Engineering Evaluation/Cost Analysis Report Revision 2

Mac and Black Jack Mines

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Homestake Mining Company of California

with:
Stantec Consulting Services Inc.

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Executive Summary

Stantec Consulting Services Inc. (Stantec) prepared this Final Engineering Evaluation/Cost Analysis (Final EE/CA) Report on behalf of Homestake Mining Company of California (HMC) for the Mac and Black Jack mine sites (the Sites) located in the Smith Lake Chapter and Mariano Lake Chapter of the Navajo Nation. The Sites include Mac No. 1, Mac No. 2, Black Jack No. 1, and Black Jack No. 2.

Stantec prepared this Final EE/CA in accordance with the United State Environmental Protection Agency (USEPA) approved EE/CA Work Plan (Stantec, 2019b) with the following exceptions:

- The cost estimates for the Regional Repositories, Alternatives 4a, 4b, and 4c (numbered as 5, 6, and 4, respectively, in the Work Plan), include volumes from only the four HMC Mines, totaling approximately 710,000 cubic yards (CY) of mining-related material (MRM). However, the repository designs presented in the figures for these alternatives show that the repositories can accommodate MRM volumes up to 1,049,000 CY to potentially include MRM from other mining parties.
- Alternatives 3ai and 3bi to segregate waste based on concentrations of radium-226 in the MRM were eliminated, as directed by the USEPA in an email to HMC on February 18, 2020, and in the Final Joint Agency Comments (Comment #43).
- The proposed outline from the Work Plan was revised slightly. The Risk Evaluation is included as Section 2.4 instead of 3.0 and the Statutory Limits section was removed.

The Final EE/CA is aimed at developing a response action for the Sites and evaluates response action alternatives for the Sites based on effectiveness, implementability, and cost. In accordance with USEPA direction, the response alternative recommendation is presented in this Final EE/CA. This Final EE/CA for the Sites identifies response action objectives (RAOs), describes six response action alternatives, and assesses the effectiveness, implementability, and cost of each alternative. The Final EE/CA considers the nature of the contamination, potential risks to human health and the environment, and how the alternatives fit into hypothetical future land use.

MRM is defined for this report as mining-related/disturbed local geologic materials (soil and rock) and remnant mine structures and related debris (e.g., concrete, metal, and wood). MRM may have elevated uranium decay series radionuclides levels relative to that occurring naturally in undisturbed local background soil or bedrock, at, or near, the ground surface; and potentially elevated levels of stable elements (e.g., metals) associated with uranium ore and/or former mining operations. The primary Contaminant of Concern (COC) and Contaminant of Ecological Concern (COEC) at the Sites is radium-226. Additional metals frequently associated with uranium mining activities (including arsenic, molybdenum, selenium, uranium, and vanadium) were also evaluated as Contaminants of Potential Concern (COPCs) and Contaminants of Potential Ecological Concern (COPECs) at the Sites. Based on risks to a hypothetical future resident calculated in the human health risk assessment, COCs identified for each site are as follows:



- Mac No. 1 – arsenic, radium-226, uranium, and vanadium
- Mac No.2 – arsenic, radium-226, and uranium
- Black Jack No.1 – arsenic, radium-226, and uranium
- Black Jack No. 2 – arsenic, radium-226, uranium, and vanadium

Based on the outcome of the ecological risk assessment, COECs identified for each site are as follows:

- Mac No. 1 – radium-226, selenium, uranium, and vanadium
- Mac No.2 – radium-226
- Black Jack No.1 – radium-226 and selenium
- Black Jack No. 2 – radium-226, selenium, uranium, and vanadium

Stantec conducted a Supplemental Site Characterization in 2019 and 25 boreholes were drilled at the Sites for further characterization. Radium-226 and uranium concentrations in some of the soil and sediment samples exceeded the background levels identified during the removal site evaluation (RSE) process. Based on the Supplemental Site Characterization, the lateral and vertical extents of MRM at the Sites were further evaluated to refine the volume calculation for total MRM. This Final EE/CA includes refined volumes that total approximately 710,000 CY of impacted soils, waste rock, and ore and approximately 770 CY of concrete, metal, and wood debris for the Sites.

Stantec performed a streamlined risk evaluation to evaluate potential impacts to human health and the environment associated with exposure to COPCs/COPECs in surface soil at the Sites. The streamlined risk evaluation for the Sites includes a screening level human health risk assessment (HHRA) for both current and hypothetical future receptors, and a screening level ecological risk assessment (SLERA) and a refined ecological risk assessment (ERA) in the form of a Step 3A analysis for ecological indicator receptors. Based on the outcome of the risk assessment COCs and COECs are identified as listed above.

The goal of the response action is to investigate and mitigate actual or threatened releases of hazardous substances from HMC's mining activities and associated MRM and identify and implement a cleanup response action that is protective in the long-term. To abate risks attributable to MRM, the RAOs for this Final EE/CA are:

1. Prevent exposure to soil with contaminants from past mining activities that would pose an unacceptable risk to human health with the reasonably anticipated future land use
2. Prevent exposure to soil with contaminants from past mining activities that would pose an unacceptable risk to plants, animals, and other ecological receptors
3. Prevent offsite migration of contaminants in soil from past mining activities to surface water, groundwater, or air that pose an unacceptable risk to human health

4. The RAOs were used to develop alternatives to be considered as potential response actions for the Sites totaling 710,000 CY of MRM. The following alternatives were developed based on the RAOs:
5. No Action
6. Consolidate and cover in-place at each of the four Sites
7. Consolidate four Sites at one repository site:
    a. Repository location at Mac No. 1 site
    b. Repository location at Black Jack No. 1 site
8. Regional repositories:
    a. Regional repository at Mac No. 1
    b. Regional repository at Black Jack No. 1
    c. Two regional repositories: one at Mac No. 1 and another at Black Jack No. 1
9. Excavation and Off-Navajo disposal within 100 miles
10. Excavation and Off-Navajo disposal at an existing licensed disposal facility

Stantec conducted a comparative analysis to evaluate each alternative based on the effectiveness, implementability, and cost. A public comment period is required upon submittal of the Final EE/CA and will last at least 30 days. The USEPA will respond to significant comments from the public comment period, then will issue an Action Memorandum with the selected alternative following the response to comments. The recommended action is provided in this Final EE/CA Report (Section 6).

Abbreviations

AKA	Alan Kuhn and Associates
AOC	Administrative Settlement Agreement and Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
Bgs	below ground surface
BIA	Bureau of Indian Affairs
BMP	best management practice
BTV	background threshold value
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
COEC	contaminant of ecological concern
COPC	contaminant of potential concern
COPEC	contaminant of potential ecological concern
Cpm	counts per minute
CY	cubic yard(s)
EE/CA	Engineering Evaluation/Cost Analysis
ERA	ecological risk assessment
ERBSL	ecological risk-based screening levels
ERG	Environmental Restoration Group
ET	evapotranspiration
ft bgs	feet below ground surface
GWCL	Ground Water Compliance Limit
HASP	health and safety plan
HDPE	high-density polyethylene
HHRA	human health risk assessment
HMC	Homestake Mining Company of California
HQ	hazard quotient
MCL	maximum contaminant level
mg/L	milligram per liter
MRM	mining-related materials
NAUM	Navajo Abandoned Uranium Mines
NCP	National Contingency Plan
NNEPA	Navajo Nation Environmental Protection Agency

NNHP	Navajo Nation Historic Preservation Department
NOAEL	no observed adverse effects level
OSR	Off-Site Rule
pCi/g	picocuries per gram
PET	potential evapotranspiration
POC	Point of Compliance
PRG	preliminary remediation goal
PTW	Principal Threat Waste
PRSC	post-removal site control
QC/QA	quality control/quality assurance
RAG	Response Action Goal
RAO	Response Action Objective
RCRA	Resource Conservation and Recovery Act
RSE	Removal Site Evaluation
SLERA	screening level ecological risk assessment
SOW	scope of work
Stantec	Stantec Consulting Services Inc.
TBC	to be considered
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
UTL	upper tolerance limit
WRCC	Western Regional Climate Center

1 Introduction

Stantec Consulting Services Inc. (Stantec) prepared this Final Engineering Evaluation/Cost Analysis (EE/CA) Report on behalf of Homestake Mining Company of California (HMC) for the Mac and Black Jack mine sites (the Sites) located in the Smith Lake Chapter and Mariano Lake Chapter of the Navajo Nation. The Sites include Mac No. 1, Mac No. 2, Black Jack No. 1, and Black Jack No. 2.

As provided in the Administrative Settlement Agreement and Order on Consent (AOC), CERCLA Docket No. 2014-06, for Interim Removal Action between HMC and the U.S. Environmental Protection Agency (USEPA) Region 9 USEPA directed HMC to prepare an EE/CA at the Sites (USEPA, 2014).

Stantec prepared this EE/CA in accordance with the EE/CA Work Plan (Stantec, 2019b) with the following exceptions:

- The cost estimates for the Regional Repositories, Alternatives 4a, 4b, and 4c (numbered as 5, 6, and 4, respectively, in the Work Plan), include volumes from only the four HMC Mines, totaling approximately 710,000 cubic yards (CY) of mining-related material[1] (MRM). However, the repository designs presented in the figures for these alternatives show that the repositories can accommodate MRM volumes up to 1,049,000 CY to potentially include MRM from other mining parties.
- Alternatives 3ai and 3bi to segregate waste based on concentrations of radium-226 in the MRM were eliminated, as directed by the USEPA in an email to HMC on February 18, 2020, and in the Final Joint Agency Comments (Comment #43).
- The proposed outline from the Work Plan was revised slightly. The risk evaluation is included as Section 2.4 instead of 3.0 and the Statutory Limits section was removed.

The Draft EE/CA was submitted to the USEPA on September 6, 2019. HMC received comments from the USEPA on June 28, 2021 and provided responses to the comments on September 27, 2021. The USEPA provided responses to the majority of HMC's comments on February 4, 2022, with final comments on limited topics (risk assessment calculator, Applicable or Relevant and Appropriate Requirements (ARARs), and Principal Threat Waste (PTW)) received August 19, 2022. The Draft EE/CA was updated to incorporate the USEPA comments and resubmitted on November 4, 2022. HMC received comments from the USEPA on April 4, 2023, and provided responses to the comments on May 26, 2023. HMC received an additional set of comments and directives from USEPA on June 21, 2023. This updated Final EE/CA incorporates the April and June 2023 USEPA comments and directives. The Final EE/CA is aimed at developing a response action for the site and evaluates response alternatives for the Sites based on effectiveness, implementability, and cost. The Final EE/CA for the Sites identifies Response Action Objectives (RAOs), describes six response action alternatives, and assesses the effectiveness, implementability, and cost of each alternative. The Final EE/CA considers the nature of the contamination, potential risks to human health and the environment, and how the alternatives fit into

[1] MRM is defined for this report as mining-related/disturbed local geologic materials (soil and rock) and remnant mine structures and related debris (e.g., concrete, metal, and wood).



hypothetical future land use as directed by USEPA in coordination with the Navajo Nation Environmental Protection Agency (NNEPA). This report consists of the following sections:

Executive Summary – Summarizes the Final EE/CA Report.

Section 1.0 Introduction – Describes the objective of the report.

Section 2.0 Site Characterization – Provides background and site information, describes the removal site evaluation, and source, nature, and extent of contamination. Section 2 also summarizes the human health risk evaluation and ecological risk evaluation.

Section 3.0 Identification of Response Action Objectives – Describes the proposed response action objectives, determination of response scope and schedule, and an evaluation of potential ARARs.

Section 4.0 Identification and Analysis of Response Action Alternatives – Discusses the response action alternatives and the effectiveness, implementability, and cost of each alternative.

Section 5.0 Comparative Analysis of Response Action Alternatives – Presents a comparative analysis of the response action alternatives discussed in Section 4.0.

Section 6.0 Recommended Response Action Alternative – Per USEPA direction, a response action alternative has been recommended in this Final EE/CA.

Section 7.0 References – Lists references cited throughout the report.



2 Site Characterization

2.1 Site Description and Background

The Sites include four legacy underground uranium mine sites: Mac No. 1 and No. 2 and Black Jack No. 1 and No. 2. The mines were formerly operated by Sabre-Pinon Corp, then the United Nuclear-Homestake Mining Co. Partnership, of which the Homestake Mining Company of California's predecessor (Homestake Mining Company) was a partner. The Sites were identified by USEPA as part of the *Health and Environmental Impacts of Uranium Contamination in the Navajo Nation Five-Year Plan* ("Five-Year Plan;" USEPA, 2008) indicating that mine materials from these sites may have elevated levels of radium-226. Radium-226 is considered a hazardous substance under CERCLA and may need to be addressed to protect the public health and the environment. The site locations are shown on Figure 1. The Sites are located within about a 5.5-mile radius and are approximately 8 miles north of Interstate 40, west of Smith Lake, New Mexico. The Sites are on allotments with Mac No. 1 within the Mariano Lake Chapter of the Navajo Nation, and Mac No. 2, Black Jack No. 1, and Black Jack No. 2 within in the Smith Lake Chapter of the Navajo Nation.

2.1.1 SITE LOCATION AND STATUS

Site descriptions are provided in the *AOC* (USEPA, 2014) and summarized in Table 2-1. Initial hazard mitigation activities at the Sites (such as backfilling vents and shafts) occurred following mine closure. iiná bá completed more recent hazard mitigation activities, and the Navajo Abandoned Mine Lands Reclamation Department personnel confirmed that the department did not complete any reclamation activities at the Sites.

Per the *AOC*, iiná bá addressed open holes related to the Sites and exploratory holes within the Sites as part of the *Removal Site Evaluation (RSE) Phase 2 Physical Hazards Assessment* (iiná bá, 2017) and provided the results in the *RSE Phase 2 Physical Hazards Mitigation Report* (iiná bá, 2018). The following subsections summarize information from the *RSE Phase 2 Physical Hazards Mitigation Report* (iiná bá, 2018), describing the locations and reclamation activities for each site.

2.1.1.1 Mac No. 1

The Mac No. 1 mine area is a closed underground uranium mine in Section 12, Township 15 North, Range 14 West, about 7 miles west of Smith Lake on allotment land (allotee parcels 1183 and 1191). The mine workings consisted of a 515-foot vertical shaft with two levels. The mine was operated from 1968 through 1979 and uranium deliveries from ore stockpiles at the mine continued until 1979 or 1980. The mine produced approximately 400,000 pounds of uranium concentrate. The shaft was backfilled and covered with a concrete slab. Hazard mitigation activities performed by iiná bá in November and December 2017 included:



- Filled/covered/capped a partially buried mine shaft and an exposed septic tank
- Cut metal edges on two concrete slabs
- Locked two buildings and added hazard warning signage

2.1.1.2 Mac No. 2

The Mac No. 2 mine area is a closed underground uranium mine in Section 18, Township 15 North, Range 13 West, about 6 miles west of Smith Lake on allotment land (allotee parcels 1179, 1182, 1868, and 1870). The mine workings consisted of a 288-foot vertical shaft with multiple drifts. Historical documentation (Holmquist, 1970) indicated that the ore was in the Poison Canyon sandstone and, for the most part, the formation was dry. The mine was operated from 1968 through 1970 and the mine produced 31,194 tons of ore yielding 109,009 pounds of uranium concentrate. The mine was closed in 1970, and the shaft was backfilled and concreted over. Hazard mitigation activities performed by iiná bá in November and December 2017 included:

- Filled and plugged two open holes and one vent shaft-borehole
- Cut metal edges flush with surfaces on one mine waste pile and two concrete slabs

2.1.1.3 Black Jack No. 1

The Black Jack No. 1 mine area is a closed underground uranium mine in Section 12, Township 15 North, Range 13 West, approximately 2 miles northwest of Smith Lake on allotment land (allotee parcels 1043, 1044, 1045, and 1046). The mine workings consisted of an 825-foot, three-compartment shaft with multiple drifts; the workings are situated above the local groundwater table and the mine was dry (Holmquist, 1970). The mine was operated from 1959 through June 30, 1967, and uranium deliveries from the mine continued until 1971. The mine produced approximately 1.44 million tons of ore yielding approximately 6,447,000 pounds of uranium concentrate. The vent holes and mine shaft were sealed with welded-in-place, half-inch steel plates in July 1967. Hazard mitigation activities performed by iiná bá in November and December 2017 included:

- Cut sharp metal edges flush with surfaces at one ore pad/slab, six concrete slabs, one vent shaft, and one utility raise
- Filled and covered the north vent shaft with surficial soils from the mine site
- Plugged two utility raises
- Removed metal from the ground at one utility raise

2.1.1.4 Black Jack No. 2

Black Jack No. 2 mine area is a closed underground uranium mine in Section 18, Township 15 North, Range 13 West, about 6 miles west of Smith Lake on allotment land (allotee parcels 1179, 1180, 1181, and 1182). The mine workings consisted of a 330-foot vertical shaft with drifts. The mine was operated from 1960 through 1964 and uranium deliveries from ore stockpiles at the mine continued until 1970. The mine produced 247,613 tons of ore yielding 1,129,004 pounds of uranium concentrate. In 1964, the shaft pillars were extracted, the shaft was backfilled, the mine's vent holes and shaft were sealed with half-inch steel plates, and the mine shaft was covered with a concrete slab. Hazard mitigation activities performed by iiná bá in November and December 2017 included:

- Filled and covered one mine shaft with flowable fill material mixture from Michele's Ready Mix (concrete) of Gallup, New Mexico
- Cut metal edges from two utility raises
- Plugged two utility raises
- Removed an exposed metal liner from a diversion channel

2.1.2 SITE STRUCTURES AND TOPOGRAPHY

Site features are detailed in the *RSE Phase 1 Summary Report - Part 2 Geomorphic Characterization and Assessment* (AKA, 2017), the *RSE Phase 2 Physical Hazards Assessment Report* (iiná bá, 2017), and the *RSE Phase 2 Physical Hazards Mitigation Report* (iiná bá, 2018). Limited site features are shown on Figures 2 through 5. There are no perennial surface water resources within the Sites.

2.1.2.1 Mac No. 1

Mine Features: Two buildings are present on the Mac No. 1 site, a hoist house and a service building. There is one buried mine shaft, one vent raise, and five concrete slabs on the site. Based on review of historical records, shaft backfill material potentially consists of MRM (including possibly waste rock). One ore pile and one waste pile are present.

Other Site Features: The Phase 3 RSE Report indicated that a windmill-operated well was installed at the Mac No.1 site (ERG, 2018). The records indicated that the well extended to 1,376 ft below ground surface (ft bgs) with a static water level of 450 ft bgs. The reported depth to groundwater (450 ft bgs) was based on the records that were provided by the Navajo Nation Water Code Administration. This well was also included on an online database showing Navajo Nation wells (Heard, 2019) and is consistent with ERG (2018). Representatives from iiná bá, Inc. attempted to measure the depth to groundwater at the well using an electronic water level indicator during the earlier Phase 2 RSE (iiná bá, 2018). Only 185 ft of the water level indicator was able to be lowered down the well casing until a hard, fixed object was encountered. No groundwater was encountered between the ground surface and the obstruction.



Topography: Mac No. 1 is on a topographic saddle along a synclinal axis between a south/southwest and a north/northeast slope. Overland flow during storm events runs down the slopes toward the mine and then either west/northwest toward a shallow valley or east/southeast through a steep draw. Constructed stormwater diversion ditches were excavated north and west of the mine to intercept runoff from the north slope and direct it to natural arroyos west of the mine site. Most runoff flows westward off the mine site.

2.1.2.2 Mac No. 2

Mine Features: No buildings exist on the Mac No. 2 mine site. There are no open mine features on the site; the mine shaft and the vent shaft are both buried. Based on review of historical records by HMC, shaft and vent backfill material potentially consists of MRM (including possibly waste rock). There are five waste piles and five concrete slabs on the ground surface. One waste pile is fenced due to the presence of sharp metal mining debris.

Topography: Bedrock at Mac No. 2 dips north/northeast at approximately 4 degrees or 7 percent and ground surface has a slightly flatter 3.5 to 4 percent grade. Mine waste piles form the only features that rise above the dipslope. Shallow stormwater drainage channels exist on the mine site surface with the channel depth limited by the shallow depth to bedrock (approximately 2 ft bgs).

2.1.2.3 Black Jack No. 1

Mine Features: No buildings exist on the Black Jack No. 1 mine site. There are 12 concrete slabs on site including slabs for an ore pad, windmill, and hoist house. A second ore pad (without concrete) and a waste rock pile are present. A former powder magazine is located approximately 0.3 miles northwest of Black Jack No. 1, along an access road. There are debris piles consisting of tires and other materials on the site and a debris dam was used to divert stormwater. There are no open mine features on the site and there is one buried mine shaft and two closed vent shafts. Based on review of historical records by HMC, shaft backfill material potentially consists of MRM (including possibly waste rock). There are three utility raises on the site.

Other Site Features: There is a livestock corral on-site (shown on Figures 4 and 8) and a fence runs east-west through the site. Overhead electric powerlines run through the project site.

Two wells were previously drilled specifically for the Black Jack No. 1 site and were summarized in Table 1 of the *Geology and Groundwater Occurrence in Southeastern McKinley County, New Mexico* (Cooper and John, 1968). The wells were drilled to depths of 1,012 and 1,100 ft bgs with static water levels of 800 ft bgs. Both wells were reportedly set in the Bluff Sandstone of the Morrison Formation. These wells are also included in an online database showing Navajo Nation wells (Heard, 2019) and the details are consistent with the Cooper and John (1968) reference.

Only one well was identified at the site by ERG. During Phase 2 of the RSE, iiná bá, Inc. attempted to measure the depth to groundwater at the remaining site well using an electronic water level indicator (iiná bá, 2018). The electronic water level indicator was lowered 580 ft down the well casing until a hard, fixed



object was encountered. No groundwater was encountered between the ground surface and the obstruction.

Topography: Surficial soils overlie bedrock at the site, and bedrock dips north/northeast at 2 to 3 degrees or 4 to 5 percent. One main arroyo runs from northwest of the site to the northeast corner of the site and continues east where two tributary arroyos extend west to the eastern edge of the permit/claim boundary. The main arroyo and the tributaries are entrenched through 2 to 8 ft of alluvium.

2.1.2.4 Black Jack No. 2

Mine Features: One building is present at Black Jack No. 2, a hoist house. There are no open mine features on the site; the mine shaft was covered with a concrete slab and backfilled, and there are two closed vent shafts. Based on review of historical records by HMC, shaft and vent backfill material potentially consists of MRM (including possibly waste rock). There are three concrete slabs, and three utility raises on site. A powder magazine is approximately 0.1 miles north of the Black Jack No. 2 permit/claim boundary.

Other Site Features: Powerlines run through the project site.

The Phase 3 RSE Report indicated that the Black Jack No. 2 site had a well inside a hoist house, but no water level data were available (ERG, 2018). Similar to the other known wells, iiná bá, Inc attempted to investigate this well during Phase 2 RSE (iiná bá, 2018) and determined that this feature extended horizontally at a shallow depth towards the outside of the hoist house. Although iiná bá, Inc referred to this feature as a well, it is unknown if this was a well.

Data for one well in the Black Jack No. 2 area was available in an online database showing Navajo Nation wells (Heard, 2019). Based on the information contained within the database, the well was completed at 350 ft bgs and the static groundwater was 210 ft bgs. The data indicated that the Westwater Canyon Member of the Morrison Formation supplied groundwater to the well. It is unknown if this well and the feature observed inside the hoist house are the same.

Topography: Bedrock at Black Jack No. 2 dips north/northeast at approximately 2 degrees and the ground surface generally slopes northeast at 2 to 2.5 percent. The mine site is flat and virtually devoid of landforms. There are no well-defined ephemeral or intermittent drainages occurring within the project site. The site receives stormwater drainage from higher elevations located south of the site. The drainage was diverted for 0.25 miles and runs on the east side of the hoist house. Surface runoff drains northeast.



2.1.3 REGIONAL AND SITE GEOLOGY

The Colorado Plateau is characterized by large regions of folding with broad uplifts and intervening basins. Structural deformation of the plateau consisted of development of a series of uplifts and downwarps and later large-scale, northwest trending folds with associated small-scale folding and faulting. The Sites are at the juncture of several of these major fold structures: the San Juan Basin, the Zuni Uplift, and the Defiance Uplift (NM Bureau of Geology and Mineral Resources, 2016 and USGS, 1987). Native soils within the area of the Sites generally consist of sands, sands with silt, clayey sands, and clays (SP, SP-SM, SC, CL per Unified Soil Classification System [USCS]).

The general geologic settings of the surface and shallow subsurface at the Sites are in the lower part of the Mancos Formation and the upper part of the Dakota Formation, which intertongue along the ESE-WNW trending Smith Lake Syncline and the Mariano Lake Anticline. Black Jack No. 1 is located over the thickest amount of Mancos Shale, and the other three mine sites are in the zone where the lower Mancos and upper Dakota intertongue to create interbedded, relatively thin layers of shale and sandstone/siltstone at the ground surface and the shallow subsurface. At Black Jack No. 2, these interbeds have been eroded to at least 10 ft depth and replaced by alluvial soils derived from the mesas to the south. As a result of these geologic conditions (ERG, 2018):

- Mac No. 1 sits on the axis of the Smith Lake Syncline where shallow sandstone controls the ground surface and is exposed in windows in the thin soil cover
- Mac No. 2 is on the south limb of the Smith Lake Syncline where the ground surface exposes a succession of thin sandstone layers alternating with thin shale down the north-facing slope
- Black Jack No. 1 has shallow windblown and colluvial/alluvial deposits overlying continuous Mancos shale across the entire Site
- Black Jack No. 2 has colluvial/alluvial soil to at least 10 ft depth over the erosion surface of Mancos/Dakota bedrock

Uranium mining at the Black Jack No. 1 mine targeted the ore body in the Westwater Canyon Member of the Morrison Formation, the top of the ore body was approximately 600 ft bgs (MacRae, 1963). The ore bodies at the Black Jack No. 2, Mac No. 1, and Mac No. 2 sites were in the Brushy Basin Member of the Morrison Formation (Hoskins, 1963) and mining was targeted at approximately 280 ft, 400 ft, and 200-300 ft bgs, respectively, for those mines (ERG, 2018). ERG evaluated a depositional basin near the Mac No. 2 and Black Jack No. 2 sites where the radiological signature of the basin was naturally greater than the area background; this information is detailed in a memorandum provided in response to NNEPA comments on the report and as shown on Figure 9 of the Phase 3 RSE Report (ERG, 2017a, 2018). ERG also identified an upslope and undisturbed sandstone outcrop in the area of the depositional basin where the bedrock has significantly elevated gamma emissions (greater than 40 microRoentgens per hour) on contact; this is indicative of natural uranium mineralization and elevated levels of naturally occurring radionuclides at the ground surface (ERG, 2017a). The presence of undisturbed geologic outcrops with elevated radiological signatures signifies naturally occurring contaminants of potential concern (COPCs) are present in the area at concentrations greater than area background levels.

2.1.4 CLIMATE SUMMARY

The Sites are situated in an arid to semi-arid climate and are subject to erosion due to high-intensity precipitation events and significant wind. The climate for the region is summarized using measurements taken at the Gallup Municipal Airport and reported by the Western Regional Climate Center (WRCC, 2016). Average annual temperatures range from 31 degrees Fahrenheit (31°F) (-1° Celsius, C) to 66°F (19°C). Maximum temperatures range from 42°F in December/January to 85°F in July. Minimum temperatures range from 17°F in January to 56°F in July. Extreme daily temperatures can reach as high as 95°F and as low as -20°F. Average annual daily wind speed is 7.0 mph with an average maximum 2-minute wind speed of 22 mph and an average peak gust of 27.3 mph. Average precipitation at the Gallup airport is about 11 inches per year (28 cm) per the Western Regional Climate Center (WRCC, 2016). Net pan evaporation rates obtained at the Gallup Ranger Station between 1966 and 1975 show an average annual evaporation of approximately 62.5 inches per year, which exceeds net precipitation by approximately six times (WRCC, 2016). The potential evapotranspiration (PET) is typically highest during July and August.

2.1.5 HYDROLOGIC SUMMARY

2.1.5.1 Surface Water

The Sites are along the border of two watersheds with Mac No. 1 and No. 2 and Black Jack No. 2 in the Upper Puerco basin and Black Jack No. 1 in the Rio San Jose basin according to the 2007 AUM Atlas (USEPA, 2007). The *Phase 1 Summary Report, Part 2: Geomorphic Characterization and Assessment* (AKA, 2017) assesses and details the specific watershed for each site with some information summarized below.

The Mac No. 1 site is in a topographic saddle (Figure 6). Overland flow during storm events runs down nearby slopes toward the mine, then either west/northwest to a north-draining canyon 2000 ft west of the site or east/southeast through a steep draw that heads on the east side of the mine site and discharges to another north-draining canyon east of the mine (AKA, 2017). Constructed stormwater diversion ditches were excavated north and west of the mine surface facilities, to intercept runoff from the north slope and direct it to natural arroyos west of the mine site. Bedrock is shallow at the mine site.

The Mac No. 2 watershed is 30.2 acres. The Mine site is near the middle of the watershed and the low point is north of the site (Figure 7). Shallow overland flow channels are present on the Mac No. 2 site that may be active during intermittent runoff events, channel depth is limited to the depth of soil, generally less than two ft, which overlies the erosion resistant sandstone (AKA, 2017).

The Black Jack No. 1 watershed has one main arroyo that begins on the mesa slope and runs east, then southeast from the north side to the east side of the mine site (Figure 8). Two tributary arroyos extend eastward toward the main arroyo within the site. The main arroyo and the tributaries are entrenched through 2 to 8 ft of alluvium into the Mancos Formation shale and are headcutting (AKA, 2017). Stormwater controls (such as excavation of channels) and any arroyo modification to address headcutting will be addressed in the remedy design phase.

AKA (2017) describes the Black Jack No. 2 site as being at the toe of a watershed and the area of the site as consisting of a broad and shallow swale that includes the west half of the site. The swale drains the mesa slope west of the primary watercourse canyon and a small canyon within the mesa. The primary ephemeral drainage is in a canyon south (and upgradient) of the site and ends in an ephemeral stock pond 0.3 miles upstream (south) of the site. Outflow from the stock pond occurs in a drainage ditch that is diverted along the east side of the mine permit/claim boundary (Figure 9). Prior to diversion, stormwater flowed across the center part of the site.

2.1.5.2 Groundwater

Groundwater is not accessible in wells at the Sites. Water wells present at the Sites are either abandoned or obstructed above the groundwater level. Specific information on wells present at the Sites is included in Section 2.1.2.

According to the USGS National Water Information System online mapping website (2020), a well located 1.8 miles east/southeast of the Mac No. 2 site has been used to measure groundwater elevations since 1963 (USGS 353125108124001). The well ID is 16T-519, it extends to 1,275 ft bgs, and the well is also listed in the Heard online database (Heard, 2019). The records indicated that the depth to groundwater measured in this well ranged from approximately 480 to 550 ft bgs between 1963 and 2019. The well was sampled as part of a sampling event conducted by the USEPA in 2009, and results of that sampling event are summarized in the report of *Navajo Nation Unregulated Water Source Sampling Results October 2009 Sampling Event* (USEPA, 2010a). The report only summarized exceedances of maximum contaminant levels (MCLs) and the following exceedances were measured in the sample from 16T-519: uranium concentration of 0.034 milligrams per liter (mg/L), exceeding the drinking water MCL of 0.030 mg/L and arsenic concentration of 0.032 mg/L, compared to MCL of 0.010 mg/L. Other data for the well are not provided in the report, but the document indicates that samples were analyzed for nitrate, nitrite, non-regulated water chemistry parameters (not defined), metals (not defined but other wells show exceedances of lead and selenium MCLs), radium-226, radium-228, gross alpha, and beta particles.

2.1.6 LAND USE

The Sites are on allotment land, with the Navajo Nation owning approximately 40 percent of the allotments.

Historical use of the Mac No. 1 site includes habitation, and livestock handling (Dinétahdóó, 2016a). HMC has no documented occurrence of the historical uses today. The closest nearby residential structures to the site are 0.4 miles (straight-line) from the site permit/claim boundary.

The cultural resources inventory identified that historical pre-mining use of the area of the Mac No. 2 site includes habitation (Dinétahdóó, 2016a). HMC has no documented occurrence of the historical uses today. The closest nearby residential structures to the site are 0.5 miles (straight-line) southeast and across a topographic divide from the site permit/claim boundary, though the areas are directly connected by a maintained road.



Corrals are present at the Black Jack No. 1 site, and it is unknown if they are currently in use. Review of the area during cultural resources surveys identified that the area was used for storing or transporting water or supplies (Dinétahdóó, 2016b). The closest nearby residential structures to the site are 0.5 miles (straight-line) south of the site permit/claim boundary.

The closest nearby residential structures are 0.3 miles west of the Black Jack No. 2 site permit/claim boundary. Based on cultural survey of the area (Dinétahdóó, 2014), historical pre-mining use of the site area included habitation. HMC has no documented occurrence of the historical uses today.

Based on the review of aerial imagery (Google Earth, 2022), residential structures near the Sites appear to generally be in-use with maintained roads and livestock corrals present near the structures.

As directed by USEPA, and as further described in the risk assessment included in Appendix C, this Final EE/CA assumes the following hypothetical future land uses for the Sites based on the Navajo Abandoned Uranium Mines (NAUM) Calculation Tool (USEPA, 2022):

- Kee'da'whíí téél – Full-Time Navajo Residential Use: This resident lives full-time at the site. Exposure pathways include external exposure to radiation, incidental ingestion of soil, dermal exposure to soil (metals only), inhalation of soil (or dust), ingestion of homegrown produce and gathered wild plants, and ingestion of animal products from raised animals (meat, milk, eggs) and hunted animals (meat), as well as plant exposures from Diné Lifeways practices including medicinal and ceremonial exposures. This resident engages in intensive subsistence lifestyle activities, including an assumed outdoor exposure time of 12 hours per day, for a 75-year exposure duration.
- Kǫǫh bí łíí nakaí – Sheep Camp Use: Navajo sheep camp workers live on-site seasonally to graze their livestock. Exposure pathways include external exposure to radiation, incidental ingestion of soil, dermal exposure to soil (metals only), inhalation of soil (or dust), ingestion of a limited number of homegrown produce and gathered wild plants, and ingestion of raised animal products and hunted animals, as well as plant exposures from Diné Lifeways practices including medicinal and ceremonial exposures. The sheep Camp user works outside 12 hours per day, 150 days per year, for a 75-year exposure duration.
- Kǫǫ eí nahaazáh – Easy Access Open Space Use: Areas that are easily accessible. Assumed to be on-site 60 days per year for 2 hours per visit. Exposure pathways include external exposure to radiation, incidental ingestion of soil, dermal exposure to soil (metals only), inhalation of soil (or dust), ingestion of gathered wild plants, meat from raised and hunted animals, as well as plant exposures from Diné Lifeways practices including medicinal and ceremonial exposures.
- Chíí dah wiih łeezh – Washes and Drainages: People that frequently utilize accessible washes and drainages. Assumed to be on-site 150 days per year for 12 hours per day. Includes external exposure to radiation, incidental ingestion of soil, dermal exposure to soil (metals only), inhalation of soil (or dust), ingestion of a limited number of homegrown produce and gathered wild plants, and raised animal products and hunted animals, as well as plant exposures from Diné Lifeways practices including medicinal and ceremonial exposures.

Natural background occurrences of contaminants of concern (COCs) and contaminants of ecological concern (COECs) at the Sites significantly exceed human health risk-based screening levels (see Appendix C) for multiple metals and radium-226 for the full-time Navajo residential use and the sheep camp use scenario (as defined by USEPA and NNEPA in the NAUM calculation tool) and present a risk to human health that is greater than the National Contingency Plan's acceptable risk range. The sites will be cleaned up to the maximum extent allowable under CERCLA, which will return the land to the level of risk it had prior to mining.

2.1.7 CULTURAL RESOURCES

Dinétahdóó Cultural Resource Management performed cultural resource inventory surveys and obtained approval prior to disturbance and characterization sampling at the Sites. Cultural resource survey reports were submitted to the Navajo Nation Historic Preservation Department's Cultural Resources Compliance Program for compliance review as part of the Navajo Nation cultural resources clearance process. Cultural resource survey boundaries are shown on Figures 6 through 15. No traditional cultural properties were identified within one mile of the Sites. Archaeological sites and isolated occurrences of cultural artifacts were identified at the Sites during the surveys. Identified cultural resources were flagged and avoided during sampling and ground disturbance activities.

Following the selection of an alternative, the cultural resource surveys will be extended to address the lateral extent of site disturbance for the response action, and cultural resources will be managed in accordance with ARARs.

2.1.8 NATURAL RESOURCES

Dodge Environmental performed biological resource inventory surveys and approval prior to disturbance and characterization sampling (Dodge Environmental, 2017a and 2017b). Boundaries for the biological resource inventory surveys are shown on Figures 6 through 15. A request for information on biological resources specific to the Sites ("Data Request") was submitted to the Navajo Nation Historic Preservation Department (NNHP) (ERG, 2017b). United States Fish and Wildlife Service and Navajo Nation Department of Fish and Wildlife were consulted on species of concern. United States Fish and Wildlife Service federally listed species and NNHP species of concern were not present at the Sites and/or the Sites did not contain suitable habitat for the species. Three NNHP species of concern were found to have the potential to occur within the project areas (they were not observed in the project areas): golden eagle and peregrine falcon may fly through the project sites on foraging trips and Townsend's big-eared bats may roost in marginal habitat in mining buildings.



2.2 Removal Site Evaluation

The RSE for the Sites was completed per the AOC, and it included the following items to evaluate the extent of MRM:

- Phase 1: Gamma surveys, geomorphologic surveys, and background study
- Phase 2: Mitigation of physical mine hazards, caution signage
- Phase 3: Site characterization and soil sampling

Phase 1 field work was completed in early May 2017, and the *Phase 1 Summary Report* (Environmental Restoration Group [ERG] and Alan Kuhn and Associates [AKA], 2017) required by Section 6.9 of the scope of work (*SOW)* was approved by USEPA on September 12, 2017. The *Phase 2 Report for Site Hazards Assessment* (*iiná bá*, 2018) was accepted by USEPA and NNEPA on July 2, 2018. The *Phase 3 RSE Report* (*RSE Report*; ERG, 2018) was accepted by the USEPA on October 15, 2018.

The primary COPC at the Sites is radium-226. Additional metals frequently associated with uranium mining activities (including arsenic, molybdenum, selenium, uranium, and vanadium) were also evaluated as COPCs. Impacts from historical mining operations at the Sites are generally limited to the top six inches of soil, with deeper soil impacted at locations such as former ore stockpiles, remnant waste rock piles, mine structures or portals, or downgradient accumulation areas (ERG, 2018). Sections 2.3.2 through 2.3.5 discuss results of characterization activities and areas of impact at the Sites.

2.2.1 SUPPLEMENTAL SITE CHARACTERIZATION

Supplemental site characterization activities occurred in 2019 following completion of the RSE (Stantec, 2019c). The objectives of the Supplemental Site Characterization were to advance up to 25 additional boreholes to further evaluate uranium and radium-226 concentrations and to advance additional geotechnical boreholes to identify and quantify potential borrow source areas. Per comments from the NNEPA on the RSE Report (ERG, 2018), HMC agreed that up to 25 additional boreholes would be drilled to further evaluate uranium and radium-226 concentrations. The other COPCs (arsenic, molybdenum, selenium, and vanadium) were not analyzed during this investigation. Based on discussion with HMC, additional geotechnical boreholes were also advanced to collect subsurface soil samples to identify and quantify potential borrow source areas at the Mac No. 1 and Black No. 1.

Twenty-five COPC boreholes were drilled for the Supplemental Site Characterization. Radium-226 and uranium concentrations in some of the soil and sediment samples exceeded the background levels identified during the RSE process. Findings during the Supplemental Site Characterization regarding the lateral extent of MRM were consistent with ERG's evaluation in the RSE Report; the vertical extent varied from ERG's findings in some areas. Examples where vertical extent varied from ERG's findings during the RSE include some supplemental characterization boreholes at Black Jack No. 1 (BJ1-23 and BJ1-24) where the MRM depth was estimated to extend deeper than nearby boreholes that were drilled during the RSE. Additionally, MRM was found to extend deeper in two areas at Black Jack No. 2 (supplemental characterization boreholes BJ2-17 and BJ2-21) than was estimated during evaluating nearby areas and boreholes during the RSE.

2.3 Nature and Extent of Contamination

2.3.1 BACKGROUND AREA EVALUATION

This section describes results of the RSE and Supplemental Site Characterization activities. During the RSE, soil sampling and gamma radiation surveying were performed in two background areas to establish background values for comparison to concentrations and measurements collected at the Sites. The background areas are shown on Figure 1. Background Area 1 was identified to represent conditions at Black Jack No. 1 and Background Area 2 was identified to represent conditions at the other three mine sites. ERG identified that two separate background areas were needed to represent the Sites. They completed two sample T-testing between the two potential background areas which indicated that COPC concentrations in Background Area 1 are statistically higher than COPC concentrations at Background Area 2 (ERG and AKA, 2017). Results of soil samples collected in the background areas are included in Table 2-2.

To complete the Risk Assessment included in Section 2.4, Stantec completed a statistical evaluation of data from the background areas to identify background threshold values (BTVs). The statistical evaluation includes a statistical comparison of data from each depth and each background area, an analysis of potential outliers for each dataset, and finally calculation of a BTV for each COPC for use in determination of response action goals for the Sites. The statistical evaluation is included in Appendix A.

For the RSE, ERG converted the raw gamma data measured in the background areas to predicted exposure rate values using a cross-calibration of gamma measurements against exposure rate measurements collected with a high-pressure ionization chamber (ERG and AKA, 2017). They then calculated 95-95 upper tolerance limits (UTLs) of the exposure rates (UTLs were 14.9 and 13.7 microRoentgens per hour for Background Area 1 and Background Area 2, respectively).



2.3.2 SITE RADIATION SURVEYS

ERG completed walkover gamma radiation surveys and used the approximate gamma survey count rate equivalents for the exposure rate UTLs (approximately 18,000 counts per minute (cpm) for Background Area 1 and approximately 16,500 cpm for Background Area 2) in the field to delineate the areal extent of impacted surface soil (ERG and AKA, 2017). Figures 2 through 5 show the exposure rate data as well as the estimated lateral limits of the impacted surface areas that were identified based on correlated exposure rates that exceeded the 95-95 UTL of the exposure rates calculated for the respective background areas.

ERG developed a correlation between gamma measurements and laboratory radium-226 concentrations to allow for estimation of radium-226 concentrations based on field gamma measurements (ERG, 2018). As discussed in Section 4.4.6 of the *Phase 3 RSE Report*, ERG evaluated the uncertainty in the estimated concentrations of radium-226 in surface soil and they focused their evaluation on the critical range of interest near the investigation level, only considering sampling locations with measured radium-226 concentrations less than 4 picocuries per gram (pCi/g). The average prediction error was right-skewed and biased high with a mean of +1.8 pCi/g and a median of +1.3 pCi/g. Therefore, use of gamma-based predictions of radium-226 concentrations to estimate areas exceeding the investigation level leads to significant overestimation of the lateral extent of impacts to surface soil from past mining operations in most areas of the Sites. For this reason, predicted radium-226 concentrations were not utilized or considered to estimate the lateral extent of contamination at the Sites. This prediction error will be an important consideration during implementation of the final response action.

Near the boundaries of the delineated impacted areas on Figures 2 through 5, the assumption that materials are impacted sometimes has greater uncertainty because readings that exceed background tend to be intermittent. The approximate areal extent of the impacted areas at the Sites are as follows:

- Mac No. 1 – 42 acres
- Mac No. 2 – 22 acres
- Black Jack No. 1 – 159 acres
- Black Jack No. 2 – 65 acres

For the Mac No. 1 site, exposure rates exceeding the UTL are generally bound by measurements that were less than the UTL. One exception is the haul road west of the site where the lateral extent of the survey exceeds the UTL. This area is adjacent to, and partially within, the Mariano Lake Mine site (also called the Old Gulf Mine) boundary. The greater readings could be attributable to material falling out of haul trucks or mining activities at the Mariano Lake Mine site. Another exception is the elevated gamma measurements just west of the primary survey area. The reasons for the hot spot are unknown. Because the hot spots are near a haul road, ERG commented that spillage from ore trucks is the most likely explanation (ERG and AKA, 2017).



Exposure rates at the Mac No. 2 site exceed the UTL in some areas outside of the impacted area. As described in the Phase 1 RSE Report (ERG and AKA, 2017), these areas are hydrologically separated from those impacted areas and lie near a historical ephemeral stream channel and zone of deposition comprised of materials with radiological properties naturally characteristic of sediments accumulated in the basin.

At the Black Jack No. 1 site, the lateral extent of the impacted area generally contains the exposure rate measurements that exceed the UTL. As stated above, near the boundary there is greater uncertainty on the lateral extent of impact because readings that exceed the background UTL tend to be intermittent.

The estimated extent of the impacted area at Black Jack No. 2 contains the majority of the exposure rate measurements that exceed the UTL. The exception is an area northeast of the site that was excluded because elevated estimated exposure rates appear to be naturally characteristic of sediments accumulated within a depositional basin present in that area. Section 4.3 of the Phase 1 RSE Report details this further (ERG and AKA, 2017).

Following completion of the RSE, it was identified that a historical haul route between Mac 1 and Black Jack No. 1 was not surveyed. This haul route, and other potential areas of mining-related impacts that are later identified (if any), will be investigated during the design phase. Any contamination found exceeding the response action goals (RAGs) will be addressed during the final action.

2.3.3 SOIL SAMPLING

Surface and subsurface samples and downhole measurements of gamma radiation were collected at the boring locations at the Sites shown on Figures 2 through 9. Characterization samples collected for the RSE were analyzed for arsenic, molybdenum, radium-226, selenium, uranium, and vanadium and analytical results are listed in Table 2-3. A limited number of boreholes were advanced for confirmation of downhole gamma measurements collected in nearby boreholes, but soil samples were not collected in those boreholes (BJ2-4C, BJ2-4D, BJ2-4E, BJ2-4F, BJ2-10B, BJ2-11B, BJ2-11C and M2-20). Table 2-3 also includes the analytical results for samples collected during the Supplemental Characterization activities. Those samples were analyzed for radium-226 and uranium. Radiological depth profile data for gamma measurements collected in boreholes are included in Appendix B.

Summary statistics for soil samples are listed in Table 2-4. To calculate summary statistics, duplicate sample results were removed and results from one composite sample that overlapped smaller sample intervals (M2-19A-0036-S-01) was excluded to avoid double-counting the sample interval. The following sampling and analysis conditions increase uncertainty in the representativeness of the statistical analysis:

- Samples were collected judgmentally – a greater number of samples were collected in the boreholes where MRM was assumed to extend deeper and fewer samples were collected in areas where MRM was assumed to be limited to the shallow subsurface. Additional boreholes were advanced in areas of elevated MRM concentrations, which may have skewed results higher.
- Sample intervals varied (e.g., samples represent 0.5 ft, 3 ft, etc.).



- Two different field teams (ERG and Stantec) collected samples. Sampling techniques likely varied.
- Samples were analyzed at two different laboratories utilizing the same analytical methods and this likely introduced some variability.

Mean radium-226, uranium, and vanadium concentrations were greatest at the Mac No. 1 site, followed by Black Jack No. 2, Mac No. 2, and Black Jack No. 1, which had the lowest calculated mean values. The greatest radium-226, uranium, and vanadium concentrations were measured at Mac No. 1. Conversely, Black Jack No. 1 had the greatest mean concentrations of arsenic, molybdenum, and selenium.

The correlation scatterplot matrix provided in Figure 18 of the *Phase 3 RSE Report* (ERG, 2018) shows a positive correlation across all analytes meaning that, on average, areas with elevated levels of one analyte will have proportionately elevated levels of other analytes.

With the possible exception of uranium and molybdenum, the COPCs listed in the AOC/SOW for the Sites are particle reactive cations that are generally insoluble under oxidizing conditions and readily bind with clay minerals to persist in a solid phase with little mobility in impacted soils or sediments (ATSDR, 1990a, 1990b, 2007a 2007b, 2013; NMHED, 1980; Weston, 2019). Moreover, in arid climates like McKinley County, New Mexico, the mobility of more soluble contaminants like uranium and molybdenum is generally limited to relatively shallow depths in the soil profile due to low precipitation and high evapotranspiration rates which constrain the maximum depth of wetting fronts from infiltrating precipitation.

As concluded by USEPA for similar abandoned uranium mine sites in the Grants Mineral Belt (Weston, 2016 and 2019), migration of legacy mine-related contamination in soils or sediments due to precipitation events is characterized by transport and deposition of solid-phase radionuclides and metals/metalloids bound to soil particles. In effect, soils/sediments function as a sink for particle reactive contaminants (Whicker and Rood, 2008), and environmental migration depends largely on soil particle entrainment, transport, and deposition due to physical forces (wind, water, and gravity).

While some variability in the relative concentrations of different COPCs with depth in the soil profile is likely, in general, removal of contaminated soils based on gamma radiation associated with radium-226 is expected to result in removal of other mine-related contaminants. Although deviations from this expectation are possible, compliance with cleanup levels will be based on final status survey data, and thus, the probability that residual amounts of some COPCs in excess of remedial objectives could be “missed” by the response action process is very small.

As discussed below in Section 2.4, results of the risk assessment indicate that arsenic, radium-226, and uranium are COCs and/or COECs at all the Sites. The remaining COPCs and contaminants of potential ecological concern (COPECs) are COCs and/or COECs as follows:

- Mac No. 1: Selenium is a COEC, and vanadium is a COC/COEC
- Mac No. 2: There are no additional COCs or COECs



- Black Jack No. 1: Selenium is a COEC
- Black Jack No. 2: Selenium is a COEC, and vanadium is a COC/COEC

Response action goals for each COC/COEC were calculated for the Sites and are listed in Table 2-5. Section 2.4.3 describes the calculation and selection of the RAGs.

Vertical impacts to soil at the Sites were identified based on comparing soil sample analytical results to RAGs. Analytical results that exceed the RAGs are highlighted in Table 2-3. For most samples, at least one COC/COEC exceeds the RAG. In general, radium-226 and/or uranium concentrations exceed the RAGs where other COCs/COEC also exceed their respective RAGs.

Table 2-6 provides the estimated depth of MRM that exceeds the RAGs in each borehole. Along with the estimated limits of the impacted area, Figures 6 through 15 show areas where the MRM depth is assumed to extend to 2 ft or more bgs. MRM in areas outside of those polygons are assumed to extend to less than 2 ft bgs and generally appear to be shallower than 1-foot bgs.

For most boreholes, samples collected for the deepest interval contain COC/COEC concentrations that exceed at least one RAG (see Table 2-6). This is because ERG and Stantec based their borehole depth and sample collection on multiple lines of evidence (per the agency-approved work plans) that include downhole gamma measurements (the stabilization of those measurements), field observations, and radium-226 concentrations. This results in uncertainty in the estimated depths of MRM at the Sites. For a number of sample locations, MRM extends to bedrock. Except for the Mac No. 1 site, COC/COEC concentrations that exceeded the RAGs in the deepest sample interval in boreholes were less than two-times the RAGs in most of the boreholes (Mac No. 1 – two of 17 boreholes; Mac No. 2 – 19 of 27 boreholes; Black Jack No. 1 – 15 of 21 boreholes; and Black Jack No. 2 – 12 of 18 boreholes).

At Black Jack No. 1 and Black Jack No. 2, vertical impacts to soil in outlying portions are generally limited to the top 6 inches of the soil profile, while the deepest impacts occur in small, localized areas, such as former ore stockpiles and soils near remnant mine structures such as former shafts and vents. At Mac No. 1 and Mac No. 2, vertical impacts to soil are generally relatively shallow (within the top 2 ft), with deeper impacts occurring primarily in localized areas, such as near the former mine shaft and former ore or mine waste stockpiles. Bedrock is relatively shallow across most areas at Mac No. 1.

2.3.4 VOLUME ESTIMATE OF MINING-IMPACTED SOIL

Volume estimates of MRM at each site were estimated for the RSE by averaging the depths of MRM (based on the multiple lines of evidence listed above) in each borehole for each site and multiplying the value by the areal extent of MRM (based on the gamma survey). The areal extent is shown on Figures 6 through 15. The RSE estimated the volume of MRM among the Sites to be approximately 710,000 CY. The estimated areal and vertical extents and volumes for each site are detailed in the Phase 3 RSE Report (ERG, 2018).



Agency guidance during the comment and response process on the Draft EE/CA indicated a RAG must be established for each COC/COEC. The approximate depth of MRM that exceeds RAGs in boreholes at the Sites was estimated based on comparison of sample results to the RAGs established following the risk assessment. As described above, deeper MRM impacts at the mines are generally in centralized and high-use areas where mining operations occurred. To better constrain MRM depth the Sites were split into two groups/areas as shown on Figures 2 through 15: 1) areas where MRM was estimated to extend to 2 ft bgs or deeper; and 2) areas where MRM was estimated to extend to less than 2 ft bgs. The values used to estimate the depth of MRM at the Sites are listed in Table 2-6. The volume calculations were completed as follows:

1. The estimated average depth of MRM in boreholes within each of the areas described above was calculated. For example, at Mac No. 1, the depth of MRM in the following boreholes were averaged to estimate the average depth of MRM extending to 2 ft bgs or deeper equal to an average depth of 2.5 ft: M1-1, M1-2, M1-4, M1-7, M1-8, M1-12 through M1-19. The depth of MRM in the following boreholes were averaged to estimate the average depth of MRM extending to less than 2 ft bgs equal to an average depth of 1.2 ft: M1-3, M1-5, and M1-9 through M1-11. No analytes exceeded the RAG in M1-6, it was not included in the calculation.

2. The areal extent of MRM equal to or deeper than 2 ft was calculated in AutoCAD (e.g., 354,914 square ft at Mac No. 1), and the areal extent of MRM assumed to be less than 2 ft bgs was estimated by calculating the lateral extent of the estimated limits of impact and subtracting the area where MRM is assumed to extend to 2 ft or deeper bgs (e.g., Mac No. 1 subtracting the area extending to 2 ft or deeper (354,914 square ft) from the extent of estimated limits of impact (976,223 square ft) results in an area of 621,309 square ft).

3. The depth of MRM in each area is multiplied times the areal extent (e.g., for Mac No. 1, MRM extending to 2 ft or deeper – MRM depth (2.5 ft) is multiplied by areal extent (354,914 sq ft) for a volume of 900,036 cubic ft).

4. The two volumes are then added and converted to CY.

The total estimated volume of MRM at the Sites is approximately 705,235 CY and was rounded to 710,000 CY. The volume estimates in Table 2-7 are high-level estimates that are meant for planning purposes only. Cleanup levels will be defined in USEPA's final decision document that selects the final response action, and proposed excavation depths will be refined during the design phase of the response action process. The following limitations contribute to uncertainties in the total volume estimate at the site:

- MRM near the boundaries of the estimated limits of the impacted area is assumed to generally be surficial, extending to less than 0.5 ft bgs. Depths for the volume estimates are assumed to extend to 1 to 1.2 ft in this area for the Sites. This may bias the estimate high.



- Site characterization activities were based on an Agency-approved multiple lines of evidence approach that incorporated review of downhole gamma measurements, field observations, and radium-226 concentrations. This volume estimate is limited to evaluated COC/COEC concentrations that exceed proposed RAGs. Therefore, the deepest samples in many boreholes still contained COC/COEC concentrations that exceed one or more RAGs. Though the exceedances may represent naturally occurring, non-mine impacted, material in some cases, this may bias the estimate low as MRM may extend further into the subsurface.
- The lateral extent of MRM is estimated based on field gamma survey readings and correlated exposure rates and is generally indicative of radium-226 concentrations. Other COCs/COECs may exceed RAGs outside of this area and this may bias the volume estimate low.
- To estimate the depth of MRM in samples, the deeper portion of the sample interval was used, and MRM may only extend into the upper portion of the sample interval (e.g., BJ1-23 at Black Jack No. 1 the deepest sample interval was 1.5 to 3.0 ft bgs, impacts were assumed to extend to 3.0 ft bgs). This may bias the estimate high.
- Borehole placement and sample collection were judgmental; therefore, clusters of boreholes with deeper MRM exceedances (e.g., BJ2-4X and BJ2-11X boreholes at Black Jack No. 2) will increase the estimated depth of MRM for that area. This biased the estimate to be greater and more conservative.
- No RAG exceedances were observed in borehole M1-6 at Mac No. 1, M2-28 at Mac No. 2, BJ1-2 and Black Jack No. 1, and BJ2-13 at Black Jack No. 2.
- Samples collected during the Supplemental Characterization were analyzed for radium-226 and uranium. For those samples where radium-226 and uranium concentrations did not exceed RAGs, other COCs/COECs that were not analyzed may be present in concentrations that exceed the RAGs. This may bias the volume estimate low. However, the impact of this is expected to be muted because those boreholes were generally placed as confirmation boreholes and all COCs/COECs were measured in other boreholes nearby.
- Some boreholes were advanced as confirmation boreholes and only downhole gamma measurement were collected (samples were not collected). MRM depth in those boreholes was estimated based on the shape of the curve of downhole gamma measurements.

2.3.5 VOLUME ESTIMATE OF CONCRETE, METAL, AND WOOD

Volume estimates for concrete, metal, and wood debris at each site were estimated using dimension data from the *RSE Phase 2 Physical Hazards Assessment* (iiná bá, 2017) and supplemented using dimensions estimated from photos within the report. Volumes were estimated assuming that the materials would retain their shapes, with an exception for buildings on the Sites which were estimated based on the materials composing the walls, floor, and roof individually. The total volumes of concrete, metal, and wood debris at the Sites were estimated to be 639, 124, and 3 CY, respectively.



- Mac No. 1 is expected to produce an estimated 237 CY of material debris
- Mac No. 2 is expected to produce an estimated 40 CY of material debris
- Black Jack No. 1 is expected to produce an estimated 405 CY of material debris
- Black Jack No. 2 is expected to produce an estimated 83 CY of material debris

2.4 Baseline Risk Evaluation

Stantec conducted a risk evaluation to assess potential impacts to human health and the environment associated with exposure to COPCs and COPECs in surface and subsurface soil at the Sites. The risk evaluation for the Sites includes a baseline human health risk assessment (HHRA) for both current and hypothetical future receptors, and a screening level ecological risk assessment (SLERA) and a refined ecological risk assessment (ERA) in the form of a Step 3A analysis for ecological indicator receptors. The human health and ecological risk evaluations are summarized below and described in detail in Appendix C. Due to the potential land use, accessibility, and limited drainages present at the Sites, each site was evaluated as one exposure unit.

2.4.1 HUMAN HEALTH RISK ASSESSMENT

The baseline HHRA for the Sites quantified human health risks for four potential receptors defined in the NAUM Calculation Tool. USEPA, in collaboration with the NNEPA, developed the NAUM Calculation Tool and USEPA required its use at the Sites. Consistent with the NNEPA Guidance for the Uniform Application of Fundamental Law to AUM Activities, the NAUM Calculation Tool default assumptions incorporate traditional Navajo land uses. Sites-specific information supporting the default assumptions is not provided. The version of the tool used in the baseline HHRA was distributed by USEPA on August 19, 2022.

No one currently resides at the Sites. Current site use for foraging or grazing is not documented, and a source of water for potable uses and crop irrigation/livestock watering is not currently present at the Sites. However, a hypothetical visitor to the Sites who uses the land to graze livestock, gather firewood, hunt, grow produce, and collect native plants for cooking and medicine was evaluated. Additionally, a hypothetical future resident who lives on the Sites and practices subsistence agriculture, a hypothetical future receptor who lives at the site seasonally to graze sheep and practice subsistence agriculture, and hypothetical future receptor who does not live on the Site but utilizes the Site to graze livestock were also evaluated. In addition to consumption of animals grazed on the Sites and plants harvested from the Sites, the exposure scenarios included direct contact soil exposure pathways (i.e., inhalation of windblown dust, incidental ingestion of soil, dermal contact with stable elements in soil, and external exposure to radionuclides) and exposure resulting from traditional ceremonial uses of plants. In total, six receptors were evaluated:



- **Kee'da'whíí téél** – Default – Full-time Navajo residential use evaluated using default assumptions in the NAUM Calculation Tool
- **Kee'da'whíí téél** – Custom – Full-time Navajo residential use evaluated primarily using default assumptions in the NAUM Calculation Tool, with modifications as described in Appendix C
- **Kǫǫh bí łíí nakaí** – Default – Sheep camp use evaluated using default assumptions in the NAUM Calculation Tool
- **Kǫǫ eí nahaazáh** – Default – Easy access open space use evaluated using default assumptions in the NAUM Calculation Tool
- **Kǫǫ eí nahaazáh** – Custom – Easy access open space use evaluated primarily using default assumptions in the NAUM Calculation Tool, with modifications as described in Appendix C
- **Chíí dah wiih łeezh** – Default – Use of washes and drainages, evaluated using default assumptions in the NAUM Calculation Tool

Potential human health receptors were evaluated by comparing site concentrations to receptor-specific preliminary remediation goals (PRGs) derived from the NAUM Calculation Tool for each COPC, as described in Appendix C. Because the COPCs evaluated in the HHRA are naturally occurring and commonly found in geologic formations in the area, concentrations of COPCs in unimpacted background reference area soils were also compared to receptor-specific PRGs.

Results of the screening level HHRA include COPC-specific estimates of cancer risk as well as estimates of the potential for adverse noncancer health impacts (termed noncancer hazard estimates) associated with exposure to the COPCs in soil from 0 to 10 ft bgs at each mine site and from 0 to 2 ft bgs at each background reference area. The COPC-specific site and background cancer risk estimates and noncancer hazard estimates for each receptor were summed to cumulative cancer risk estimates and cumulative noncancer hazard estimates (termed hazard indices) for each receptor exposed to COPCs in soil at each mine.

The background and Site cancer risk and noncancer hazard estimates were compared to USEPA's cancer risk criterion of 1×10^{-4} and hazard criterion of 1. Background and Site cancer risk estimates in excess of 1×10^{-4}, and background and Site noncancer hazard estimates in excess of 1, were calculated for the above-listed human receptors at each of the Sites. Radium-226 was the primary cancer risk driver at the Sites; arsenic was also present at concentrations associated with cancer risk estimates in excess of 1×10^{-4} for one or more receptor(s) at all four sites. Uranium was the primary noncancer hazard driver at the Sites, with arsenic and vanadium making minor contributions to a total cumulative noncancer hazard estimate in excess of 1 at the Sites. It is important to note that radium-226 and arsenic were present in both background reference areas at concentrations associated with cancer risk estimates in excess of the cancer risk criterion.



As described in Appendix C, for human health, COCs were identified as those COPCs associated with a constituent-specific Site cancer risk or noncancer hazard estimate for soil from 0 to 10 ft bgs greater than 1 x 10^{-4} or 1, respectively, for a custom Kee'da'whíí tééh (hypothetical subsistence lifestyle resident). The COCs identified for each site are as follows:

- Mac No. 1 – arsenic, radium-226, uranium, and vanadium
- Mac No. 2 – arsenic, radium-226, and uranium
- Black Jack No. 1 – arsenic, radium-226, and uranium
- Black Jack No. 2 – arsenic, radium-226, uranium, and vanadium

2.4.2 ECOLOGICAL RISK ASSESSMENT

The ERA conducted for the Sites included a SLERA and a refined ERA in the form of a Step 3A analysis, which together provide a basis for the identification of COPECs and development of ecological PRGs.

The USEPA's eight step ERA process (USEPA, 1997) includes the development of a screening-level problem formulation as part of Step 1 and a more refined problem formation, as necessary, in Step 3. The Step 1 problem formulation identified ecological receptors that might come in to contact with site-related contaminated soil and the potential for complete exposure pathways between contaminated media and ecological receptors, indicating that a quantitative assessment of the potential for ecological risk is appropriate. In a SLERA, ecological risk is quantified through comparison of maximum detected concentrations of COPECs to conservative screening benchmarks. Because maximum detected concentrations do not represent likely exposure concentrations for most receptors, and because conservative benchmarks are selected, the SLERA does not provide an accurate representation of site impacts, but instead indicates the *potential* for impacts to ecological receptors (USEPA, 1997). Step 3 of the ERA process quantifies ecological risk through exposure dose modeling and toxicity data for upper trophic receptors, generating a more accurate estimate of potential ecological risk; a Step 3A analysis includes more in-depth research than a baseline Step 3 assessment.

Screening-level ecological hazard estimates associated with exposure to Site COPECs were calculated for the following receptor groups: terrestrial invertebrates, terrestrial plants, terrestrial avians, and terrestrial mammals. These hazard estimates were calculated by comparing maximum detected concentrations of COPECs in surface soil samples collected from site and background sampling locations to conservative no observed adverse effects level (NOAEL)-based ecological risk-based screening levels (ERBSLs) for soil. For each site, receptor, and COPEC combination, Site and background hazard estimates were calculated; the resultant hazard estimates were compared to USEPA's acceptable ecological hazard criterion of 1. Site ecological hazard estimates in excess of USEPA's acceptable hazard criterion of 1 were calculated for several COPECs in every receptor group at all the Sites. Of particular note are molybdenum, selenium, and vanadium, which are present at concentrations associated with screening-level ecological hazard quotient (HQ) estimates at or above 1 for upper trophic level receptors even at ambient background concentrations. Elevated ecological hazard estimates based on ambient background concentrations provide one indication that a SLERA is too conservative. For this



reason, molybdenum, selenium, and vanadium were further evaluated in a refined Step 3A ERA. The refined Step 3A dose modeling-based ecological HQ estimates indicated that site concentrations of selenium may pose an ecological hazard to avian and mammalian receptors at Black Jack No. 1, Black Jack No. 2, and Mac No. 1, and that site concentrations of vanadium may pose an ecological hazard to avian receptors at Black Jack No. 2 and Mac No. 1.

As described in Appendix C, COPECs for soil from 0 to 2 ft bgs that were only evaluated in the SLERA (i.e., arsenic, radium-226, and uranium) were identified as COECs if they have an associated screening-level hazard estimate greater than 1 (to one significant figure) for an upper trophic level receptor. COPECs for soil from 0 to 2 ft bgs that were evaluated in the refined Step 3A Analysis (i.e., molybdenum, selenium, and vanadium) were identified as COECs if they have an associated refined ecological hazard estimate greater than 1 (to one significant figure) for an upper trophic level receptor. The COECs identified for each site are as follows:

- Mac No. 1 – radium-226, selenium, uranium, and vanadium
- Mac No. 2 – radium-226
- Black Jack No. 1 – radium-226 and selenium
- Black Jack No. 2 – radium-226, selenium, uranium, and vanadium

2.4.3 PROPOSED RESPONSE ACTION GOALS

Stantec calculated site-specific PRGs and ERBSLs for each of the COPCs and COPECs that are protective of human health and the environment, as summarized in Sections 2.4.1 and 2.4.2, detailed in Appendix C and listed in Table 2-8. Note that Table 2-8 only lists the custom full-time Navajo residential use scenario because it is the basis for the PRGs. Other scenarios are detailed in Appendix C. Those PRGs and ERBSLs for contaminants identified as COCs and COECs were then compared to BTVs to establish preliminary RAGs.

The BTVs for the Sites, which were calculated for Background Area 1 and Background Area 2, are described in Section 2.3 and Appendix A. The RAGs applicable to Black Jack No. 1 were established using constituent data from Background Area 1. The RAGs applicable to Mac No.1, Mac No. 2, and Black Jack No. 2 were established using constituent data from Background Area 2.

RAGs are listed in Tables 2-5 and 2-8. RAGs were identified using the following process:

1. Selecting the lower value of the PRG and ERBSL for each applicable COC or COEC
2. If the value was greater than the BTV, the selected PRG or ERBSL is identified as the RAG
3. If the selected PRG or ERBSL was less than the BTV, the BTV is identified as the RAG

COECs are applicable for the area of the sites from the surface to 2 ft bgs. For those RAGs identified based on ERBSLs, the RAGs default to human health PRGs for MRM deeper than 2 ft bgs.



The lateral extent of the area of the Sites that are estimated to exceed RAGs are shown as the Estimated Limits of Impacted Area on Figures 2 through 15. As noted in Section 2.3.2, this lateral extent is based on the 95-95 UTL of the exposure rate as calculated from background area gamma surveys. As described above, predicted radium-226 concentrations were not utilized or considered to estimate the lateral extent of contamination at the Sites.

Where RAGs default to BTV, it is important to note that cleanup to background based on a 95-95 UTL will result in the incorporation of background/non-impacted materials into the response action, resulting in lateral and vertical over-excavation of MRM and the removal of background materials. RAGs provided in this document are preliminary; final cleanup levels will be defined in the final decision document and technical options for preventing the removal of background materials will be refined in the design phase of the response action process. As such, the RAGs are preliminary and used to estimate volumes of MRM provided for the purpose of assessing alternatives in this Final EE/CA.



3 Identification of Response Action Objectives

The goal of the response action is to investigate and mitigate actual, or threatened, releases of hazardous substances from HMC's past mining activities and associated MRM and to identify and implement a long-term remedial cleanup of such hazardous substances. To abate risks attributable to MRM the RAOs for this Final EE/CA are:

1. Prevent exposure to soil with contaminants from past mining activities that would pose an unacceptable risk to human health with the reasonably anticipated future land use
2. Prevent exposure to soil with contaminants from past mining activities that would pose an unacceptable risk to plants, animals, and other ecological receptors
3. Prevent offsite migration of contaminants from past mining activities in soil to surface water, groundwater, or air that pose an unacceptable risk to human health

3.1 Determination of Response Scope

The response scope includes surface cleanup of MRM at the Sites. A verification survey and confirmation sampling and analysis will be performed after excavation of MRM to confirm MRM is excavated from the site. Following cleanup verification, to the extent necessary response areas will be graded to establish positive drainage away from the repositories and towards the existing natural drainages. Borrow soil may be required for fill in some areas. The vegetation will be restored in disturbed areas with a seed mix consisting of plants native to the work areas.

3.2 Determination of Response Schedule

A public comment period is required upon submittal of the Final EE/CA and will last 60 days. The USEPA will respond to significant comments from the public comment period, then will issue an Action Memorandum following the response to comments. The USEPA will provide public notification of the schedule for the response action process upon issuance of the Action Memorandum.

3.3 Applicable or Relevant and Appropriate Requirements

The National Contingency Plan (NCP) (40 CFR 300) requires, to the extent practicable, compliance with, or waiver of, ARARs. To be considered an ARAR, the requirement must (a) specifically address a hazardous substance, contaminant, action, location, or other circumstance present at the Sites to be applicable or (b) be well-suited to the site and address situations sufficiently similar to the circumstances of the release or contemplated action to be relevant and appropriate [40 CFR 300.400(g)]. In addition, for tribal standards to be ARARs, the standards need to be substantive in nature, promulgated (be generally applicable and legally enforceable), more stringent than federal requirements, and identified in a timely manner [40 CFR 300.400(g)(4)].



3.3.1 TERMS AND DEFINITIONS

Applicable requirements mean those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, response action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable. Consistent with USEPA guidance, Navajo Nation laws are treated as state laws.

Relevant and appropriate requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, response action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

In addition to applicable or relevant and appropriate requirements, the lead and support agencies may, as appropriate, identify other advisories, criteria, or guidance to be considered for a particular release. The "to be considered" (TBC) category consists of advisories, criteria, or guidance that were developed by USEPA, other federal agencies, or states that may be useful in developing CERCLA remedies [40 CFR 300.400(g)(3)].

ARARs are divided into the following three categories to facilitate identification:

- **Chemical-specific ARARs** usually are either health- or risk-based numerical values or methods that establish the acceptable amount or concentration of a chemical that may remain in or be discharged to the environment. Where more than one requirement addressing a contaminant is determined to be an ARAR, the requirement that should be used is the one that is the most stringent. Note, however, that in some cases, a less stringent requirement is better suited to the circumstances at a site, such that a more stringent requirement will not be deemed relevant and appropriate under the circumstances.
- **Location-specific ARARs** generally restrict certain activities or limit concentrations of hazardous substances solely because of geographical or land use concerns. Requirements addressing wetlands, historic places, floodplains, or sensitive ecosystems and habitats are potential location-specific ARARs.

- **Action-specific ARARs** usually are restrictions on the conduct of certain activities or the operation of certain technologies at a particular site. Regulations that dictate the design, construction, and operating characteristics of incinerators, air stripping units, or a landfill construction are examples of action-specific ARARs.

Identification and evaluation of ARARs is an iterative process throughout the response process. For this Final EE/CA Report, preliminary ARARs identified by USEPA and NNEPA are included in Appendix D. The final ARARs will be established in the final decision document.

3.3.2 COVER DESIGN CRITERIA

Alternatives 2 through 5 use an engineered cover. This section discusses the conceptual design parameters for the cover options described in this document. Guidance documents regarding the remediation of mine wastes will be selected during the design phase of the project and will help the designers determine specific criteria for:

- Cover longevity (design life) in terms of years with minimal maintenance, to the extent reasonably achievable
- Releases in the form of Rn-220 and -222, limited in terms of picocuries per meter squared per second
- Cover construction design to protect the mine waste, reduce the potential for leachate development, prevent contaminated runoff by limiting infiltration of precipitation, and provide erosion protection and durability
- Cover slope, shape, and drainage construction to establish stability and mitigate the effects of erosion, root intrusion, and animal destruction

The cost analysis for the alternatives incorporates the following assumptions.

- The cover(s) is assumed to require up to a 100-year post-construction maintenance and monitoring period.
- The post-construction maintenance and monitoring period includes semi-annual cost of inspections (labor), and semi-annual cost of road maintenance (labor and equipment).
- A soil layer, or layers, consisting of non-impacted borrow soil, will be placed to provide assurance that MRM will not come in contact with surface water or be subject to wind erosion.
- Revegetation goals will be consistent with the RAOs and cover design criteria listed above. The area of the repository will have restrictions prohibiting residential use and excavation on the repository cover. Revegetation would attempt to emulate the structure, function, diversity, and dynamics of native plant species in the area.
- The cover must protect mine wastes, prevent leachate development, and by minimize infiltration of water from precipitation.



- The design would include rock placement, cover shaping, and proper drainage to mitigate surface erosion. Stantec estimates that approximately 6 inches of rock will be included with the soil layer(s) for the cover concepts. Erosion modeling would be completed during the design phase to determine the quantity and size of rock required.
- The cover would consider controls to limit plant roots and burrowing animals from infiltrating into the MRM. Controls would be considered during the design phase as well as for the long-term maintenance plan.
- Engineering and institutional controls are not included in the cost estimates.

For cost estimating, Stantec used other designs at similar sites with response activities as guidance to estimate the cost for comparison purposes only. Stantec assumed that since the material has similar radioactivity, the cover designs would be the same for Alternatives 2 through 5. Stantec assumed for the cost estimates that an evapotranspiration (ET) cover consisting of two layers would be placed on top of the repository to provide radon protection and limit infiltration. The lower cover layer would consist of a 2.5-foot-thick layer of unimpacted borrow soil available on, or near, the Sites. The upper cover layer would consist of a 6-inch-thick vegetated cover layer with 15 percent by volume gravel admixture for erosion control. The gravel was assumed to be imported from an offsite location for the cost estimating purposes.

4 Identification and Analysis of Response Action Alternatives

4.1 Identification of Response Action Alternatives

The proposed response action alternatives were identified in the EE/CA Work Plan (Stantec, 2019b), and the EE/CA Work Plan was approved by the USEPA on April 10, 2019. The regional repository alternatives were developed based on the Mac and Black Jack Mines Conceptual Regional Repository design memorandum (Stantec, 2019a) and guidance from the USEPA provided in an email on October 25, 2018. The remaining alternatives were developed through the USEPA comment and response process to finalize the EE/CA Work Plan. The alternatives presented in this Final EE/CA are in accordance with the work plan, with the exceptions listed in Section 1.0, and no additional alternatives were analyzed or screened out while developing the Work Plan or the Final EE/CA.

As directed by the USEPA, the following discussion on treatment options evaluated and determination of PTW was copied directly from text provided by USEPA via electronic-mail on August 19, 2022 and April 4, 2023. The language was adapted to be site specific. CERCLA and NCP express a preference for the treatment of MRM that significantly and permanently reduces the volume, toxicity, or mobility of contaminants, where such treatment is practicable. CERCLA § 121(b), 40 CFR § 300.430(a)(1)(iii), and USEPA (1991a) guide to Principal Threat and Low-Level Threat Waste describe how to identify MRM that may be appropriate for treatment. USEPA reviewed potential treatment options to reduce the toxicity, and volume of contaminants in the MRM. The potential treatment options were evaluated based on site-specific criteria and included phytoremediation, soil washing, ablation, milling, acid extraction, stabilization, and solidification. Phytoremediation uses plants to remove contaminants. Soil washing, ablation, and milling employ physical means to remove contaminants. Acid extraction removes contaminants with an acetic solution that increases the contaminant solubility. Stabilization is a process that reduces the leaching of chemically bound material, and solidification is a process that encapsulates MRM to form a solid material.

All of the treatment options were assessed by the USEPA based on their effectiveness and implementability on a site-specific basis. A technology or treatment option can be eliminated from further consideration if it does not meet the effectiveness or implementability criteria. Treatment options may be used alone or in combination to manage COCs throughout the sites. While some treatment options may address one or more COCs, unless all COCs and the associated radioactivity can be treated and attenuated to achieve cleanup goals, the treatment option would be deemed impracticable because the treated MRM would still require containment or disposal to shield the radioactivity. In fact, the total volume of MRM requiring disposal for many options would either remain unchanged or increase because of the addition of water, binding agents, or chemicals.

USEPA Region 9 evaluated Energy Fuels' White Mesa Mill near Blanding, Utah as a possible off-site waste disposal facility for CERCLA waste under this EE/CA. In an Off-Site Rule Verification (OSR) of Continued Acceptability letter dated January 13, 2023, USEPA Region 8 found six of White Mesa Mills'



seven waste management units to be Acceptable to receive CERCLA waste. In that same correspondence, Region 8, found that Cell 4B remained unacceptable to receive CERCLA waste until it returns to compliance with 40 C.F.R. § 62.252(b). Further, EPA Region 8 raised additional concerns related to compliance with the OSR based on increasing groundwater quality issues. Specifically, the letter states that recent groundwater data collected by the Mill demonstrate over 300 instances of Ground Water Compliance Limit (GWCL) permit exceedances in the Mill's Point of Compliance (POC) monitoring wells located throughout the facility, and notes that concentrations above GWCLs of multiple contaminants resulted in reported out of compliance status for 11 point of compliance wells during the 2021-Q2 2022 timeframe. Based on this information, Region 9 has concluded that current corrective actions implemented by Energy Fuels to control known releases appear to be ineffective. As a result, USEPA Region 9 does not believe that disposal at the White Mesa Mill is a viable CERCLA waste disposal facility for this EE/CA. USEPA Region 9 may reconsider White Mesa Mill as a potential disposal facility when additional data is available to support a finding that disposal at this facility would be effective and protective.

The Mac and Black Jack Mines are located in an arid region where water is a scarce resource in the area needing to be either purchased and trucked in; or extracted from a new 700- to 1,500-ft construction well, if allowed. Treatment methods requiring large quantities of water such as soil washing, acid extraction, solidification, and stabilization would place additional demand beyond what is already needed for construction dust suppression during MRM excavation, loading, and stockpiling. The additional resource and cost impact is prohibitive. In addition, slurry and backfill of mine voids, while not a treatment option, would also require a large volume of water. Wastewater generated from treatment processes would require additional treatment and concentrates would require disposal; the additive cost of these treatments is impracticable.

With respect to particle-size distribution, MRM generally consist of blasted sandstone bedrock with particle sizes ranging from medium sand to gravels, which are significantly greater than clay and silt fines typical of sediments. Further, the uranium mineralization is located on the surface of the sand grains and not in fines or solution. An unpublished ablation bench scale treatability study conducted by DISA, Inc. for NNEPA demonstrated that fines comprise only 5 percent of total waste in the feed stock. As a result, uranium removal based solely on particle-size separation (screening, sieving, flotation, and cyclone) is not a viable technological approach. Only in combination with ablation, which physically removes uranium mineral deposits from the surface of sand grains, would the cleanup goal be achieved. Ablation, as a standalone technology, is currently being evaluated in a pilot study.

The treatment evaluation concluded that no currently available treatment options are practicable at the Mac and Black Jack Mines as follows:



- **Phytoremediation** is a treatment process that uses plants to absorb radionuclides and metals. This and similar alternative treatment methods were considered but screened out as infeasible for the site. Much of the contamination at the sites is located in 30-to-60-foot-deep piles and not all of the MRM would be easily accessible by plant roots. Moreover, because radionuclides and metals cannot be biodegraded, plants used in phytoremediation must be harvested and sent for disposal as a radioactive MRM and prevention of human or animal consumption of the plants would be necessary. To use this treatment option, MRM would have to be spread out over a large enough area to accommodate the rooting depths of the plant species, which could further contaminate additional areas of the Sites. Phytoremediation has not been shown to reduce radium-226 concentrations in MRM to the extent needed to meet the removal action goals. Because of the limited planting area, limited access, limited depth of root penetration, and harvested material handling requirements, phytoremediation was determined not practicable.

- **Soil washing** is a treatment process that involves washing the contaminated MRM (with water) in a heap, vat, or agitated vessel to dissolve water-soluble contaminants. Soil washing requires that contaminants be readily soluble in water and sized sufficiently small so that dissolution can be achieved within a practical retention time. The most common forms of uranium oxides attached to sand particles in waste rock at the sites have low solubility in water, rendering soil washing ineffective for removal to below cleanup goals. Solubility of other metals depends on the forms of the metals present in the MRM and can range from highly soluble to insoluble. Insoluble metals in the MRM would not be treated. Highly soluble metals in the wash solution are then precipitated as insoluble compounds, and the treated solids are dewatered. Additionally, the precipitates may form a sludge requiring additional treatment, such as dewatering or stabilization, before disposal. Dewatered precipitates and sludge must be disposed of at a mill, Resource Conservation and Recovery Act (RCRA) Class C, or Low-Level Radioactive Waste facility because of the concentrating of radionuclides. Because of the low concentrations of uranium in the waste rock and varying solubilities at different pH ranges for radionuclides and metals, soil washing likely would not meet cleanup goals and was determined not practicable.

- **Acid extraction** is similar to soil washing except an acidic solution instead of water is applied to the waste rock or other contaminated media in a heap, vat, or agitated vessel. Depending on temperature, pressure, and acid concentration, varying quantities of metal constituents would be solubilized. A broader range of contaminants are expected to be acid soluble at ambient conditions with acid extraction than with soil washing. Acid extraction would dissolve a portion of the mineralized uranium attached to the sand particles; however, some percentage could remain bound in the sand particles. Dissolved contaminants are subsequently precipitated for additional treatment and disposal. Based on the uranium mineralization on the surface of sand particles in the waste rock and varying solubilities of radionuclides and metals at different pH ranges, acid extraction likely would not decrease concentrations of all contaminants below cleanup goals and was determined not practicable. In particular, acid extraction would not remove radium which is a primary risk driver.



- **Ablation** is a treatment technology that can be applied to sandstone-hosted uranium mineralization, where the uranium minerals form a crust on the sand grains. The ablation process mixes water and waste rock into a slurry that is injected into impact tank modules. The opposing slurry streams impact one another, and collisions between the sandstone particles and fragments within each stream result in disassociation of fine-grained, intergranular, and mineralized material (uranium minerals) from coarser-grained sands. Ablation technology has potential for treating waste rock with surface uranium mineralization with some small commercial systems in operation. Pilot scale studies occurred in the summer 2022 to test the feasibility of the technology at three sites on the Navajo Nation; information and results of the studies will be available later in 2023. Ablation technologies have not demonstrated sufficient throughput to address a large volume of waste rock. One of the goals of the pilot studies is to evaluate scale-up designs and economics.

- **Milling** is an offsite commercial process that removes uranium by a combination of several methods, including pulverization and acid extraction. Concentrations of uranium in the waste rock at the sites are low, so any processing would, therefore, yield only a minimal amount of uranium. Additionally, milling does not remove radium and the resulting mill waste is neither less toxic nor less mobile than the source material. Thus, milling was determined not practicable for treatment of uranium mine waste.

- **Solidification** is a process whereby uranium minerals and soluble radionuclides and metals in MRM is physically encapsulated to form a solid material to reduce contaminant leachability and to reduce mobility. However, solidification does not address radiation concerns. Solidification involves mixing of MRM with a binder material such as cement, fly ash, clay, or geopolymers. The binder material would have to be hauled to the sites, and a batch plant would need to be set up to mix the binder with MRM. The mixing process requires a large quantity of water for binding to occur; therefore, a water source must be developed, or water must be imported from offsite. Once the material is solidified, it may be placed into a repository or in aboveground mine workings as stackable blocks; however, the volume of MRM requiring disposal greatly increases because of the addition of binding agents. Furthermore, unless placed in a disposal cell or repository, the solidified material may break apart when exposed to freeze-thaw and precipitation, potentially increasing leachability. On- or offsite disposal options are just as protective for the original volume of MRM and use fewer resources. As a result, solidification was determined not practicable.

- **Stabilization** is a process whereby uranium minerals and soluble radionuclides and metals in MRM are chemically altered to reduce contaminant leachability and to reduce toxicity. However, stabilization does not address radiation concerns. Surface area, porosity, and permeability of MRM are reduced to limit leaching. Stabilization involves the mixing of MRM with a neutralizing material such as lime/fly ash and pozzolan/cement. The neutralizing material would have to be hauled to the sites, and a batch plant would need to be set up to mix the material with MRM. The mixing process requires a large quantity of water for the reaction to occur; therefore, a water source must be developed, or water must be imported from offsite. Once the material is stabilized, it may be placed into a repository or in aboveground mine workings as a gravel admixture; however, the volume of MRM requiring disposal increases because of the addition of neutralizing agents. Furthermore, unless placed in a disposal cell or repository, the stabilized material may break apart when exposed to



freeze-thaw and precipitation, potentially increasing leachability. On-site or offsite disposal options are just as protective for the original volume of MRM and use fewer resources. As a result, stabilization was determined not practicable.

- **Principal Threat Waste:** The purpose of identification of principal threat waste is to address the NCP's preference for treatment. Specifically, USEPA's 1991 Guide to Principal Threat and Low-Level Threat Wastes states:

  EPA expects that treatment will be the preferred means by which to address the principal threats posed by a site, wherever practicable. Principal threats are characterized as waste that cannot be reliably controlled in place, such as liquids, highly mobile materials (e.g., solvents), and high concentrations of toxic compounds (e.g., several orders of magnitude above levels that allow for unrestricted use and unlimited exposure). Treatment is less likely to be practicable when sites have large volumes of low concentrations of material, or when the waste is very difficult to handle and treat (e.g., mixed waste of widely varying composition).

The guide states further that specific situations that may limit the use of treatment include:

- Treatment technologies are not technically feasible or are not available within a reasonable timeframe
- The extraordinary volume of materials or complexity of the site make implementation of treatment technologies impractical
- Implementation of a treatment-based remedy would result in greater overall risk to human health and the environment due to risks posed to workers or the surrounding community during implementation
- Severe effects across environmental media resulting from implementation would occur

CERCLA and the NCP express a preference for treatment that significantly and permanently reduce the toxicity, mobility, or volume of contaminants in selecting remedial actions, where such treatments are practicable. See CERCLA Section 121(b) and 40 CFR Section 300.430(a)(1)(iii). See also USEPA Guidance on Principal Threat and Low-Level Threat Waste ("1991 Guidance"), describing how to identify wastes that may be appropriate for treatment. PTW are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health, or the environment should exposure occur.

USEPA fully considered whether the Sites contained any PTW, whether the waste could safely be contained using engineering controls, and whether any treatment options may be practicable for the waste at the Site. As a result of its investigation and analysis, USEPA concluded that, while some individual samples at the Site contained higher levels of contaminants, the waste at the Site is variable and heterogeneous and USEPA found no distinct areas of waste rock that were clearly distinguishable as meeting the definitions of PTW in the 1991 Guidance. However, to be consistent with USEPA's preference for treatment, USEPA did fully evaluate a complete range of treatment options. A summary of the treatment evaluation is discussed above.



A bottom liner in the repository underneath the MRM was also evaluated as a technology. With proper design and construction of an ET cover for the MRM, in this precipitation-deficit environment, a bottom liner beneath the MRM provides no additional protection of the natural environment. A sloped repository would be designed to shed the majority of the precipitation and overland flow during storm events and the revegetated surface would be designed to remove the majority of any infiltration via evapotranspiration. Using an ET cover, which has been used at other nearby mine sites, is a cost-effective solution that fits the natural environment using local vegetation and soils to isolate the MRM and is expected to have a longer design life than what a synthetic liner provides. The estimated depths to groundwater at the Sites range from approximately 210 to 800 ft bgs, with most groundwater levels between approximately 450 and 500 ft bgs, which further indicates a liner would not provide additional protections from impacts to subsurface resources. Additionally, the import via truck of high-density polyethylene (HDPE) liners manufactured using petroleum products and hauling the extensive volume of required bedding material, will increase the carbon footprint of the regional repositories and does not align with USEPA's Greener Cleanups initiatives.

Table 4-1 describes the technologies considered to address the RAOs, and the analysis of each. Based on the analysis of the nature and extent of contamination, a limited number of alternatives appropriate for addressing the RAOs were identified and assessed (USEPA, 1993). The following six alternative response actions were evaluated for this Final EE/CA and include only the MRM from the Sites, totaling approximately 710,000 CY:

1. No Action
2. Consolidate and cover in-place at each site
3. Consolidate four sites at one repository site
    a. Mac No. 1 or
    b. Black Jack No. 1
4. Regional Repository
    a. Regional repository at Mac No. 1 including the four HMC Sites and Mariano Lake Mine or
    b. Regional repository at Black Jack No. 1 including the four HMC Sites and Mariano Lake Mine or
    c. Two regional repositories: one at Mac No. 1, including Mac No. 1, Mac No. 2, Black Jack No. 2, and Mariano Lake Mine, and another at Black Jack No. 1 including only material from Black Jack No. 1
5. Excavation and Off-Navajo disposal within 100 miles
6. Excavation and Off-Navajo disposal at an existing licensed facility



The conceptual design assumptions for each alternative are discussed in the following sections and summarized in Table 4-2. Area and depth estimates used to calculate the response action volumes are based on the Supplemental Site Characterization and data obtained from the RSE. MRM is defined for this report as mining-related/disturbed local geologic materials (soil and rock) and remnant mine structures and related debris (e.g., concrete, metal, and wood). Existing buildings and foundations will be demolished and either removed from the Sites for disposal or buried in the repository. If disposed in the repository site(s), the debris will be crushed, if necessary, spread in lifts, and filled over and around with MRM soils to minimize void spaces and settlement. Clearance of building surfaces for salvage was not considered in cost estimating for various alternatives. Stantec considers the volume estimates to be sufficiently accurate to compare costs and conceptual designs.

Revegetation is included in the cost estimate for areas where MRM was excavated and backfilled, to support stormwater drainage and simulate natural topography, with local borrow soil, as well as for the repository cover surface. The revegetation is assumed to include a native seed mix with fine mulch and fertilizer using the placement method of either hydro- or air- seeding. The costs include labor, equipment, and materials. Haul road maintenance assumes three passes of the roadway per month with a CAT grader, supervisor, laborer, and operator. The cost includes labor and equipment, and the costs are built up to a monthly rate.

Potential sources of water for all alternatives include installation of a new production well, a private well near the Mariano Lake Chapter house, or hauling water from a source off the Navajo Nation to use for construction water. For purposes of the cost estimates for each alternative, it was assumed that water would be hauled in from an offsite source. The water source to be used during construction will be refined during the response design phase, which will include more detailed permit requirements and costs for a water source.

The post removal site control (PRSC) period for both vegetation inspections and haul road maintenance includes 100 years post-construction for Alternatives 2, 3, and 4; and 5 years post-construction for Alternatives 5 and 6. A summary of costs of each alternative is included in Table 4-3.

Greener Cleanups analyses were completed for Alternatives 2, 3a, 3b, 4a, 4b, 4c, 5 and 6, using USEPA's methodology for conducting an environmental footprint analysis (USEPA, 2012). Development of this methodology is in line with USEPA's Superfund Green Remediation Strategy (USEPA, 2010b). By considering environmental effects of the remedy implementation, this assessment can aid in minimizing the environmental footprint of cleanup actions. Analytical workbooks (USEPA, 2019) (i.e., Spreadsheets for Environmental Footprint Analysis (SEFA)) were used to quantify each alternatives' environmental footprint. Core elements analyzed include materials and waste, water use on site, energy consumption, air emissions, and land and ecosystem impacts. Environmental footprint summaries that include green remediation metrics for each Alternative are included in the Greener Cleanups analyses as presented in Appendix G.

Comprehensive planning will have to be completed and work plans and engineering design documents developed prior to the work activities on site for Alternatives 2 through 6. The planning phase is not discussed in detail in this report; however, HMC assumed that the following documents would also have to be developed in addition to design analyses, drawings, and specifications:

- Transportation plan
- Erosion and stormwater control plan
- Schedule
- Air monitoring plan
- Sampling and analysis plan
- Quality Control/Quality Assurance (QC/QA) plan
- Site health and safety plan
- Environmental protection plan
- Revegetation plan
- Dust control and haul road maintenance plan
- PRSC Plan

4.1.1 ALTERNATIVE 1: NO ACTION

Alternative 1 includes no further actions at the Sites. No active remediation or site work activities would be performed. No action would be taken to treat, contain, remove, or monitor any areas with impacted soil at the Sites. No site access controls or security would be installed under **Alternative 1**. No action is not expected to meet the RAOs; however, the no action alternative will be retained for evaluation as a baseline option for comparison to other alternatives.

4.1.2 ALTERNATIVE 2: CONSOLIDATE AND COVER IN-PLACE AT EACH SITE

Alternative 2 assumes that MRM with concentrations above the RAG would be excavated and consolidated at each of the four mines, combined with engineering and institutional controls. Each site would have a repository containing the MRM, which would be graded to blend with the existing surrounding grades, covered with an ET cover system to mitigate erosion, limit infiltration, reduce radon emanation to acceptable limits, and be revegetated with native plant species. A summary of major activities, sub activities, and rationale for Alternative 2 is included in Table 4-4.



Table 4-4 Activity Summary for One MRM Repository at Each Site (Alternative 2)

Major Activity	Sub Activity	Rationale
Design and site preparation	Design and planning of work	• Design and work planning will be required to efficiently start, maintain progress, and complete the project. • Site preparation and site activities work will establish initial equipment parking areas, site traffic routes, security fence construction, and job trailer setup.
	Preparation of sites	
	Site activities	
Clear vegetation at each site	Clearing vegetation and stockpiling locally	• Vegetation in parking, job trailer(s), maintenance, and work areas will be cleared. This will be done to increase safety and mitigate organic contamination of soil materials. Vegetation material will be stockpiled locally to reduce disposal costs. • Debris and remnant mine structures (wood, concrete, and metal) will be demolished and stockpiled for placing in the repository.
	Debris removal	
Excavate MRM for the Sites, and place in repository located at each site	Excavating and hauling MRM materials	• To contain MRM at each site per the design, these materials will be excavated, hauled, and placed in the respective site repository. • Demolished debris and remnant mine structures will be placed in the respective site repository.
	Placing and spreading material at repositories	
Regrade excavated areas with borrow material	Excavate and haul borrow material found locally	• Locally sourced fill materials will be hauled, placed, and graded on MRM excavation areas to support stormwater drainage and simulate natural topography. Sourcing fill materials locally will reduce project costs.
	Placing and spreading borrow material	
Place topsoil and revegetate disturbed areas	Excavate and haul topsoil found locally	• Locally sourced topsoil will be hauled, placed, and spread on the fill placed on MRM excavation areas to support revegetation. Sourcing fill materials locally will reduce project costs. • Seeding MRM excavation areas will be required to establish vegetation.
	Placing and spreading topsoil material	
	Seeding over topsoil materials	
Construct ET cover at each site	Excavation and hauling of on-site borrow for cover	• ET cover construction is assumed as part of the design to contain MRM material. Construction will require excavation, hauling, placement, and grading cover soil materials. • Rock material will be sourced from offsite source near Gallup, NM, approximately 35 miles from the Sites.
	Place and spread materials for cover	
	Compaction of ET cover materials	
	Protective cover layer with gravel mixture	
	Place and spread protective layer	

Identification and Analysis of Response Action Alternatives

Major Activity	Sub Activity	Rationale
	Seeding over ET cover	• To support revegetation of the ET cover area, seeding will be required.
Dust suppression and oversight	Water truck operating full time per day	• Dust suppression will be required during MRM excavation and repository construction to mitigate dust. Water spraying by truck will be used to moisten surface soil to reduce dust generation. • Due to a lack of water sources on the Sites, water will be purchased from an offsite source, hauled to the Sites, and stored in water tanks for use. • Equipment and storage tanks required for dust suppression will require maintenance to operate safely and effectively.
	Water tank purchase (on-site)	
	Water tank filling and maintenance	
	Other costs (permit, surge tank)	
	Daily cost using offsite water source	
	Water purchase from source	
PRSC Costs for 100 years	Semi-annual cost of inspections Semi-annual cost of road maintenance	• Semi-annual inspections by an engineer at the repository site to inspect cover and stormwater features and determine if maintenance is required. • Semi-annual inspections by an engineer at the Sites to inspect excavated, backfilled, and revegetated areas. • Semi-annual maintenance includes grading the roads to maintain access at all four sites.

The repository location at each site would overlap the impacted soil boundary to reduce the overall construction footprint. Areas within the repository footprint that lie outside of the impacted areas would be used for borrow soil for the cover or to fill and regrade excavated areas to support stormwater drainage and simulate natural topography. Proposed borrow areas located on Mac No. 1 and Black Jack No. 1 would provide cover material for all repositories, which would require haul trips between 2 and 10 miles (roundtrip) for Mac No. 2 and Black Jack No. 2. The repository locations and borrow areas would be selected to avoid site features (i.e., existing arroyos, trees) and to blend with the existing topography and general drainage patterns, if possible.

During response action and restoration activities, site access would be restricted by temporary fencing and signage. Temporary stormwater controls would be constructed to manage stormwater during response activities. Air monitoring and dust suppression control would be implemented during construction.

Existing wells within the limits of the impacted areas would be abandoned and existing buildings, structures, or other debris within the limits of impacted area would be removed, demolished, and disposed of in the repository. Permanent stormwater controls and backfill and grading of excavated areas would be included in the design. Engineering and institutional controls may include fencing, signage, deed restrictions, or land use restrictions. The caps/repository could be accessible for controlled grazing, but residential use and excavation will be prohibited. Livestock access, fencing/cross fencing, vegetation, and potential impact on cap integrity will be evaluated during the remedy design phase to determine if controlled grazing is protective. Monitoring and maintenance of each site was assumed for 100 years to maintain long-term effectiveness.

Alternative 2 is shown on Figures 6 through 9, and the cross-sections are shown on Figures 16 through 19. Preliminary repository footprints extend into the following allotee parcels: Mac No. 1 – parcel 1183; Mac No. 2 – parcels 1182 and 1868; Black Jack No. 1 – parcels 1044, 1045, and 1046; and Black Jack No. 2 – parcel 1179. Implementation (construction) of Alternative 2 is expected to take approximately 579 working days and the estimated cost is $22.6 million.

4.1.3 ALTERNATIVES 3A AND 3B: CONSOLIDATE FOUR SITES AT ONE REPOSITORY SITE

Alternative 3 assumes that MRM with concentrations above the RAG would be excavated from the Sites and consolidated at one of the sites, combined with engineering and institutional controls. The total approximate volume of MRM from the Sites is 710,000 CY.

Alternative 3 was divided into two sub-alternatives for evaluation:

- Alternative 3a assumes the repository would be located at the Mac No. 1 site
- Alternative 3b assumes the repository would be located at the Black Jack No. 1 site

For Alternatives 3a and 3b, the selected site would have a repository containing the MRM, which would be graded to blend with the existing surrounding grades, covered with a cover system to mitigate erosion, limit infiltration, reduce radon emanation to appropriate limits, and be revegetated with native species. A summary of major activities, sub activities, and rationale for a consolidated repository are included in Table 4-5.



Identification and Analysis of Response Action Alternatives

Table 4-5 Activity Summary for MRM Consolidation into One Repository (Alternatives 3, 4a, 4b, 4c)

Major Activity	Sub Activity	Rationale
Design and site preparation	Design and planning of work	• Design and work planning will be required to efficiently start, maintain progress, and complete the project. • Site preparation and site activities work will establish initial equipment parking areas, site traffic routes, security fence construction, and job trailer setup.
	Preparation of sites	
	Site activities	
Clear vegetation	Clearing vegetation and stockpiling locally	• Vegetation in parking, job trailer(s), maintenance, and work areas will be cleared. This will be done to increase safety and mitigate organic contamination of soil materials. Vegetation material will be stockpiled locally to reduce disposal costs. • Debris and remnant mine structures (wood, concrete, and metal) will be demolished and stockpiled for placing in the repository.
	Debris removal	
Excavate MRM and place in one repository	Excavating and hauling MRM material intrasite	• To contain MRM per the design, these materials will be excavated, hauled (on site), stockpiled (on site), and placed in a consolidated repository. • Demolished debris and remnant mine structures will be placed in the site repository. Note: Over-the-road transportation of intersite MRM is accounted for in a separate row, below.
	Placing and spreading intrasite MRM in repository	
	Excavating and hauling MRM to local staging area at intersites	
	Placing and spreading intersite MRM in repository	
Regrade excavated areas with borrow material	Excavate and haul borrow material found locally	• Locally sourced fill materials will be hauled, placed, and graded on MRM excavation areas to support stormwater drainage and simulate natural topography. Sourcing fill materials locally will reduce project costs.
	Placing and spreading borrow material	
Place topsoil and revegetate disturbed areas	Excavate and haul topsoil found locally	• Locally sourced topsoil will be hauled, placed, and spread on the fill placed on MRM excavation areas to support revegetation. Sourcing fill materials locally will reduce project costs. • Seeding MRM excavation areas will be required to establish vegetation.
	Placing and spreading topsoil material	
	Seeding over topsoil materials	
Transport intersite MRM to repository site	Loading material for site-to-site transport	• MRM will be loaded for transport to repository site. • Intersite hauling, or second handlings, will occur as MRM is staged at each site and transported to the repository site.
	Hauling materials of intersites	
Construct ET cover	Excavation and hauling of on-site borrow for cover	

Identification and Analysis of Response Action Alternatives

Major Activity	Sub Activity	Rationale
	Place and spread materials for cover	• ET cover construction is assumed as part of the design to contain MRM material. Construction will require excavation, hauling, placement, and grading cover soil materials. • Rock material will be sourced from offsite source near Gallup, NM, approximately 35 miles from the Sites. • To support revegetation of the ET cover area, seeding will be required.
	Compaction of ET cover materials	
	Protective cover layer with gravel mixture	
	Place and spread protective layer	
	Seeding over ET cover	
Dust suppression and oversight	Water truck operating full time per day	• Dust suppression will be required during MRM excavation and repository construction to mitigate dust. Water spraying by truck will be used to moisten surface soil to reduce dust generation. • Due to a lack of water sources on the Sites, it was assumed that water will be purchased from offsite source(s), hauled to the Sites, and stored in water tanks for use. • Equipment and storage tanks required for dust suppression will require maintenance to operate safely and effectively.
	Water tank purchase (on-site)	
	Water tank filling and maintenance	
	Other costs (permit, surge tank)	
	Daily cost using offsite water source	
	Water purchase from source	
PRSC Costs for 100 years	Semi-annual cost of inspections Semi-annual cost of road maintenance	• Semi-annual inspections by an engineer at the repository site to inspect cover and stormwater features and determine if maintenance is required. • Semi-annual inspections by an engineer at the Sites to inspect excavated, backfilled, and revegetated areas. • Semi-annual maintenance includes grading the roads to maintain access at all four sites.



The repository location at the Site (either Mac No. 1 or Black Jack No. 1) would overlap the impacted soil boundary to reduce the overall construction footprint. Areas within the repository footprint that lie outside of the impacted areas would be used for borrow soil for the cover or to fill and regrade excavated areas. The repository location would be selected to avoid site features (i.e., existing arroyos, trees) and to blend with the existing topography and general drainage patterns to the extent possible.

During response action and restoration activities, site access would be restricted by temporary fencing and signage. Temporary stormwater controls would be constructed to manage stormwater during response activities. Air monitoring and dust suppression control would be implemented during construction.

Existing wells within the limits of the impacted area would be abandoned and existing buildings, structures, or other debris within the limits of impacted area would be removed, demolished, and disposed of in the repository. Permanent stormwater controls and backfill and grading of excavated areas would be included in the design. Engineering and institutional controls may include fencing, signage, deed restrictions, or land use restrictions. The caps/repository could be accessible for controlled grazing, but residential use and excavation will be prohibited. Livestock access, fencing/cross fencing, vegetation, and potential impact on cap integrity will be evaluated during the remedy design phase to determine if controlled grazing is protective. Maintenance and monitoring of the Sites was assumed for 100 years to maintain long-term effectiveness.

Alternatives 3a and 3b are shown on Figures 10 and 11, respectively. Alternative 3a cross-section is shown on Figure 16 and Figure 18 includes Alternative 3b cross-section. Preliminary repository footprints extend into the following allotee parcels: Alternative 3a at Mac No. 1 – parcels 1183 and 1191; Alternative 3b at Black Jack No. 1 – parcels 1044, 1045, and 1046. Construction of Alternative 3 is expected to take approximately 657 working days for Alternative 3a and 672 working days for Alternative 3b. The estimated costs for each sub-alternative are $32.9 million and $30.4 million for 3a, and 3b, respectively.

4.1.4 ALTERNATIVE 4A: REGIONAL REPOSITORY AT MAC NO. 1

Alternative 4a assumes that MRM with concentrations above the RAG at each of the four Sites would be excavated and placed at a regional repository located at the Mac No. 1 site, combined with engineering and institutional controls. The total approximate volume of MRM from the four HMC Sites is 710,000 CY. Mac No. 1 site would have a repository containing the MRM, which would be graded to blend with the existing surrounding grades, capped with a cover system to mitigate erosion, limit infiltration, reduce radon emanation to acceptable limits, and be revegetated with native species.

The Mac No. 1 regional repository could accommodate a total volume of MRM up to 1,049,000 CY to include MRM from the four HMC Sites and the Mariano Lake Mine. The addition of MRM from Mariano Lake Mine would require cooperation from the party responsible for that material. For the purposes of this evaluation, the cost estimate for Alternative 4a includes disposal of MRM from only the four HMC Sites. Table 4-5 summarizes major activities, sub activities, and rationale for a consolidated repository.



The repository location at the Mac No. 1 site would overlap the impacted soil boundary to reduce the overall construction footprint. Areas within the repository footprint that lie outside of the impacted areas would be used for borrow soil for the cover or to fill and regrade excavated areas. The repository location would be selected to avoid site features (i.e., existing arroyos, trees) and to blend with the existing topography and general drainage patterns to the extent reasonably possible.

During response action and restoration activities, site access would be restricted by temporary fencing and signage. Temporary stormwater controls would be constructed to manage stormwater during response activities. Air monitoring and dust suppression control would be implemented during construction.

Existing wells within the limits of the impacted area would be abandoned and existing buildings, structures, or other debris within the limits of impacted area would be removed, demolished, and disposed of in the repository. Permanent stormwater controls and backfill and grading of excavated areas would be included in the design. Engineering and institutional controls may include fencing, signage, deed restrictions, or land use restrictions. The caps/repository could be accessible for controlled grazing, but residential use and excavation will be prohibited. Livestock access, fencing/cross fencing, vegetation, and potential impact on cap integrity will be evaluated during the remedy design phase to determine if controlled grazing is protective. Maintenance and monitoring of the Sites was assumed for 100 years to maintain long-term effectiveness.

Alternative 4a is shown on Figure 12, and in cross-section on Figure 16. Preliminary repository footprint extends into allotee parcels 1183 and 1191 at Mac No. 1. Construction of Alternative 4a is expected to take approximately 657 working days and the estimated cost is $32.9 million.

4.1.5 ALTERNATIVE 4B: REGIONAL REPOSITORY AT BLACK JACK NO. 1

Alternative 4b assumes that MRM with concentrations above the RAG at each of the four HMC Sites would be excavated and placed at a regional repository located at the Black Jack No. 1 site, combined with engineering and institutional controls. The total approximate volume from the four HMC Sites is 710,000 CY. Black Jack No. 1 site would have a repository containing the MRM, which would be graded to blend with the existing surrounding grades, capped with a cover system to mitigate erosion, limit infiltration, reduce radon emanation to acceptable limits, and be revegetated with native plant species.

The Black Jack No. 1 regional repository could accommodate a total volume of MRM up to 1,049,000 CY to include MRM from the four HMC Sites and the Mariano Lake Mine. The addition of MRM from Mariano Lake Mine would require cooperation from the party responsible for that material. The cost estimate for Alternative 4b includes disposal of MRM from only the four HMC Sites. Table 4-5 provides a summary of major activities, sub activities, and rationale for a consolidated repository.

The repository location at the Black Jack No. 1 site would overlap the impacted soil boundary to reduce the overall construction footprint. Areas within the repository footprint that lie outside of the impacted areas would be used for borrow soil for the cover or to fill and regrade excavated areas. The repository

location would be selected to avoid site features (i.e., existing arroyos, trees) and to blend with the existing topography and general drainage patterns to the extent reasonably possible.

During response action and restoration activities, site access would be restricted by temporary fencing and signage. Temporary stormwater controls would be constructed to manage stormwater during response activities. Air monitoring and dust suppression control would be implemented during construction.

Existing wells within the limits of impacted area would be abandoned and existing buildings, structures, or other debris within the limits of impacted area would be removed, demolished, and disposed of in the repository. Permanent stormwater controls and backfill and grading of excavated areas would be included in the design. Engineering and institutional controls may include fencing, signage, deed restrictions, or land use restrictions. The caps/repository could be accessible for controlled grazing, but residential use and excavation will be prohibited. Livestock access, fencing/cross fencing, vegetation, and potential impact on cap integrity will be evaluated during the remedy design phase to determine if controlled grazing is protective. Maintenance and monitoring of the Sites was assumed for 100 years to maintain long-term effectiveness and would include maintaining the stormwater controls.

Alternative 4b is shown on Figure 13 and in cross-section on Figure 18. Preliminary repository footprint extends into allotee parcels 1044, 1045, and 1046 at Black Jack No. 1. Construction of Alternative 4b is expected to take approximately 670 working days and the estimated cost is $30.3 million.

4.1.6 ALTERNATIVE 4C: TWO REGIONAL REPOSITORIES: ONE AT MAC NO. 1 AND ANOTHER AT BLACK JACK NO. 1

Alternative 4c assumes that MRM with concentrations above the RAG at each of the four Sites would be excavated and placed at one of two regional repositories, combined with engineering and institutional controls. One repository would be located at the Mac No. 1 site including approximately 340,000 CY from three HMC Sites (Mac No. 1, Mac No. 2, and Black Jack No. 2) and MRM from the Mariano Lake Mine. A second repository would be located at the Black Jack No. 1 site including approximately 370,000 CY from the Black Jack No. 1 consolidated in-place. Each site would have a repository to contain the MRM, which would be graded to blend with the existing surrounding grades, capped with a cover system to mitigate erosion, limit infiltration, reduce radon emanation to acceptable limits, and be revegetated with native plant species.

The regional repository at Mac No. 1 can accommodate MRM from the Mariano Lake Mine with the cooperation of the party responsible for the Mariano Lake Mine material. The regional repository at Mac No. 1 site would include excavated MRM from three HMC sites: Mac No. 1, Mac No. 2, Black Jack No. 2, and the Mariano Lake Mine. The repository for this alternative could accommodate up to 510,000 CY at the Mac No. 1 site as shown on Figure 8. The regional repository at the Black Jack No. 1 site would include excavated MRM from Black Jack No. 1. The repository for this alternative could accommodate up to 539,000 CY (as shown on Figure 9) but will only include the MRM from the Black Jack No. 1 site. The regional repositories could accommodate the waste from multiple sites, but for the purposes of this evaluation, the cost estimate for Alternative 4c includes disposal of MRM from only the four HMC Sites (710,000 CY). A summary of major activities, sub activities, and rationale for two consolidated repositories are included in Table 4-5.

The repository location at each site would overlap the impacted soil boundary to reduce the overall construction footprint. Areas within the repository footprint that lie outside of the impacted areas would be used for borrow soil for the cover or to fill and regrade excavated areas. The repository locations would be selected to avoid site features (i.e., existing arroyos, trees) and to blend with the existing topography and general drainage patterns to the extent reasonably possible.

During the Response Action and restoration activities, site access would be restricted by temporary fencing and signage. Temporary stormwater controls would be constructed to manage stormwater during response activities. Air monitoring and dust suppression control would be implemented during construction.

Existing wells within the limits of impacted area would be abandoned and existing buildings, structures, or other debris within the limits of impacted area would be removed, demolished, and disposed of in the repository. Permanent stormwater controls and backfill and grading of excavated areas would be included in the design. Engineering and institutional controls may include fencing, signage, deed restrictions, or land use restrictions. The caps/repository could be accessible for controlled grazing, but residential use and excavation will be prohibited. Livestock access, fencing/cross fencing, vegetation, and potential impact on cap integrity will be evaluated during the remedy design phase to determine if controlled grazing is protective. Maintenance and monitoring of each site was assumed for 100 years to maintain long-term effectiveness.

Alternative 4c is shown on Figure 15 and in cross-section on Figures 16 and 18. Preliminary repository footprints extend into allotee parcels 1183 and 1191 at Mac No. 1 and parcels 1044, 1045, and 1046 at Black Jack No. 1. Construction of Alternative 4c is expected to take approximately 578 working days and the estimated cost is $24.9 million.

4.1.7 ALTERNATIVE 5: EXCAVATION AND OFF-NAVAJO DISPOSAL WITHIN 100 MILES

Alternative 5 assumes that MRM with concentrations above the RAG at each of the four Sites would be excavated and transported from the Sites and moved off of Navajo Nation to a repository within 100 miles. Currently no repository exists that could accept the MRM. A repository would be designed and built at an approved location to contain the MRM from the four HMC Sites (710,000 CY), combined with engineering and institutional controls. This repository could be designed to accommodate MRM from other sites in the region. HMC identified a potentially viable repository location in the Ambrosia Lake, NM area within Township 14N, Range 10W, Section 13, as shown on Figure 20.

Although noncontiguous with the four Sites, the Sites and the Ambrosia Lake site are reasonably related with respect to the MRM and associated threats and sufficiently close in distance to constitute a single facility for purposes of creating an “on-site” repository in the Ambrosia Lake area for the MRM from the four Sites. The cost estimate and trucking calculations uses the average of 66 miles from the Sites to the repository location at Section 13. The haul route would utilize local roads at the Sites, highways, and the interstate to transport the MRM from the Sites to the repository location. The assumed haul route would follow NM-371 south to I-40 east, then north on NM-605 to NM-509 north to Section 13.

A Removal Site Evaluation (RSE) was conducted by HMC at the Section 13 site with an anticipated RSE Report submittal date of September 30, 2023, pending USEPA review and approval of the HHRA (submitted May 23, 2023) and Screening Level Ecological Risk Assessment (submitted March 27, 2023). A covered MRM pile already exists at the Section 13 site. The site was further characterized by collection of geologic data and advancement of boreholes. The field data collected during the RSE and geotechnical investigation include:

- Background gamma radiation surveys and surface/subsurface soil sampling
- Cultural and ecological resource surveys
- Gamma radiation surveys and gamma/soil correlation study
- Visual identification and documentation of remnant mine features
- Radon monitoring where historical conduits to underground workings still exist at the surface
- Borehole gamma depth profile logging and surface/subsurface soil sampling
- Geomorphic, geotechnical, and geological data to inform removal action/disposition options for contaminated soils

The repository at Section 13 to contain the MRM from the four HMC Sites would be graded to blend with the existing surrounding grades, capped with a cover system to mitigate erosion, limit infiltration, reduce radon emanation to acceptable limits, and be revegetated with native plant species. Table 4-6 summarizes major activities, sub activities, and rationale for a repository.

Table 4-6 Summary of Offsite MRM Disposal Activities (Alternative 5)

Major Activity	Sub Activity	Rationale
Design and site preparation	Design and planning of work Preparation of sites Site activities	• Design and work planning will be required to efficiently start, maintain progress, and complete the project. • Site preparation and site activities work will establish initial equipment parking areas, site traffic routes, security fence construction, and job trailer setup.
Clear vegetation	Clearing vegetation and stockpiling locally Debris removal	• Vegetation in parking, job trailer(s), maintenance, and work areas will be cleared. This will be done to increase safety and mitigate organic contamination of soil materials. Vegetation material will be stockpiled locally to reduce disposal costs. • Debris and remnant mine structures (wood, concrete, and metal) will be demolished and stockpiled for placing in the repository.
Excavate and place MRM in offsite repository	Excavating and hauling MRM material to offsite repository Placing and spreading MRM in offsite repository	• To contain MRM per the design, these materials will be excavated, stockpiled (on site), and hauled to a repository. • Demolished debris and remnant mine structures will be placed in the repository. Note: Over-the-road transportation of MRM to a repository is accounted for in a separate row, below.
Regrade excavated areas with borrow material	Excavate and haul borrow material found locally Placing and spreading borrow material	• Locally sourced fill materials will be hauled, placed, and graded on MRM excavation areas to support stormwater drainage and simulate natural topography. Sourcing borrow fill materials locally will reduce project costs.
Place topsoil and revegetate disturbed areas	Excavate and haul topsoil found locally Placing and spreading topsoil material Seeding over topsoil materials	• Locally sourced topsoil will be hauled, placed, and spread on the fill placed on MRM excavation areas to support revegetation. Sourcing borrow fill materials locally will reduce project costs. • Rock material will be sourced from offsite source near Gallup, NM, approximately 35 miles from the Sites. • Seeding MRM excavation areas will be required to establish vegetation.
Transport MRM to offsite repository site	Loading material for transport Hauling materials to offsite repository	• MRM will be loaded for transport to repository site. • Intersite hauling, or second handlings, will occur as MRM is staged at each site and transported to the repository site.



Identification and Analysis of Response Action Alternatives

Major Activity	Sub Activity	Rationale
Construct ET cover	Excavation and hauling of on-site borrow for cover	• ET cover construction is assumed as part of the design to contain MRM material. Construction will require excavation, hauling, placement, and grading cover soil materials. • To support revegetation of the ET cover area, seeding will be required.
	Place and spread materials for cover	
	Compaction of ET cover materials	
	Protective cover layer with gravel mixture	
	Place and spread protective layer	
	Seeding over ET cover	
Dust suppression and oversight	Water truck operating full time per day	• Dust suppression will be required during MRM excavation and repository construction to mitigate dust. Water spraying by truck will be used to moisten surface soil to reduce dust generation. • Due to a lack of water sources on the sites, water will be purchased from offsite source(s), hauled to the sites, and stored in water tanks for use. • Equipment and storage tanks required for dust suppression will require maintenance to operate safely and effectively.
	Water tank purchase (on-site)	
	Water tank filling and maintenance	
	Other costs (permit, surge tank)	
	Daily cost using offsite water source	
	Water purchase from source	
PRSC Costs for 5 years at the f four M&BJ sites and 12 years at the Ambrosia Lake repository site	Semi-annual cost of inspections Semi-annual cost of road maintenance	• Semi-annual inspections by an engineer at the four Sites to inspect excavated, backfilled, and revegetated areas. • Semi-annual maintenance includes grading the roads to maintain access at all four sites, until the end of the PRSC period. • The PRSC costs do not include PRSC at the Ambrosia Lake repository site.

During response action and restoration activities, site access at the four Sites would be restricted by temporary fencing and signage. Temporary stormwater controls would be constructed to manage stormwater during response activities. Air monitoring and dust suppression control would be implemented during construction.

Existing wells within the limits of the impacted area would be abandoned and existing buildings, structures, or other debris within the limits of impacted area would be removed, demolished, and disposed of in the repository. Permanent stormwater controls and backfill and grading of excavated areas to support stormwater drainage and simulate natural topography would be included in the design. Repository maintenance and monitoring was assumed for 100 years to maintain long-term effectiveness and would include maintaining the stormwater controls. Monitoring and maintenance of each MRM excavation area was assumed for 5 years to support revegetation efforts. Engineering and institutional controls may include fencing, signage, deed restrictions, or land use restrictions. The caps/repository could be accessible for controlled grazing, but residential use and excavation will be prohibited. Livestock access, fencing/cross fencing, vegetation, and potential impact on cap integrity will be addressed during the remedy design phase.

The repository for Alternative 5 was assumed to be similar in size and have similar dimensions as Alternative 3. The cost estimate assumes that MRM will be excavated and staged at Black Jack No. 1 mine, then hauled to the repository location. Construction of Alternative 5 is expected to take approximately 898 working days and the estimated cost is $40.6 million.

4.1.8 ALTERNATIVE 6: EXCAVATION AND OFF-NAVAJO DISPOSAL AT AN EXISTING LICENSED FACILITY

Alternative 6 assumes that MRM with concentrations above the RAG at each of the four Sites (710,000 CY) would be excavated and transported from the Sites and off of Navajo Nation. The Clean Harbors Deer Trail facility in Colorado was identified as the approved offsite RCRA Subtitle C disposal facility to dispose of the MRM. Although the Deer Trail facility confirmed that the estimated trucks per day (10 to 13) could be accepted for the duration of the project, the Deer Trail facility may not have sufficient capacity. The current reported total maximum permitted capacity of the Deer Trail facility is 2,528,000 CY. The estimated MRM from the four Sites would consume approximately 28% of the Deer Trail facility's available capacity. Deer Trail's future capacity is uncertain; therefore the facility may require additional RCRA Subtitle C Permitting actions. A summary of major activities, sub activities, and rationale for two consolidated repositories are included in Table 4-7.



Table 4-7 Summary of Activities for MRM Offsite Disposal or Processing (Off Navajo Nation) (Alternative 6)

Major Activity	Sub Activity	Rationale
Design and site preparation	Design and planning of work Preparation of sites Site activities	• Design and work planning will be required to efficiently start, maintain progress, and complete the project. • Site preparation and site activities work will establish initial equipment parking areas, site traffic routes, security fence construction, and job trailer setup.
Clear vegetation	Clearing vegetation and stockpiling locally Debris removal	• Vegetation in parking, job trailer(s), maintenance, and work areas will be cleared. This will be done to increase safety and mitigate organic contamination of soil materials. Vegetation material will be stockpiled locally to reduce disposal costs. • Debris and remnant mine structures (wood, concrete, and metal) will be demolished and stockpiled for offsite disposal.
Excavate and place MRM in local staging area	Excavation and hauling of MRM materials at Black Jack No. 1 to local staging area Excavation and hauling of MRM materials at Mac No. 1, Mac No. 2, and Black Jack No. 2 to local staging area	• To dispose of MRM per the design efficiently, these materials will be excavated and staged locally for hauling to offsite disposal location. • Demolished debris and remnant mine structures will be placed in the repository. Note: Over-the-road transportation of MRM to disposal location is accounted for in a separate row, below.
Regrade excavated areas with borrow material	Excavate and haul borrow material found locally Placing and spreading borrow material	• Locally sourced fill materials will be hauled, placed, and graded on MRM excavation areas to support stormwater drainage and simulate natural topography. Sourcing fill materials locally will reduce project costs.
Place topsoil and revegetate disturbed areas	Excavate and haul topsoil found locally Placing and spreading topsoil material Seeding over topsoil materials	• Locally sourced topsoil will be hauled, placed, and spread on the fill placed on MRM excavation areas to support revegetation. Sourcing fill materials locally will reduce project costs. • Seeding MRM excavation areas will be required to establish vegetation.
Consolidate MRM at Black Jack No. 1 staging area	Loading of material for site-to-site transport Hauling intersite materials to consolidation location	• MRM will be loaded for transport to consolidation location for logistics efficiency.

Identification and Analysis of Response Action Alternatives

Major Activity	Sub Activity	Rationale
		• Intersite hauling, or second handlings, will occur as MRM is staged at each site and transported to consolidation location. Note: Over-the-road transportation of MRM to disposal location is accounted for in a separate row, below.
Transport MRM to offsite disposal location	Loading MRM for transport to offsite disposal location	• To reach the offsite disposal location, MRM will be loaded onto over-the-road trucks and transported to the location.
	Hauling MRM to offsite disposal location (Deer Trail, Colorado)	
Environmental Waste Disposal	Deer Trail, Colorado disposal costs	• Fees must be paid to dispose of impacted materials at the Deer Trail facility.
Dust suppression and oversight	Water truck operating full time per day	• Dust suppression will be required during MRM excavation and repository construction to mitigate dust pollution and windblown spread of MRM. Water spraying by truck will be used to moisten surface soil to reduce dust generation. • Due to a lack of water sources on the sites, it was assumed that water will be purchased from offsite source(s), hauled to the sites, and stored in temporary water tanks for use. • Equipment and storage tanks required for dust suppression will require maintenance to operate safely and effectively.
	Water tank purchase (on-site)	
	Water tank filling and maintenance	
	Daily cost using offsite water source	
	Water purchase from source	
PRSC Costs for 5 years	Semi-annual cost of inspections Semi-annual cost of road maintenance	• Semi-annual inspections by an engineer at the four Sites to inspect excavated, backfilled, and revegetated areas. • Semi-annual maintenance includes grading the roads to maintain access at all four sites, until the end of the PRSC period.

During response action and restoration activities, site access would be restricted by temporary fencing and signage. Existing wells within the limits of the impacted area would be abandoned and existing buildings, structures, or other debris within the limits of impacted area would be removed, demolished, and disposed of in accordance with the selected remedy. Temporary stormwater controls would be constructed to manage stormwater during response activities. Air monitoring and dust suppression control would be implemented during construction. Permanent stormwater controls and backfill and grading of excavated areas would be included in the design. Monitoring and maintenance of each MRM excavation area would be required for 5 years to support revegetation efforts.

For cost purposes, Stantec assumed disposal costs at the Clean Harbors Deer Trail facility located in Colorado approximately 528 miles from the Sites. The disposal cost was based on a budgetary disposal estimate from the Deer Trail facility. The cost estimate assumes that MRM will be excavated and staged at Black Jack No. 1 mine, then hauled to the repository location. Implementation of Alternative 6 is expected to take approximately 1,505 working days and the estimated cost is $168.9 million.

4.2 Analysis of Response Action Alternatives

Each alternative was evaluated on the basis of effectiveness, implementability, and cost, as set forth in the USEPA guidance on conducting an EE/CA for a removal action (USEPA, 1993). Effectiveness refers to the ability of an alternative to meet the RAOs. Implementability addresses the technical and administrative feasibility of implementing an alternative and availability of various required services and materials. The elements for an action's estimated total cost generally include capital costs, PRSC costs, and net present value for capital and PRSC costs. The evaluation criteria and sub-criteria are discussed below. Per USEPA direction, State, Agency, and Community Acceptance were not evaluated in the analysis presented in this Final EE/CA. Public community input will be solicited as part of the EE/CA public comment process described in Section 3.2. The alternatives are evaluated for each of these criteria in the following sections and are also summarized in tables included in Appendix E. The alternatives were also ranked as very poor, poor, medium, good, or very good for threshold criteria, effectiveness, implementability, and cost. The details in the subsections below for each alternative provide support for the rankings assigned, which are summarized in Table 4-8.

Threshold Criteria

- **Protective of Human Health and the Environment** – Evaluates how each alternative achieves adequate protection and describes how the alternative will reduce, control, or eliminate risks through the use of treatment, engineering, or institutional controls. Evaluates the potential exposure pathways for each alternative that are disrupted and the way in which they are disrupted to achieve protectiveness. This evaluation should identify any unacceptable short-term impacts.
- **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) and Other Criteria, Advisories, and Guidance** – Evaluates how each alternative addresses and complies with ARARs as well as other criteria, advisories, and guidance that are typically identified as "to be considered" (TBC) information. Section 3, above, summarizes ARAR compliance.

Effectiveness

- **Long-Term Effectiveness and Permanence** – Evaluates the extent and effectiveness of controls that may be required to manage the risk posed by treatment residuals and/or untreated waste material. Magnitude of risk as well as adequacy and reliability of controls are specific factors evaluated. For mine waste sites, long-term effectiveness is an evaluation of the permanence and stability of the disposal alternative and how the repository will survive and age.
- **Short-Term Effectiveness** – Evaluates the effects of the alternative during implementation before the response objectives have been met. Alternatives should also be evaluated with respect to their effects on human health and the environment following implementation. Protection of the community and workers, environmental impact, and time until response objectives are achieved are specific factors evaluated.

Implementability

- **Technical Feasibility** – Evaluates the ability of the technology to implement the response action. Evaluates whether a proposed alternative can be built, and if there are aspects of the alternative that will make it more difficult to construct than other alternatives.
- **Administrative Feasibility** – Evaluates those activities needed to coordinate with other offices and agencies. The administrative feasibility of each alternative should be evaluated, including the need for offsite permits, adherence to applicable non-environmental laws, and concerns of other regulatory agencies. Statutory limits, permits, and waivers are specific factors evaluated.

4.2.1.1 Cost

- **Direct Capital Costs, Indirect Capital Costs, Annual Costs** – Evaluates the capital for materials, equipment, and related items. Cost estimates for each response action alternative were developed in accordance with the Association for the Advancement of Cost Engineering and *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (USEPA, 2000).

4.2.2 ALTERNATIVE 1: NO ACTION

Under Alternative 1, no action, treatment, containment, or response action would occur at any of the Sites. Potential human health and environmental impacts associated remain unchanged. The No Action alternative was retained to be used as a baseline for comparison with the response action alternatives.



4.2.2.1 Threshold Criteria

4.2.2.1.1 Protective of Human Health and the Environment

With no treatment, engineering, or institutional controls, MRM remains exposed to humans, animals, and the environment under Alternative 1. Stormwater discharge could potentially continue to transport MRM from the Sites to the downstream watersheds. Nearby residents and the environment could be exposed to wind and water-borne contaminants. The effectiveness of no action would be very poor for achieving the RAOs. This alternative would not minimize the potential exposure to or transport of COCs/COECs from the Sites. Exposure pathways would not be disrupted to achieve protectiveness. There would be no control of soil concentrations or mobility, and, therefore, no reduction in risk to human health or the environment.

4.2.2.1.2 Compliance with ARARs

Compliance with ARARs would not be met under Alternative 1. The MRM would not be managed under this alternative and, therefore, not comply with ARARs.

4.2.2.2 Effectiveness

4.2.2.2.1 Long-Term Effectiveness

Alternative 1 would not be an effective option for achieving RAOs long term. All MRM would remain in-place under this alternative resulting in exposure risks for humans and the environment via wind, groundwater, and surface water transport.

4.2.2.2.2 Short-Term Effectiveness

In general, Alternative 1 would not be an effective option for achieving RAOs in the short term. However, when compared to the other alternatives this option may reduce temporary exposure risk to humans, animals, and environment because the MRM will not be excavated or handled.

4.2.2.3 Implementability

The implementability of this alternative is very good and is technically and administratively feasible. No services, materials, personnel, or permits are required. However, community and Navajo Nation/State/Agency would be unlikely to accept this alternative.

4.2.2.4 Cost

The costs were ranked very good since here are no capital costs nor PRSC costs for this alternative.



4.2.3 ALTERNATIVE 2: CONSOLIDATE AND COVER IN-PLACE AT EACH SITE

Alternative 2 would require excavation and covering at each of the Sites and includes the following: excavation of MRM on the Sites, on site disposal and covering of mine wastes, and site restoration with erosion and stormwater controls, regrading, and revegetation.

4.2.3.1 Threshold Criteria

4.2.3.1.1 Protective of Human Health and the Environment

The MRM exceeding the RAG would be consolidated beneath an engineered ET cover on each mine site. This alternative would prevent direct contact between MRM and humans, and the environment. With proper design and construction of the cover, and proper stormwater controls and maintenance of the cover, release of MRM back into the environment would be mitigated. This alternative would meet RAOs of protecting human health and the environment through disruption of ingestion of soil and biota, direct contact, external exposure, and inhalation exposure pathways via engineered containment.

4.2.3.1.2 Compliance with ARARs

Alternative 2 is expected to comply with, or be eligible for obtaining a waiver of, the preliminary ARARs identified in Appendix D. Compliance with the substantive requirements of chemical-specific ARARs should be met by containing and isolating the MRM exceeding the RAG in a repository with a cover system. Stormwater controls would be included in the design so that stormwater would be diverted around the repository. The cover would provide a physical barrier to provide protection from water infiltration to the mine wastes and also provide shielding from ionizing radiation to protect human health and the environment.

Compliance with substantive requirements of the location-specific ARARs should be met. Natural and Cultural Resource surveys have been conducted at the Sites. Those surveys would be reviewed, and additional surveys would be identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.

Compliance with substantive requirements of the action-specific ARARs should be met. These include control of stormwater discharges during construction, establishing best management practices (BMPs) for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.



4.2.3.2 Effectiveness

4.2.3.2.1 Long-Term Effectiveness

The long-term effectiveness and permanence was ranked medium for Alternative 2 since the MRM remains on Navajo Nation and depends on the monitoring and maintenance activities. Since this alternative includes four separate repositories that would need to be maintained and monitored, four repository sites at four separate locations would remain with restricted use and have contaminated material present on each site. Comparative to other alternatives that consolidate waste to one or two locations (3a, 3b, 4a, 4b, and 4c), these other alternatives would have two or three sites for unrestricted use in the long-term. Alternatives 5 and 6 would have unrestricted use at all four sites long-term. Depending on final repository footprints, Alternative 2 would place repositories on, and require long-term restrictions on, between five and nine allottee parcels (Figures 6 through 9). The long-term effectiveness of Alternative 2 is ranked lower than the other alternatives since more long-term site restrictions remain for this alternative across the Sites, preventing future land uses including residential.

A 100-year monitoring and maintenance plan is assumed for Alternative 2. Alternative 2 is expected to effectively mitigate the effects on potential human health and the environment by excavating, consolidating, and covering the MRM at each site. The cover would minimize the water infiltration and human or animal disturbance to the MRM with proper engineering controls such as signage and fencing if necessary. The conceptual repositories have slopes between one and five percent, with slope lengths less than 1000 ft. These factors contribute to the long-term stability of the repositories for both slope stability and erosional stability.

4.2.3.2.2 Short-Term Effectiveness

The primary considerations of short-term effectiveness are protection of the community, workers, and environmental impacts during and after implementation. Alternative 2 was ranked very good for short-term effectiveness and activities are anticipated to take 579 working days to complete, which could encounter weather delays during the winter months.

Alternative 2 involves clearing and excavation, material transfer, stockpile management, construction of cover and stormwater controls, and site restoration activities (backfilling and seeding). Heavy equipment would be used to clear and grub, excavate, transfer, load, grade the MRM, and construct the cover. Dust control and air monitoring would be implemented to protect the community and workers during implementation of the alternative. Additionally, worker protection and safety equipment would be implemented to protect workers. Potential exposure and protection procedures for workers engaged in the implementation would be addressed under a Site-Specific Health and Safety Plan (HASP). Work areas would be secured to control access to authorized personnel.

Heavy equipment transporting the MRM within each site would be covered and secured. Traffic would be coordinated under a site-specific transportation plan for haul routes, operating hours, and traffic rules. Emergency spill containment and cleanup contingencies would be included in this plan during implementation of the alternative.



Potential community impacts include temporary traffic affects and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. Alternative 2 would produce additional greenhouse gas emissions, compared with Alternative 1 and would impact the air quality to nearby residents, but the effects are assumed to be contained to the mine sites and immediate areas. For Alternative 2, waste hauling would be restricted to each mine site and heavy equipment would be present on the highway during mobilization/demobilization, and to import borrow/fill or rock materials.

4.2.3.3 Implementability

4.2.3.3.1 Technical and Administrative Feasibility

Alternative 2 was ranked good for technical feasibility and would not require unconventional techniques, materials, or labor for the excavation, covering, and associated activities. The Sites are readily accessible when permission is granted by the property owners. Work would be performed in a manner that promotes worker and public safety and minimizes handling where possible. Excavation would be performed in a manner to maximize direct loading, hauling, and dumping. Roadway improvement and haul routes would be made to optimize access for equipment, materials, and labor. Temporary construction stormwater controls would be utilized, and permanent stormwater controls would be developed as part of the design.

There would be a greater impact on the land and potential land use restrictions for Alternative 2 compared to the other alternatives. The four M&BJ Site locations would have a repository at each location and those repository locations would have restricted land use and potentially have institutional controls. In comparison to other alternatives that consolidate the MRM into one or two repositories, Alternative 2 has more locations with restricted use. However, the repositories are smaller and would be easier to scale, and blend with the natural topography at each site. The repositories have the lowest height, and shortest slope lengths compared to other alternatives.

Alternative 2 was ranked good for administrative feasibility, four repository locations will require similar coordination with multiple land owners, access, permits, and agreements as compared to the other repository alternatives (3, 4, 5, and 6). Government to government consultation is ongoing on specific administrative actions such as rights-of-way, permits, and property easements. Construction of an on-site cover at each site would require similar permitting compared to the other on-site repository alternatives (alternatives 3 and 4) because mine wastes would be relocated on site and would not be transported offsite. Depending on the repository location, property easements may be required.

4.2.3.4 Cost

Costs for Alternative 2 were ranked very good. The estimated construction cost for Alternative 2 is $22,199,094, and the estimated PRSC cost is $381,609. The detailed cost estimate is included in Appendix F.



4.2.4 ALTERNATIVES 3A AND 3B: CONSOLIDATE FOUR HOMESTAKE SITES AT ONE REPOSITORY SITE

Alternatives 3a and 3b would require excavation at each of the four Sites, transportation of MRM, and covering at one site and includes the following steps: excavation of MRM on the Sites, on site disposal in a repository at either Mac No. 1 or Black Jack No. 1 site and covering of mine wastes, and site restoration with erosion and stormwater controls, regrading, and revegetation. Alternative 3a assumes a repository at Mac No. 1 and 3b assumes a repository at Black Jack No. 1.

4.2.4.1 Threshold Criteria

4.2.4.1.1 Protective of Human Health and the Environment

The MRM exceeding the RAG would be excavated from the Sites and consolidated and covered in a repository at either the Mac No. 1 site or Black Jack No. 1 site. These activities would prevent direct contact between the MRM and humans and the environment. With proper design and construction of the cover, and proper stormwater controls and maintenance of the cover, erosion and release of MRM back into the environment would be mitigated. Alternatives 3a and 3b would provide protection of human health and the environment through disruption of the ingestion of soil and biota, direct contact, external exposure, and inhalation exposure pathways via removal of MRM (for those sites where material is being removed) and engineered containment at the repository location.

4.2.4.1.2 Compliance with ARARs

Alternatives 3a and 3b are expected to comply with, or be eligible for obtaining a waiver of, the preliminary ARARs identified in Appendix D. Compliance with substantive requirements of the chemical-specific ARARs should be met by containing and isolating the MRM exceeding the RAG in a repository with a cover system. Stormwater controls would be included in the design so that stormwater would be diverted around the repository. The cover would provide a physical barrier to provide protection from water infiltration to the mine wastes and also provide shielding from ionizing radiation to protect human health and the environment.

Compliance with substantive requirements of the location-specific ARARs should be met. Natural and Cultural Resource surveys have been conducted at the site. Those surveys would be reviewed, and additional surveys would be identified and conducted, if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.

Compliance with substantive requirements of the action-specific ARARs should be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.



4.2.4.2 Effectiveness

4.2.4.2.1 Long-Term Effectiveness

The long-term effectiveness and permanence were ranked good for Alternatives 3a and 3b since the MRM remains on Navajo Nation and depends on the long-term monitoring and maintenance activities. A 100-year monitoring and maintenance plan is assumed for Alternatives 3a/3b. Alternatives 3a and 3b consolidate the MRM into one repository location, which results in three sites without land use restrictions. Only the repository site location would have land use restrictions long-term. Depending on final repository footprints, Alternative 3a would place a repository on, and require long-term restrictions on, one to two allottee parcels (Figure 10), and Alternative 3b would require long-term restrictions on one to three allottee parcels (Figure 11). Alternatives 3a and 3b were ranked higher than Alternative 2 for long-term effectiveness due to returning more Site locations to unrestricted land use, including residential. If the cap and stormwater diversion channels are properly maintained, Alternatives 3a/3b are expected to effectively mitigate the effects on potential human health and the environment by excavating, consolidating, and covering the MRM at each site. The cover would minimize the water infiltration and human or animal disturbance to the MRM in conjunction with proper engineering controls such as signage and fencing, if necessary.

The conceptual repositories have slopes between one and five percent, with slope lengths up to 1500 ft. These factors contribute to and provide long-term stability of the repository for both slope stability and erosional stability.

4.2.4.2.2 Short-Term Effectiveness

The primary considerations of short-term effectiveness are protection of the community, workers, and environmental impacts during and after implementation. Alternatives 3a/3b activities are anticipated to take place over 657 working days and could encounter winter weather delays.

Alternatives 3a/3b were ranked good for short-term effectiveness and involves clearing and excavation, transporting MRM offsite, stockpile management, construction of cover and stormwater controls, and site restoration activities (backfilling and seeding). Heavy equipment would be used to clear and grub, excavate, load, transport, and grade the MRM, and construct the cover. Dust control and air monitoring would be implemented to protect the community and workers during implementation of the alternative. Additionally, worker protection and safety equipment would be implemented to protect workers. Potential exposure and protection procedures for workers engaged in the implementation would be addressed under a Site-Specific Health and Safety Plan. Work areas would be secured to control access to authorized personnel.

Heavy equipment transporting the MRM would be covered and secured. Traffic would be coordinated under a site-specific transportation plan for haul routes, operating hours, and traffic rules. Emergency spill containment and cleanup contingencies would be included in this plan during implementation of the alternative. The estimated number of truck loads and truck loads per day hauling MRM are summarized in Table 4-9, assuming the use of nine trucks carrying 40 CY per load.



Table 4-9 Alternatives 3a and 3b Truck Load Summary

Alternative	Total Hauling Days	Average Haul Distance	Total Truck Loads	Truck Loads / Day	Total Miles Traveled[1]	Potential Accidents[2]	Potential Fatalities[2]
3a	129	11 mi	16,106	124	345,339	0.57	0.005
3b	55	8 mi	8,414	153	134,617	0.22	0.002

[1] Total miles traveled only includes hauling MRM material. Does not include mobilization/demobilization or importing any borrow or rock materials.
[2] Potential accidents and fatalities estimated based on New Mexico average Crash Rate from 2010 to 2019 of 162.1 crashes per 100 million vehicle miles traveled and New Mexico average fatality rate from 2010 to 2019 of 1.33 fatalities per 100 million vehicle miles traveled (NMDOT, 2021; 2020; 2019; 2018; 2017a; 2017b; 2016; 2015; 2013a; 2013b)

Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. Alternatives 3a/3b would produce comparatively more greenhouse gas emissions than Alternative 2 and would impact the air quality to nearby residents over a larger area. For Alternatives 3a/3b, MRM hauling would take place between each mine site and the repository location and heavy equipment would be present on the highway during construction. The average haul distance for Alternative 3a is 10.7 miles, and for Alternative 3b is 8.1 miles. The total days spent hauling MRM is greater for Alternative 3a, but there would be slightly less trucks on the roads per day compared to Alternative 3b. The total traveled distance is approximately 346,000 miles for Alternative 3a and 135,000 for Alternative 3b. Each alternative increases the potential for construction related accidents to occur because of the increased truck traffic. Additional measures and plans would be in place to protect the public and community while hauling MRM on the highway. Heavy equipment would also be present on the highway during mobilization/demobilization and to import borrow/fill or rock materials.

4.2.4.3 Implementability

4.2.4.3.1 Technical and Administrative Feasibility

Alternatives 3a/3b were ranked good for technical feasibility and would not require unconventional techniques, materials, or labor for the excavation, covering, and associated activities. The Sites are readily accessible when permission is granted by the property owners. Work would be performed to safeguard workers and the public and minimize handling where possible. Excavation would be performed in a manner to maximize direct loading, hauling, and dumping. Roadway improvement and haul routes would be made to optimize access for equipment, materials, and labor. Temporary construction stormwater controls would be utilized, and permanent stormwater controls would be developed as part of the design.



Alternatives 3a/3b were ranked good for administrative feasibility. Construction of an on-site cover at either Mac No. 1 or Black Jack No. 1 would not require additional permitting compared to the other repository alternatives (Alternatives 2, 4, and 5) because mine wastes would be relocated to another mine site nearby. Depending on the location of the repository within the site, property easements or other land use restriction instruments may be required. Government to government consultation is ongoing on specific administrative actions such as rights-of-way, permits, and property easements.

There would be less impact on the land and potential land use restrictions for Alternatives 3a and 3b to construct one repository. However, the repositories for this alternative are smaller than the regional repositories (Alternatives 4a, 4b, and 4c), and would be easier to construct, scale, and blend with the natural topography.

4.2.4.4 Cost

Costs for Alternatives 3a/3b were ranked good. The estimated construction cost for Alternative 3a is $32,627,055, and the estimated PRSC cost is $249,698. The estimated construction cost for Alternative 3b is $30,241,781, and the estimated PRSC cost is $140,321. The detailed cost estimate is included in Appendix F.

4.2.5 ALTERNATIVE 4A: REGIONAL REPOSITORY AT MAC NO. 1

Alternative 4a would require excavation at the four HMC Sites and the Mariano Lake Mine and includes the following steps: excavation of MRM on the Sites, on site disposal in a repository at Mac No. 1 and covering of mine wastes, and site restoration with erosion and stormwater controls, regrading, and revegetation.

4.2.5.1 Threshold Criteria

4.2.5.1.1 Protective of Human Health and the Environment

The MRM exceeding the RAG would be excavated from the Sites and consolidated and covered in a repository at the Mac No. 1 site. These activities would prevent direct contact between the MRM and humans and the environment. With proper design and construction of the cover, and proper stormwater controls and maintenance of the cover, erosion, and release of MRM back into the environment would be mitigated. Alternative 4a would provide protection of human health and the environment through disruption of the ingestion of soil and biota, direct contact, external exposure, and inhalation exposure pathways via removal of MRM (for those sites where material is being removed) and engineered containment at the repository location.

4.2.5.1.2 Compliance with ARARs

Alternative 4a is expected to comply with or be eligible for obtaining a waiver of, the preliminary ARARs identified in Appendix D. Compliance with substantive requirements of the chemical-specific ARARs should be met by containing and isolating the MRM exceeding the RAG in a repository with a cover



system. Stormwater controls would be included in the design so that stormwater would be diverted around the repository. The cover would provide a physical barrier to provide protection from water infiltration to the mine wastes and also provide shielding from ionizing radiation to protect human health and the environment.

Compliance with substantive requirements of the location-specific ARARs should be met. Natural and Cultural Resource surveys were conducted at the Sites. Those surveys would be reviewed, and additional surveys identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.

Compliance with substantive requirements of the action-specific ARARs should be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.

4.2.5.2 Effectiveness

4.2.5.2.1 Long-Term Effectiveness

The long-term effectiveness and permanence was ranked good for Alternative 4a since the MRM is consolidated into one repository location. This would result in three Mac and Black Jack site locations and the Mariano Lake site location with removal of MRM and unrestricted long-term use, allowing for future residential use. According to USEPA, this would benefit the community and allow for future development at the Mac No.2, Black Jack No. 1, Black Jack No. 2, and Mariano Lake mine sites. The one repository location will have MRM that remains on allotments within the Mariano Lake Chapter of the Navajo Nation and depends on the long-term monitoring and maintenance activities. One repository will require fewer long-term land use restrictions than Alternatives 2 and 3, but more than Alternatives 5 and 6 which remove the MRM from all four Sites. Depending on the final repository footprint, Alternative 4a would place a repository on, and require long-term restrictions on, one to three allottee parcels (Figure 12). A 100-year monitoring and maintenance plan is assumed for Alternative 4a. If the cover and stormwater diversion channels are properly maintained, Alternative 4a is expected to effectively mitigate the effects on potential human health and the environment by excavating MRM at each site and consolidating and covering the MRM at the repository site. The cover would minimize the water infiltration and human or animal disturbance to the MRM in conjunction with proper engineering controls such as signage and fencing, if necessary.

The conceptual repository has slopes between one and five percent, with slope lengths up to 1250 ft. These factors contribute to and provide long-term stability of the repository for both slope stability and erosional stability.

4.2.5.2.2 Short-Term Effectiveness

The primary considerations of short-term effectiveness are protection of the community, workers, and environmental impacts during and after implementation. Alternative 4a activities are anticipated to take place over 657 working days and could encounter winter weather delays.

Alternative 4a was ranked good for short-term effectiveness and involves clearing and excavation, transporting MRM offsite, stockpile management, construction of cover and stormwater controls, and site restoration activities (backfilling and seeding). Heavy equipment would be used to clear and grub, excavate, load, transport, and grade the MRM, and construct the cover. Dust control and air monitoring would be implemented to protect the community and workers during implementation of the alternative. Additionally, worker protection and safety equipment would be implemented to protect workers. Potential exposure and protection procedures for workers engaged in the implementation would be addressed under a Site-Specific HASP. Work areas would be secured to control access to authorized personnel.

Heavy equipment transporting the MRM would be covered and secured. Traffic would be coordinated under a site-specific transportation plan for haul routes, operating hours, and traffic rules. Emergency spill containment and cleanup contingencies would be included in this plan during alternative implementation. The estimated number of truck loads and truck loads per day hauling MRM are summarized in Table 4-10, assuming the use of nine trucks carrying 40 CY per load.

Table 4-10 Alternative 4a Truck Load Summary

Alternative	Total Hauling Days	Average Haul Distance	Total Truck Loads	Truck Loads / Day	Total Miles Traveled[1]	Potential Accidents[2]	Potential Fatalities[2]
4a	129	11 mi	16,106	124	354,339	0.57	0.005

[1] Total miles traveled only includes hauling MRM material. Does not include mobilization/demobilization or importing any borrow or rock materials.
[2] Potential accidents and fatalities estimated based on New Mexico average Crash Rate from 2010 to 2019 of 162.1 crashes per 100 million vehicle miles traveled and New Mexico average fatality rate from 2010 to 2019 of 1.33 fatalities per 100 million vehicle miles traveled (NMDOT, 2021; 2020; 2019; 2018; 2017a; 2017b; 2016; 2015; 2013a; 2013b)

Potential community impacts include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. Alternative 4a would produce additional greenhouse gas emissions compared to the Alternatives 2, 3b, 4b, and 4c, and would impact the air quality to nearby residents. For Alternative 4a, MRM hauling would take place between each mine site and the repository location and heavy equipment would be present regularly on the highway during construction. The weighted-average haul distance for Alternative 4a is 11 miles to Mac No. 1 site. The total traveled distance is approximately 355,000 miles and creates the potential for accidents to occur because of the increased truck traffic. This alternative has a similar number of miles traveled as Alternative 3a. Additional measures and plans would be in place to protect the public and community while hauling MRM on the highway. Heavy equipment would also be present on the highway during mobilization/demobilization and to import borrow/fill or rock materials.



4.2.5.3 Implementability

4.2.5.3.1 Technical and Administrative Feasibility

Alternative 4a was ranked good for technical feasibility and would not require unconventional techniques, materials, or labor for the excavation, covering, and associated activities. The Sites are readily accessible when permission is granted by the property owners. Work would be performed to maximize worker and public safety and minimize handling where possible. Excavation would be performed to maximize direct loading, hauling, and dumping. Roadway improvement and haul routes would be made to optimize access for equipment, materials, and labor. Temporary construction stormwater controls would be utilized, and permanent stormwater controls would be developed as part of the design.

Alternative 4a was ranked good for administrative feasibility. The MRM remains on allotments within the Mariano Lake Chapter of the Navajo Nation and would require coordination and cooperation with other agencies, including BIA, and Navajo Nation. Construction of an on-site cover at Mac No. 1 would require similar permitting compared to the other on-site repository alternatives (Alternatives 2, 3, 4b, and 4c) because mine wastes would be relocated to another HMC mine site. Government to government consultation is ongoing on specific administrative actions such as rights-of-way, permits, and property easements. Depending on the repository location within the site, property easements may be required.

There would be less impact on the land and potential land use restrictions for Alternative 4a to construct one repository when compared to Alternative 2. However, the repositories for this alternative are larger than the other alternatives and would be more difficult to blend in with the surrounding topography and scale to a larger footprint because of existing site features that constrain the footprint (e.g., arroyos, trees, overlap with impacted material).

4.2.5.4 Cost

Costs for Alternative 4a were ranked good. The estimated construction cost for Alternative 4a is $32,624,838 and the estimated PRSC cost is $249,698. The detailed cost estimate is included in Appendix F.

4.2.6 ALTERNATIVE 4B: REGIONAL REPOSITORY AT BLACK JACK NO. 1

Alternative 4b includes the following steps: excavation of MRM on the four HMC Sites and the Mariano Lake Mine, on-site disposal in a repository at Black Jack No. 1 and covering of mine wastes, site restoration with erosion and stormwater controls, regrading, and revegetation.

4.2.6.1 Threshold Criteria

4.2.6.1.1 Protection of Human Health and Environment

The MRM exceeding the RAG would be excavated from the Sites and consolidated and covered in a repository at the Black Jack No. 1 site. These activities would prevent direct contact between the MRM and humans and the environment. Proper design and construction of the cover, and proper stormwater



controls and maintenance of the cover, would mitigate erosion and release of MRM back into the environment. Alternative 4b would provide protection of human health and the environment through disruption of the ingestion of soil and biota, direct contact, external exposure, and inhalation exposure pathways via removal of MRM (for those sites where material is being removed) and engineered containment at the repository location.

4.2.6.1.2 Compliance with ARARs

Alternative 4b is expected to comply with, or be eligible for obtaining a waiver of, the preliminary ARARs identified in Appendix D. Compliance with substantive requirements of the chemical-specific ARARs should be met by containing and isolating the MRM exceeding the RAG in a repository with a cover system. Stormwater controls would be included in the design to divert stormwater around the repository. The cover would provide a physical barrier against water infiltration to the mine wastes and also provide shielding from ionizing radiation to protect human health and the environment.

Compliance with substantive requirements of the location-specific ARARs should be met. Natural and Cultural Resource surveys were conducted at the Sites and those surveys would be reviewed and additional surveys identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.

Compliance with substantive requirements of the action-specific ARARs should be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.

4.2.6.2 Effectiveness

4.2.6.2.1 Long-Term Effectiveness

The long-term effectiveness and permanence was ranked good for Alternative 4b since the MRM is consolidated into one repository location. This would result in three Mac and Black Jack site locations and the Mariano Lake site location with removal of MRM and unrestricted long-term use, allowing for future residential use. According to USEPA, this would benefit the community and allow for future development at the Mac No.1, Mac No. 2, Black Jack No. 2, and Mariano Lake mine sites. The one repository location will have MRM that remains on allotments within the Smith Lake Chapter of the Navajo Nation and depends on the long-term monitoring and maintenance activities. One repository is likely to create less long-term land use restrictions than Alternatives 2 and 3, but more than Alternatives 5 and 6 which remove the MRM from all four Sites. Depending on final repository footprint, Alternative 4b would place the repository on, and require long-term restrictions on, two to three allottee parcels (Figure 13). A 100-year monitoring and maintenance plan is assumed for Alternative 4b. If the cover and stormwater diversion channels are properly maintained, Alternative 4b is expected to effectively mitigate the effects



on potential human health and the environment by excavating, consolidating, and covering the MRM at each site. The cover would minimize the water infiltration and human or animal disturbance to the MRM in conjunction with proper engineering controls such as signage and fencing, if necessary.

The conceptual repository has slopes between one and five percent, with slope lengths up to 2000 ft. These factors contribute to and provide long-term stability of the repository for both slope stability and erosional stability.

4.2.6.2.2 Short-Term Effectiveness

The primary considerations of short-term effectiveness are protection of the community, workers, and environmental impacts during and after implementation. Alternative 4b activities are anticipated to take place over 670 working days and could encounter winter weather delays.

Alternative 4b was ranked good for short-term effectiveness and involves clearing and excavation, transporting MRM offsite, stockpile management, construction of cover and stormwater controls, and site restoration activities (backfilling and seeding). Heavy equipment would be used to clear and grub, excavate, load, transport, and grade the MRM, and construct the cover. Dust control and air monitoring would be implemented to protect the community and workers during implementation of the alternative. Additionally, safe work practices would be implemented, and safety equipment used to protect workers. Potential exposure and protection procedures for workers engaged in the implementation would be addressed under a Site-Specific HASP. Work areas would be secured to control access to authorized personnel.

Heavy equipment transporting the MRM would be covered and secured. Traffic would be coordinated under a site-specific transportation plan for haul routes, operating hours, and traffic rules. Emergency spill containment and cleanup contingencies would be included in this plan during implementation of the alternative. The estimated number of truck loads and truck loads per day hauling MRM are summarized in Table 4-11, assuming the use of nine trucks carrying 40 CY per load.

Table 4-11 Alternative 4b Truck Load Summary

Alternative	Total Hauling Days	Average Haul Distance	Total Truck Loads	Truck Loads / Day	Total Miles Traveled[1]	Potential Accidents[2]	Potential Fatalities[2]
4b	55	8 mi	8,414	153	134,617	0.22	0.002

[1] Total miles traveled only includes hauling MRM material. Does not include mobilization/demobilization or importing any borrow or rock materials.
[2] Potential accidents and fatalities estimated based on New Mexico average Crash Rate from 2010 to 2019 of 162.1 crashes per 100 million vehicle miles traveled and New Mexico average fatality rate from 2010 to 2019 of 1.33 fatalities per 100 million vehicle miles traveled (NMDOT, 2021; 2020; 2019; 2018; 2017a; 2017b; 2016; 2015; 2013a; 2013b)

Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. Alternative 4b would produce



additional greenhouse gas emissions compared to Alternatives 2 and 4c and would impact the air quality to nearby residents, similarly to Alternative 3b. For Alternative 4b, MRM hauling would take place between each mine site and the repository location and heavy equipment would be present regularly on the highway during construction. The weighted-average haul distance for Alternative 4b is 8 miles to Black Jack No. 1 site. The total traveled distance is approximately 135,000 miles and poses the potential for increased accidents to occur because of the increased truck traffic and miles traveled. Additional measures and plans would be in place to protect the public and community while hauling MRM on the highway. Heavy equipment would also be present on the highway during mobilization/demobilization and to import borrow/fill or rock materials.

4.2.6.3 Implementability

4.2.6.3.1 Technical and Administrative Feasibility

Alternative 4b was ranked good for technical feasibility and would not require unconventional techniques, materials, or labor for the excavation, covering, and associated activities. The Sites are readily accessible when permission is granted by the property owners. Work would be performed to safeguard workers and the public and minimize handling where possible. Excavation would be performed to maximize direct loading, hauling, and dumping. Roadway improvement and haul routes would be made to optimize access for equipment, materials, and labor. Temporary construction stormwater controls would be utilized, and permanent stormwater controls would be developed as part of the design.

Alternative 4b was ranked good for administrative feasibility. The MRM remains on Navajo Nation and would require coordination and cooperation with other agencies, including BIA and, Navajo Nation to obtain the necessary easements or rights of way. Construction of an on-site cover at Black Jack No. 1 would require similar permitting compared to the other on-site repository alternatives (Alternatives 2, 3, 4a, and 4c) because mine wastes would be relocated to another nearby mine site. Government to government consultation is ongoing on specific administrative actions such as rights-of-way, permits, and property easements. Depending on the location of the repository within the site, property easements may be required.

There would be less impact on the land and potential land use restrictions for Alternative 4b to construct one repository when compared to Alternative 2. However, the repository for this alternative is larger than the other alternatives and would be more difficult to blend in with the surrounding topography and scale to a larger footprint. One repository at one site is likely to create the least land use restrictions.

4.2.6.4 Cost

Costs for Alternative 4b were ranked good. The estimated construction cost for Alternative 4b is $30,186,876 and the estimated PRSC cost is $140,321. The detailed cost estimate is included in Appendix F.



4.2.7 ALTERNATIVE 4C: TWO REGIONAL REPOSITORIES: ONE AT MAC NO. 1 AND ANOTHER AT BLACK JACK NO. 1

Alternative 4c would require excavation at the four HMC Sites and Mariano Lake Mine and includes the following steps: excavation of MRM on the Sites, on site disposal in one of two repositories at either Mac No. 1 or Black Jack No. 1 sites and covering of mine wastes, and site restoration with erosion and stormwater controls, regrading, and revegetation.

4.2.7.1 Threshold Criteria

4.2.7.1.1 Protection of Human Health and Environment

The MRM exceeding the RAG would be excavated from the Sites and consolidated and covered in one of two repositories at both the Mac No. 1 site and Black Jack No. 1 sites. These activities would prevent direct contact between the MRM and humans and the environment. With proper design and construction of the covers, and proper stormwater controls and maintenance of the cover, erosion and release of MRM back into the environment would be mitigated. Alternative 4c would provide protection of human health and the environment through disruption of the ingestion of soil and biota, direct contact, external exposure, and inhalation exposure pathways via removal of MRM (for those sites where material is being removed) and engineered containment at the repository location.

4.2.7.1.2 Compliance with ARARs

Alternative 4c is expected to comply with, or be eligible for obtaining a waiver of, the preliminary ARARs identified in Appendix D. Compliance with substantive requirements of the chemical-specific ARARs should be met by containing and isolating the MRM exceeding the RAG in a repository with a cover system. Stormwater controls would be included in the design so that overland flow during storm events would be diverted around the repository. The cover would provide a physical barrier to provide protection from water infiltration to the MRM and provide shielding from ionizing radiation to protect human health and the environment.

Compliance with substantive requirements of the location-specific ARARs should be met. Natural and Cultural Resource surveys have been conducted at the Sites and those surveys would be reviewed and additional surveys would be identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.

Compliance with substantive requirements of the action-specific ARARs should be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.



4.2.7.2 Effectiveness

4.2.7.2.1 Long-Term Effectiveness

The long-term effectiveness and permanence was ranked good for Alternative 4c since the MRM is consolidated into two repository locations. This would result in two Mac and Black Jack site locations and the Mariano Lake site location with removal of MRM and unrestricted long-term use, allowing for future residential use. According to USEPA, this would benefit the community and allow for future development at the Mac No. 2, Black Jack No. 2, and Mariano Lake mine sites. The two repository locations will have MRM that remains on allotments within the Smith Lake and Mariano Lake Chapters of the Navajo Nation and depends on the long-term monitoring and maintenance activities. Two repositories are likely to create less land use restrictions than Alternatives 2 and 3, but more than Alternatives 5 and 6 which remove the MRM from all four Sites. Depending on final repository footprints, Alternative 4c would place repositories on, and require long-term restrictions on, two to five allottee parcels (Figure 8 and 14). A 100-year monitoring and maintenance plan is assumed for Alternative 4c. If the cover and stormwater diversion channels are properly maintained, Alternative 4c is expected to effectively mitigate the effects on potential human health and the environment by excavating, consolidating, and covering the MRM at each site. The cover would minimize the water infiltration and human or animal disturbance to the MRM in conjunction with proper engineering controls such as signage and fencing, if necessary.

The conceptual repository has slopes between one and five percent, with slope lengths up to 1500 ft. These factors contribute to and provide long-term stability of the repository for both slope stability and erosional stability.

4.2.7.2.2 Short-Term Effectiveness

The primary considerations of short-term effectiveness are protection of the community, workers, and environmental impacts during and after implementation. Alternative 4c activities are anticipated to take place over 578 working days and could encounter winter weather delays.

Alternative 4c was ranked good for short-term effectiveness and involves clearing and excavation, transporting MRM offsite, stockpile management, construction of cover and stormwater controls, and site restoration activities (backfilling and seeding). Heavy equipment would be used to clear and grub, excavate, load, transport, and grade the MRM, and construct the cover. Dust control and air monitoring would be implemented to protect the community and workers during implementation of the alternative. Additionally, worker protection and safety equipment would be implemented to protect workers. Potential exposure and protection procedures for workers engaged in the implementation would be addressed under a Site-Specific HASP. Work areas would be secured to control access to authorized personnel.

Heavy equipment transporting the MRM would be covered and secured. Traffic would be coordinated under a site-specific transportation plan for haul routes, operating hours, and traffic rules. Emergency spill containment and cleanup contingencies would be included in this plan during implementation of the alternative. The estimated number of truck loads and truck loads per day hauling MRM are summarized in Table 4-12, assuming the use of nine trucks carrying 40 CY per load.

Table 4-12 Alternative 4c Truck Load Summary

Alternative	Total Hauling Days	Average Haul Distance	Total Truck Loads	Truck Loads / Day	Total Miles Traveled[1]	Potential Accidents[2]	Potential Fatalities[2]
4c	48	9.5 mi	6,889	143	130,891	0.21	0.002

[1] Total miles traveled only includes hauling MRM material. Does not include mobilization/demobilization or importing any borrow or rock materials.
[2] Potential accidents and fatalities estimated based on New Mexico average Crash Rate from 2010 to 2019 of 162.1 crashes per 100 million vehicle miles traveled and New Mexico average fatality rate from 2010 to 2019 of 1.33 fatalities per 100 million vehicle miles traveled (NMDOT, 2021; 2020; 2019; 2018; 2017a; 2017b; 2016; 2015; 2013a; 2013b)

Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. Alternative 4c would produce less greenhouse gas emissions than all other alternatives except for Alternative 2 and would impact the air quality to nearby residents. For Alternative 4c, MRM hauling would take place between each mine site and the respective repository location and heavy equipment would be present regularly on the highway during construction. The weighted-average haul distance for Alternative 4c is 9.5 miles to Mac No. 1 site. The total traveled distance is approximately 131,000 miles and increases the potential for accidents to occur because of the increased truck traffic, although there is less potential than with Alternative 3 due to the lesser number of miles traveled. Additional measures and plans would be in place to promote the protection of the public and community while hauling MRM on the highway. Heavy equipment would also be present on the highway during mobilization/demobilization and possibly to import borrow/fill or rock materials.

4.2.7.3 Implementability

4.2.7.3.1 Technical and Administrative Feasibility

Alternative 4c was ranked good for technical feasibility and would not require unconventional techniques, materials, or labor for the excavation, covering, and associated activities. The Sites are readily accessible when permission is granted by the property owners. Work would be performed in a manner to promote worker and public safety and minimize handling where possible. Excavation would be performed in a manner to maximize direct loading, hauling, and dumping. Roadway improvement and haul routes would be made to optimize access for equipment, materials, and labor. Temporary construction stormwater controls would be utilized, and permanent stormwater controls would be developed as part of the design.

Alternative 4c was ranked good for administrative feasibility. The MRM remains on Navajo Nation and would require coordination and cooperation with other agencies including BIA, and Navajo Nation. Construction of an on-site cover at Mac No. 1 and Black Jack No. 1 would require similar permitting compared to the other on-site repository alternatives (Alternatives 2, 3, 4a, and 4b) because mine wastes would be relocated to another nearby mine site. Government to government consultation is ongoing on specific administrative actions such as rights-of-way, permits, and property easements. Depending on the repository location within the sites, property easements may be required.



There would be less impact on the land and potential land use restrictions for Alternative 4c to construct two repositories when compared to Alternative 2. However, the repository for this alternative is larger than the other alternatives and would be more difficult to blend in with the surrounding topography and scale to a larger footprint. Two repositories are likely to create less land use restrictions than Alternative 2, but more than Alternatives 3a, 3b, 4a, and 4b.

4.2.7.4 Cost

Costs for Alternative 4c were ranked very good. The estimated construction cost for Alternative 4c is $24,616,932 and the estimated PRSC cost is $293,373. The detailed cost estimate is included in Appendix F.

4.2.8 ALTERNATIVE 5: EXCAVATION AND OFF-NAVAJO DISPOSAL WITHIN 100 MILES

Alternative 5 would require excavation at the four Sites and includes the following steps: excavation of MRM on the Sites, transportation of MRM and disposal in a repository at a location off Navajo Nation within 100 miles and covering of mine wastes, and site restoration with erosion and stormwater controls, regrading, and revegetation. For this Final EE/CA, it is assumed that the repository site location is within the Ambrosia Lake, NM area, specifically Township 14N, Range 10W, Section 13.

4.2.8.1 Threshold Criteria

4.2.8.1.1 Protection of Human Health and Environment

The MRM exceeding the RAG would be excavated from the Sites and consolidated and covered in a repository at an off-Navajo Nation location. These activities would prevent direct contact between the MRM and humans and the environment. Proper design and construction of the cover, and proper stormwater controls and maintenance of the cover, would mitigate erosion and release of MRM back into the environment. Alternative 5 would provide protection of human health and the environment through disruption of the ingestion of soil and biota, direct contact, external exposure, and inhalation exposure pathways via removal of MRM from the Sites.



4.2.8.1.2 Compliance with ARARs

Alternative 5 is expected to comply with, or be eligible for obtaining a waiver of, the preliminary ARARs identified in Appendix D. Compliance with substantive requirements of the chemical-specific ARARs should be met by containing and isolating the MRM exceeding the RAG in a repository with a cover system at the repository location. Stormwater controls would be included in the design to divert overland flow during storm events around the repository. The cover would provide a physical barrier against water infiltration to the mine wastes and also provide shielding from ionizing radiation to protect human health and the environment. Verification surveys would be conducted to confirm that no MRM remains within the excavated areas at the Sites.

Compliance with substantive requirements of the location-specific ARARs should be met. Natural and Cultural Resource surveys were conducted at the four Sites and those surveys would be reviewed and additional surveys identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.

Compliance with substantive requirements of the action-specific ARARs should be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.

4.2.8.2 Effectiveness

4.2.8.2.1 Long-Term Effectiveness

Alternative 5 is expected to effectively mitigate the effects on potential human health and the environment by excavating, consolidating, and covering the MRM at a location off of the Navajo Nation. The long-term effectiveness and permanence was ranked good for Alternative 5 since the MRM will be removed from the Sites. A 5-year monitoring and maintenance plan is assumed for Alternative 5 to monitor and maintain the vegetated and regraded areas at the four Sites. The 5-year monitoring and maintenance does not include activities or costs at the Ambrosia Lake area repository location. Excavating and removing waste would eliminate the risks to human health and the environment at the Sites. The material, however, would be added to a repository (i.e., not treated or destroyed) thereby shifting the volume, toxicity, and mobility of waste from the Sites to the location of the repository. The repository would be designed for long-term slope stability and erosional stability.

4.2.8.2.2 Short-Term Effectiveness

The primary considerations of short-term effectiveness are protection of the community, workers, and environmental impacts during and after implementation. Alternative 5 activities are anticipated to take place over 898 working days and could encounter winter weather delays.



Alternative 5 was ranked medium for short-term effectiveness since this alternative would take longer to excavate and haul MRM off of the four Sites. Short-term effectiveness involves clearing and excavation, transporting MRM offsite, stockpile management, construction of cover and stormwater controls, and site restoration activities (backfilling and seeding). Heavy equipment would be used to clear and grub, excavate, load, transport, and grade the MRM, and construct the cover. Dust control and air monitoring would be implemented to protect the community and workers during implementation of the alternative. Additionally, safe work practices would be implemented, and safety equipment used to protect workers. Potential exposure and protection procedures for workers engaged in the implementation would be addressed under a Site-Specific HASP. Work areas would be secured to control access to authorized personnel.

Heavy equipment transporting the MRM would be covered and secured. Traffic would be coordinated under a site-specific transportation plan for haul routes, operating hours, and traffic rules. Emergency spill containment and cleanup contingencies would be included in this plan during implementation of the alternative. The estimated number of truck loads and truck loads per day hauling MRM are summarized in Table 4-13, assuming the use of 22 trucks carrying 40 CY per load.

Table 4-13 Alternative 5 Truck Load Summary

Alternative	Total Hauling Days	Average Haul Distance	Total Truck Loads	Truck Loads / Day	Total Miles Traveled[1]	Potential Accidents[2]	Potential Fatalities[2]
5	412	66 mi	17,631	43	2,327,275	3.77	0.031

[1] Total miles traveled only includes hauling MRM material an average haul distance of 66 miles. Does not include mobilization/demobilization or importing any borrow or rock materials.
[2] Potential accidents and fatalities estimated based on New Mexico average Crash Rate from 2010 to 2019 of 162.1 crashes per 100 million vehicle miles traveled and New Mexico average fatality rate from 2010 to 2019 of 1.33 fatalities per 100 million vehicle miles traveled (NMDOT, 2021; 2020; 2019; 2018; 2017a; 2017b; 2016; 2015; 2013a; 2013b)

Potential community impacts include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. Alternative 5 would produce additional greenhouse gas emissions compared to Alternatives 1 through 4c and would have a greater impact on air quality over a larger area than the previous alternatives.

The impact of hauling MRM offsite to a location within 100 miles would affect a larger area and more communities. Hauling the MRM on the highway could pose a greater risk to a larger public population, as well as expose workers (truck drivers) to greater potential for accidents given the substantial number of miles traveled on highways and freeways (2.3 million miles total). This could result in additional traffic accidents due to construction traffic.



For Alternative 5, MRM hauling would take place between each mine site and the offsite repository location and heavy equipment would be present regularly on the highway during construction. The haul distance for Alternative 5 was assumed to be 66 miles from the Sites. Additional measures and plans would be in place to promote the protection of the public and community while hauling MRM on the highway, to the extent possible. Heavy equipment would also be present on the highway during mobilization/demobilization and possibly to import borrow/fill or rock materials.

4.2.8.3 Implementability

4.2.8.3.1 Technical and Administrative Feasibility

Alternative 5 was ranked good for technical feasibility and would not require unconventional techniques, materials, or labor for the excavation, covering, and associated activities. The Sites are readily accessible when permission is granted by the property owners. Work would be performed in a manner that promotes worker and public safety and minimizes handling where possible. Excavation would be performed in a manner to maximize direct loading, hauling, and dumping. Roadway improvement and haul routes would be made to optimize access for equipment, materials, and labor. Temporary construction stormwater controls would be utilized, and permanent stormwater controls would be developed as part of the restoration design.

Alternative 5 was ranked for administrative feasibility. It removes the MRM from the Navajo Nation. The MRM would be transported along the highway and interstate to the Ambrosia Lake site and transportation permits may be necessary. This Final EE/CA assumes that a new repository in the Ambrosia Lake area would constitute an “on-site” repository, and its construction would proceed under CERCLA § 121(e),

There would be less impact on future land use at the four Sites since this alternative removes MRM from all four locations and constructs one repository at a new location when compared to the other alternatives since this alternative removes the MRM from Navajo Nation. The repository for this alternative may have less siting and design constraints, such as repository height, nearby residents, and existing stormwater channels and other land features. The repository location and design would be optimized to minimize impact on existing facilities and land features.

4.2.8.4 Cost

Costs for Alternative 5 were ranked good. The estimated construction cost for Alternative 5 is $40,500,960 and the estimated PRSC cost is $64,085. The detailed cost estimate is included in Appendix F.

4.2.9 ALTERNATIVE 6: EXCAVATION AND OFF-NAVAJO DISPOSAL AT AN EXISTING LICENSED FACILITY

Alternative 6 includes the following steps: excavation of all wastes on the four Sites, offsite disposal of mine wastes at a RCRA facility, and site restoration with erosion and stormwater controls, regrading, and revegetation.

4.2.9.1 Threshold Criteria

4.2.9.1.1 Protection of Human Health and Environment

The MRM exceeding the RAG would protect human health and the environment by preventing direct contact between the MRM and humans and the environment. The MRM would be removed from the Sites and the post-verification surveys would be performed to confirm no MRM remained on the Sites. Alternative 6 would provide protection of human health and the environment through disruption of the ingestion of soil and biota, direct contact, external exposure, and inhalation exposure pathways via removal of MRM from the Sites.

4.2.9.1.2 Compliance with ARARs

Alternative 6 is expected to comply with, or be eligible for obtaining a waiver of, the preliminary ARARs identified in Appendix D. Compliance with substantive requirements of the chemical-specific ARARs should be met by removing the MRM exceeding the RAG and disposing of the MRM at a RCRA facility.

Compliance with substantive requirements of the location-specific ARARs should be met. Natural and Cultural Resource surveys were conducted at the four Sites and those surveys would be reviewed and additional surveys identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.

Compliance with substantive requirements of the action-specific ARARs should be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.

4.2.9.2 Effectiveness

4.2.9.2.1 Long-Term Effectiveness

The long-term effectiveness and permanence would effectively mitigate the effects on potential human health and the environment by excavating and removing MRM from the Sites. The long-term effectiveness and permanence were ranked very good for Alternative 6 since the material will be removed from the Sites and permanently disposed of at a licensed facility. A 5-year monitoring and maintenance plan is assumed for Alternative 6 to monitor and maintain the vegetated, backfilled areas at the Sites following removal.

4.2.9.2.2 Short-Term Effectiveness

The primary considerations of short-term effectiveness are protection of the community, workers, and environmental impacts during and after implementation. Alternative 6 activities are anticipated to take



place over 1,505 working days which does not include weekends, holidays, or weather delays. This alternative requires the longest period of working days, requiring a period twice as long as disposal at a nearby regional repository (Alternative 5), and nearly three-times as long as disposal at onsite options to complete (Alternatives 2, 3, and 4).

Alternative 6 was ranked very poor for short-term effectiveness since this alternative would take a significant amount of time to complete and has a higher risk for schedule delays compared to the other alternatives. Short-term effectiveness involves clearing and excavation, material transfer, stockpile management, and site restoration activities (backfilling and seeding). Heavy equipment would be used to clear and grub, excavate, transfer, load, and haul the MRM. The four Sites would have longer restricted site access for residential, open space, and other use during the response action and restoration. Dust control and air monitoring would be implemented to protect the community and workers during implementation of the alternative. Additionally, worker protection practices would be implemented, and safety equipment used to protect workers. Potential exposure and protection procedures for workers engaged in the implementation would be addressed under a Site-Specific HASP. Work areas would be secured to control access to authorized personnel.

Heavy equipment transporting the containerized MRM would be covered and secured. Traffic would be coordinated under a site-specific transportation plan for haul routes, operating hours, and traffic rules. Emergency spill containment and cleanup contingencies would be included in this plan during implementation of the alternative. Assuming the use of 22 trucks carrying 40 CY per load, the estimated number of truck loads and truck loads per day hauling MRM are summarized in Table 4-14.

Table 4-14 Alternative 6 Truck Load Summary

Alternative	Total Hauling Days	Average Haul Distance	Total Truck Loads	Truck Loads / Day	Total Miles Traveled[3]	Potential Accidents	Potential Fatalities
6[1]	50 (inter-mine)	8 mi	8,414	170	134,617	0.22	0.002
6[1]	1317 (NM)	308 mi	17,631	13	10,860,616	17.61	0.144
6[2]	1317 (CO)	220 mi	17,631	13	7,757,583	17.49	0.083

[1] Potential accidents and fatalities estimated based on New Mexico average Crash Rate from 2010 to 2019 of 162.1 crashes per 100 million vehicle miles traveled and New Mexico average fatality rate from 2010 to 2019 of 1.33 fatalities per 100 million vehicle miles traveled (NMDOT, 2021; 2020; 2019; 2018; 2017a; 2017b; 2016; 2015; 2013a; 2013b).

[2] Potential accidents and fatalities estimated based on Colorado average Crash Rate from 2010 to 2019 of 225.5 crashes per 100 million vehicle miles traveled and Colorado average fatality rate from 2010 to 2019 of 1.07 fatalities per 100 million vehicle miles traveled (CDOT, 2021 and 2016).

[3]Total miles traveled only includes hauling MRM material. Does not include mobilization/demobilization or importing any borrow or rock materials.

Based on current conditions, the Clean Harbors Deer Trail facility confirmed that the estimated trucks per day (10 to 13) could be accepted for the duration of the project. The current total maximum permitted

capacity of the Deer Trail facility is reportedly 2,528,000 CY. Actual capacity at the time of construction is presently unknown and reduced available capacity at that time could negatively impact this alternative. Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. Alternative 6 would produce the most greenhouse gas emissions and would have the greatest impact on air quality in the vicinity. For Alternative 6, MRM hauling would take place between each mine site to a stockpile area and from the stockpile area to the RCRA facility, and heavy equipment would be present regularly on the highway during construction. The average haul distance for Alternative 6 is 528 miles (308 miles in New Mexico and 220 miles in Colorado), assuming the Deer Trail facility in Colorado would be utilized for disposal. This results in over 10.8 million vehicle miles traveled in New Mexico, correlating to over 17 accidents and over 7.7 million vehicle miles traveled in Colorado, correlating to over 17 accidents. There is a possibility of a fatal accident in either New Mexico or Colorado, but a higher potential for a fatality in New Mexico.

The impact of hauling MRM offsite to a disposal location would affect a larger area and more communities including urban areas such as Albuquerque, NM; Santa Fe, NM; Colorado Springs, CO; and Denver, CO on freeways including Interstate 40 and Interstate 25. Hauling the MRM for the distance and time required could pose a significant risk to a larger public population, as well as expose workers (truck drivers) to a greater potential for accidents given the number of miles traveled on highways and freeways. Additional measures and plans would be in place to protect the public and community while hauling MRM on the highway, to the extent possible. There will be added truck traffic present regularly on highways and interstate freeways for long durations, both locally and across state borders. Truck traffic would also be present on the local highways during mobilization/demobilization and possibly to import borrow/fill or rock materials.

4.2.9.3 Implementability

4.2.9.3.1 Technical and Administrative Feasibility

Alternative 6 was ranked good for technical feasibility and would use conventional techniques, materials, and labor for the excavation, transporting, and associated activities. USEPA and the Navajo Nation have secured funding to assess and address 230 of the 523 abandoned uranium mines on or near the Navajo Nation. The estimated volume of MRM from the four Sites would consume roughly 28% of the Deer Trail Facility's current capacity. There is also a greater risk of transporting the MRM a long distance either by truck or rail. The Sites are readily accessible when permission is granted by the property owners. Work would be performed to safeguard workers and the public and minimize handling where possible. Excavation would be performed in a manner to maximize direct loading, hauling, and stockpiling. Roadway improvement and haul routes at the four Sites would be made to optimize access for equipment, materials, and labor within and in between the four Sites. Temporary construction stormwater controls would be utilized, and permanent stormwater controls would be developed as part of the design.

Alternative 6 was ranked good for administrative feasibility. The MRM would be transported across state boundaries to a disposal or reprocessing facility and transportation permits may be necessary. All MRM is anticipated to be accepted by the permitted facilities, subject to available capacity.



4.2.9.4 Cost

Costs for Alternative 6 were ranked very poor. The estimated total construction and disposal cost for Alternative 6 is $168,879,252 and the estimated PRSC cost is $64,085. The detailed cost estimate is included in Appendix F.



5 Comparative Analysis of Response Action Alternatives

HMC conducted an alternatives comparison based on the qualitative ranking in Table 4-8. Alternative 1 is not protective of human health and does not comply with ARARs. The No Action alternative was included in Table 4-8 as a baseline to compare other alternatives. Alternatives 2 through 6 were evaluated and compared for long-term and short-term effectiveness, technical and administrative feasibility, and cost.

Alternative 2, that requires four repositories that leave MRM on allotments, ranked medium for long-term effectiveness and very good for short-term effectiveness. The other alternatives that leave MRM on allotments (Alternatives 3a through 4c) rank good in long-term effectiveness and good for short-term effectiveness. Alternative 5 that removes the MRM from Navajo Nation ranks good in long-term effectiveness in line with the other consolidate and cap options. Alternative 5 ranks medium in short-term effectiveness, lower than Alternatives 2 through 4c. Alternative 5 requires a longer duration and haul distance than the other on-site repository alternatives but removes the MRM from Navajo Nation. This alternative will construct a repository to include MRM from the four HMC Sites and be located at the Ambrosia Lake, NM site at the Section 13 location. The assessment of this alternative also assumed that borrow material and a nearby water source are available for construction of the repository in this location. If borrow material will need to be purchased or trucked in from another location, this would affect cost and duration of the alternative.

Alternative 6 was ranked very good in long-term effectiveness since MRM is removed from Navajo Nation for this alternative and the long-term O&M is implemented by the facility and is dictated by the facility's permit. The short-term effectiveness was ranked very poor since this alternative would take significantly longer than the other alternatives to remove MRM from the four Sites and carries a higher risk for significant schedule delays compared to the other alternatives.

It is technically and administratively feasible to implement each alternative. Technical feasibility includes construction and operational considerations. Alternatives 2 through 6 were ranked good for technical feasibility as each alternative utilizes a similar process and construction methods. It is assumed equipment, personnel and services are readily available for excavating and hauling material and capping with an ET cover.

Alternatives 2 through 6 were ranked good for administrative feasibility since these alternatives have similar coordination and permitting requirements. Government to government consultation is ongoing on specific administrative actions such as rights-of-way, permits, and property easements. The addition of MRM from Mariano Lake Mine would increase the size of the repository but, according to USEPA, would reduce the overall footprint of contaminated areas after implementation by consolidating the MRM into one or two regional repositories.

Alternatives 2 through 5 are similar by consolidating the MRM into one or multiple repositories and capping the MRM with an ET soil cover. Alternative 2 would have a repository on each Site and the associated long-term restricted use and long-term PRSC, but the repositories would be smaller as



compared to the other alternatives. Alternative 2 also has slightly lower cost and shorter construction duration as compared to the other alternatives. Alternatives 3a and 3b consolidate the MRM to one repository at either Mac No. 1 or Black Jack No. 1 leaving three sites with unrestricted use and the repository site with restricted use and long-term PRSC. Alternatives 4a/4b/4c are regional repositories at one, or both, of the Mac No. 1 and Black Jack No. 1 sites in combination with MRM from Mariano Lake Mine. HMC's costs for Alternatives 3 and 4 are relatively similar (ranging from $24.9M to $32.9M) and duration (ranging from 578 days to 672 days). Alternative 4c has the lowest cost and shortest construction duration of the Alternative 3a/3b and 4a/4b/4c options. This cost and construction duration only accounts for the HMC mine Sites and does not account for the extra coordination and duration for the design phase or construction phase of hauling MRM from the Mariano Lake Mine site to the repository location. The regional repository options would have larger repository footprints and require more coordination with BIA, Navajo Nation, and allottees on allotment lands. Alternative 5 removes MRM from all four HMC sites and transports the MRM to a repository location in the Ambrosia Lake, Section 13 area. Alternative 5 has a longer duration and higher cost due to the transporting of MRM from the four Sites; however, Alternative 5 would remove MRM from Navajo Nation and return all four HMC Sites to unrestricted use.

Alternative 6 removes the MRM from all four Sites and transports the MRM to the Deer Trail, CO disposal facility. This alternative has a significantly longer project duration (1,505 days), requires the longest haul distance of the MRM (528 miles one-way), and may require permitting and approval, which could require extra time; this alternative also poses a significantly greater risk to human health and the environment by hauling the MRM offsite a long distance across two states, producing the greatest greenhouse emissions, and higher chance to cause accidents and potential fatalities due to the haul distance and time. Alternative 6 costs significantly more than the other alternatives (approximately 4 to 7 times more costly) and has additional risks associated with potential schedule delays (i.e., if the Deer Trail Facility cannot accept the waste due to capacity issues, or if the facility requires expansion).

6 Recommended Response Action Alternative

USEPA's recommended Response Action Alternative is Alternative 4c which USEPA discussed with HMC and Stantec during a workshop on May 9, 2023. Alternative 4c includes the following two repository locations:

- Mac No. 1 site that includes waste from that site, Mac No. 2, Black Jack No. 2, and MRM from the nearby Mariano Lake Mine
- Black Jack No.1 site that includes consolidation of waste from that site only

The rationale of the recommended alternative includes:

- Long-term effectiveness: Regional Repository locations at the Mac and Black Jack sites that incorporate Mariano Lake Mine MRM allows for future residential use at the Mariano Lake Mine location. The repository design and construction at the Mac No. 1 and Black Jack No. 1 sites can be executed in a way that blends the repository into the existing landscape. Dig and haul is a proven effective technology and ET covers are proven effective capping technologies in arid and semi-arid environments. Institutional controls would be implemented to prevent residential use and excavation at the repository locations.
- Short-term effectiveness: The time to construct Alternative 4c is less than, or generally equal to, the other alternatives evaluated.
- Technical feasibility: The sites are easily accessible by the technologies to excavate and haul MRM and cap with an ET cover to meet performance standards. Equipment, personnel, and services are readily available.
- Administrative feasibility: The regional repository on Mac No. 1 site will require adding waste to an allotment land site. Haul routes may impact additional allotments. The USEPA and BIA are working together on allotment engagement and consent processes.
- Future Land Use: The repositories at the Mac and Black Jack sites would have restricted use at the repository locations (Mac No. 1 and Black Jack No. 1). The USEPA anticipates future controlled grazing, gathering, or other land uses could be allowed at these sites once vegetation has been reestablished, but excavation and residential use will be excluded . There would be no future restrictions at the Mac No. 2 and Black Jack No. 2 sites at the conclusion of the response action.
- Cost: The cost is comparable to other consolidate and cap alternatives but is less than the other alternatives, except for Alternative 2.

Based on USEPA's evaluation of the alternatives, Alternative 4c is the most effective overall by consolidating five mine sites into two repository footprints. This alternative minimizes community impacts along haul routes, as there are no residences along potential haul routes between Mac No. 1 and the other HMC mines that will be hauled to Mac No. 1. These potential haul routes will require biological and



cultural surveys prior to use. This alternative also minimizes future land use restrictions by allowing unrestricted use at the Mariano Lake Mine, Mac No. 2, and Black Jack No. 2 sites. Alternative 4c minimizes the construction duration and the total cost is less than the other alternatives evaluated, except for Alternative 2.



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Table 2-1 Site Summary

Mine Site	Surface Area	Underground Area	Operational Years
Black Jack No. 1	24 acres	56 acres	1959 – 1967 mining 1967 – 1971 continued ore shipments
Black Jack No. 2	14 acres	26 acres	1960 – 1964 mining 1964 – 1970 continued ore shipments
Mac No. 1	33 acres	8 acres	1968 – 1971 mining 1971 – 1980 continued ore shipments
Mac No. 2	6 acres	10 acres	1968 – 1970

Table 2-2 Summary of Background Area Soil Analytical Laboratory Data and Summary Statistics

Background Area 1 - Surface Soil

Sample ID	Collection Date	Depth (cm)	Uranium (mg/kg)	Ra-226 (pCi/g)	Ac-228 (pCi/g)	k-40 (pCi/g)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
BA1-01-S-0015	4/20/2015	0 - 15	1.2	1.5	2.6	23.5	5.2	0.4	0.6	17.9
BA1-02-S-0015	4/20/2015	0 - 15	1.3	1.1	0.6	13.9	5.9	0.4	0.6	18.7
BA1-03-S-0015	4/20/2015	0 - 15	1.2	0.9	2	22.8	6.2	0.4	0.6	20.6
BA1-04-S-0015	4/20/2015	0 - 15	1.4	1.4	2.6	23.6	7.7	0.5	0.7	26.4
BA1-05-S-0015	4/20/2015	0 - 15	1.5	1.2	1.3	22.3	7.1	0.4	0.7	23
BA1-06-S-0015	4/20/2015	0 - 15	1.5	1.4	3	23.5	7	0.4	0.7	22.6
BA1-07-S-0015	4/20/2015	0 - 15	1.8	1.4	0.9	22.2	6.6	0.4	0.6	22
BA1-08-S-0015	4/20/2015	0 - 15	1.5	1.2	2.9	24.9	6.5	0.5	0.7	21.8
BA1-09-S-0015	4/20/2015	0 - 15	1.5	1.3	2.1	17.4	1	0.5	0.7	3.8
BA1-10-S-0015	4/20/2015	0 - 15	1.3	1	1.5	20.5	6.3	0.4	0.7	20.1
BA1-11-S-0015	4/20/2015	0 - 15	1.3	1.1	2.1	15.5	6.4	0.4	0.6	21.1
Mean			1.4	1.2	2.0	20.9	6.0	0.4	0.7	19.8
Std. Dev.			0.2	0.2	0.8	3.7	1.8	0.0	0.1	5.8
Median			1.3	1.1	2.1	22.3	6.4	0.4	0.7	21.1
Minimum			1.2	0.9	0.6	13.9	1.0	0.4	0.6	3.8
Maximum			1.8	1.5	3.0	24.9	7.7	0.5	0.7	26.4
n			11	11	11	11	10	11	11	11

Background Area 1 - Subsurface Soil

Sample ID	Collection Date	Depth (cm)	Uranium (mg/kg)	Ra-226 (pCi/g)	Ac-228 (pCi/g)	k-40 (pCi/g)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
BA1-01-S-1560	4/20/2015	15 - 60	1.3	1.1	1.6	16	6.4	0.4	0.7	19.5
BA1-02-S-1560	4/20/2015	15 - 60	1.3	1.8	2.9	18.9	6.5	0.4	0.7	23.1
BA1-03-S-1560	4/20/2015	15 - 60	1.3	1	2.5	19.6	6.1	0.4	0.7	18.4
BA1-04-S-1560	4/20/2015	15 - 60	1.5	1.1	1.8	21.4	6.6	0.4	0.8	22.7
BA1-05-S-1560	4/20/2015	15 - 60	1.5	1.1	2.8	23.7	6.9	0.4	0.8	24.2
BA1-06-S-1560	4/20/2015	15 - 60	1.7	1.1	1.9	22	7.1	0.5	0.7	23.6
BA1-07-S-1560	4/20/2015	15 - 60	1.7	1.4	1.5	19.3	6.9	0.4	0.8	22.6
BA1-08-S-1560	4/20/2015	15 - 60	1.2	0.8	1.9	20.9	6	0.4	0.6	18.6
BA1-09-S-1560	4/20/2015	15 - 60	1.5	1.5	1.6	20.7	7	0.4	0.7	21.9
BA1-10-S-1560	4/20/2015	15 - 60	1.3	1.2	2.8	16.7	6.5	0.5	0.8	22.8
Mean			1.4	1.2	2.1	19.9	6.6	0.4	0.7	21.7
Std. Dev.			0.2	0.3	0.6	2.3	0.4	0.0	0.1	2.1
Median			1.4	1.1	1.9	20.2	6.6	0.4	0.7	22.7
Minimum			1.2	0.8	1.5	16.0	6.0	0.4	0.6	18.4
Maximum			1.7	1.8	2.9	23.7	7.1	0.5	0.8	24.2
n			10	10	10	10	10	10	10	10

Table 2-2 Summary of Background Area Soil Analytical Laboratory Data and Summary Statistics

Background Area 2 - Surface Soil

Sample ID	Collection Date	Depth (cm)	Uranium (mg/kg)	Ra-226 (pCi/g)	Ac-228 (pCi/g)	k-40 (pCi/g)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
BA2-01-S-0015	4/21/2015	0 - 15	0.9	1	1.6	12.8	3.3	0.3	0.4	13.4
BA2-02-S-0015	4/21/2015	0 - 15	1.1	0.9	2.2	16.7	3.4	0.4	0.4	14.9
BA2-03-S-0015	4/21/2015	0 - 15	1	1	1.8	14.2	3.1	0.3	0.4	14.3
BA2-04-S-0015	4/21/2015	0 - 15	0.9	0.7	1.3	18.6	2.7	0.3	0.3	14.3
BA2-05-S-0015	4/21/2015	0 - 15	1.1	0.8	1.3	10.7	3.3	0.3	0.3	14.6
BA2-06-S-0015	4/21/2015	0 - 15	0.9	1.2	1.5	17.5	3.1	0.3	0.4	15.3
BA2-07-S-0015	4/21/2015	0 - 15	1.1	0.8	1.4	17.2	3.3	0.4	0.4	15.3
BA2-08-S-0015	4/21/2015	0 - 15	1	1.2	1.3	15	3.3	0.4	0.3	15.4
BA2-09-S-0015	4/21/2015	0 - 15	1.1	1.1	1.4	15.9	4	0.3	0.3	16.8
BA2-10-S-0015	4/21/2015	0 - 15	0.5	0.8	0	12.2	2.3	0.2	0.3	9.7
BA2-11-S-0015	4/21/2015	0 - 15	0.6	0.8	0.9	14.4	2.2	0.2	0.3	10.1
		Mean	0.9	0.9	1.3	15.0	3.1	0.3	0.3	14.0
		Std. Dev.	0.2	0.2	0.6	2.4	0.5	0.1	0.1	2.2
		Median	1.0	0.9	1.4	15.0	3.3	0.3	0.3	14.6
		Minimum	0.5	0.7	0.0	10.7	2.2	0.2	0.3	9.7
		Maximum	1.1	1.2	2.2	18.6	4.0	0.4	0.4	16.8
		n	11	11	11	11	11	11	11	11

Background Area 2 - Subsurface Soil

Sample ID	Collection Date	Depth (cm)	Uranium (mg/kg)	Ra-226 (pCi/g)	Ac-228 (pCi/g)	k-40 (pCi/g)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
BA2-01-S-1560	4/21/2015	15 - 60	0.9	0.7	1	17.1	3.3	0.3	0.3	12.9
BA2-02-S-1560	4/20/2015	15 - 60	1.1	0.07	1.2	14.6	3.9	0.4	0.4	16.4
BA2-03-S-1560	4/20/2015	15 - 60	1.1	0.9	0	17.3	3.7	0.3	0.4	16.3
BA2-04-S-1560	4/20/2015	15 - 60	0.8	0.7	0	15.3	2.9	0.2	0.3	14.5
BA2-05-S-1560	4/20/2015	15 - 60	0.9	0.8	1.5	13.1	3.2	0.3	0.4	14.4
BA2-06-S-1560	4/20/2015	15 - 60	0.9	1.1	2.5	19.6	3.8	0.7	0.4	17.7
BA2-07-S-1560	4/20/2015	15 - 60	1.2	0.9	1.7	16.8	4.8	0.4	0.4	17.3
BA2-08-S-1560	4/20/2015	15 - 60	1.1	1	2.4	17.4	4.4	0.4	0.8	17.9
BA2-09-S-1560	4/20/2015	15 - 60	0.9	1	1.4	15.3	3.6	0.3	0.4	14.4
BA2-10-S-1560	4/20/2015	15 - 60	0.5	0.4	0.5	17.6	2.2	0.2	0.3	10.7
		Mean	0.9	0.8	1.2	16.4	3.6	0.4	0.4	15.3
		Std. Dev.	0.2	0.3	0.9	1.8	0.7	0.1	0.1	2.3
		Median	0.9	0.9	1.3	17.0	3.7	0.3	0.4	15.4
		Minimum	0.5	0.1	0.0	13.1	2.2	0.2	0.3	10.7
		Maximum	1.2	1.1	2.5	19.6	4.8	0.7	0.8	17.9
		n	10	8	10	10	10	10	10	10

Notes:

ft = feet

mg/kg = milligrams per kilogram

n = number

pCi/g = picocuries per gram

Std. Dev. = standard deviation

Table 2-3 Summary of Mine Site Soil Analytical Laboratory Data

Site	Sample ID	Collection Date	Depth (ft)	Ra-226 (pCi/g)	Uranium (mg/kg)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
Black Jack No. 1	BJ1-1-0006-S-01	10/13/2017	0 - 0.5	1.5	0.8	6.9	*0.8*	0.4	26.3
Black Jack No. 1	BJ1-1-0006-S-02D	10/13/2017	0 - 0.5	1.6	1	*8.2*	*0.9*	0.5	*31.4*
Black Jack No. 1	BJ1-1-0612-S-01	10/13/2017	0.5 - 1	1.6	0.7	7.2	*0.9*	0.4	23.8
Black Jack No. 1	BJ1-2-0006-S-01	10/13/2017	0 - 0.5	1.7	1.7	7.1	*0.9*	0.4	25.5
Black Jack No. 1	BJ1-2-0612-S-01	10/13/2017	0.5 - 1	1.8	1.1	7.8	*1*	0.4	*28.4*
Black Jack No. 1	BJ1-3-0012-S-01	10/13/2017	0 - 1	*10.2*	*11*	*8*	*1.4*	*4.4*	*40.2*
Black Jack No. 1	BJ1-3-1218-S-01	10/13/2017	1 - 1.5	1.4	*12.1*	7.2	*1.4*	0.6	21.7
Black Jack No. 1	BJ1-4-0018-S-01	10/13/2017	0 - 1.5	*7.5*	*19.1*	*8.5*	*1.6*	*1*	*34.2*
Black Jack No. 1	BJ1-4-0018-S-02S	10/13/2017	0 - 1.5	*5.1*	*17.5*	*8.2*	*1.5*	*1.2*	*34.4*
Black Jack No. 1	BJ1-4-1824-S-01	10/13/2017	1.5 - 2	*2.6*	*4.8*	*8.4*	*1.2*	*1.2*	*29.5*
Black Jack No. 1	BJ1-4-3036-S-01	10/13/2017	2.5 - 3	1.5	0.8	7.5	*1.1*	*0.9*	23.5
Black Jack No. 1	BJ1-5-0036-S-01	10/13/2017	0 - 3	*45*	*86*	*8.8*	*7.9*	*14.7*	*40.6*
Black Jack No. 1	BJ1-5-3642-S-01	10/13/2017	3 -3.5	*6.4*	*20.7*	*8.2*	*2.7*	*5.5*	*37.5*
Black Jack No. 1	BJ1-5-4854-S-01	10/13/2017	4 - 4.5	1.4	0.8	6	*0.9*	*0.9*	14.8
Black Jack No. 1	BJ1-6-0012-S-01	10/13/2017	0 - 1	*3.9*	*28.5*	6.2	*2.3*	*3.5*	*30.1*
Black Jack No. 1	BJ1-6-1218-S-01	10/13/2017	1 - 1.5	1.8	*22.7*	*8.1*	*1.5*	*1.9*	*33.9*
Black Jack No. 1	BJ1-7-0024-S-01	10/13/2017	0 - 2	*10.8*	*32.6*	*8.7*	*3.3*	*3.1*	*30.5*
Black Jack No. 1	BJ1-7-0024-S-02S	10/13/2017	0 - 2	*9.9*	*34.5*	*8.6*	*3.5*	*3.4*	*34.2*
Black Jack No. 1	BJ1-7-2430-S-02S	10/13/2017	2 - 2.5	*1.9*	*10.8*	*8.4*	*1.8*	0.8	*36*
Black Jack No. 1	BJ1-8-0006-S-01	10/9/2017	0 - 0.5	*7.7*	*9.2*	*8.9*	*1.6*	*2*	*37.9*
Black Jack No. 1	BJ1-8-0612-S-01	10/9/2017	0.5 - 1	*3.6*	*5.2*	*8.8*	*1.4*	*2*	*39.2*
Black Jack No. 1	BJ1-9-0006-S-01	10/9/2017	0 - 0.5	*2.2*	1.8	*8.3*	*1.1*	0.6	*39.5*
Black Jack No. 1	BJ1-9-0612-S-01	10/9/2017	0.5 - 1	*2*	1.8	*8.3*	*1.2*	0.7	*38.1*
Black Jack No. 1	BJ1-10-0006-S-01	10/9/2017	0 - 0.5	1.8	1.1	*8.8*	*1.5*	0.5	*39.9*
Black Jack No. 1	BJ1-10-0612-S-01	10/9/2017	0.5 - 1	*2.8*	1	*8.5*	0.5	0.5	*35*
Black Jack No. 1	BJ1-11-0006-S-01	10/9/2017	0 - 0.5	*2.2*	1.3	*12.3*	*0.7*	0.6	*44.9*
Black Jack No. 1	BJ1-11-0612-S-01	10/9/2017	0.5 - 1	*2.1*	1	*8.2*	*0.6*	0.5	*34.2*
Black Jack No. 1	BJ1-12-0006-S-01	10/9/2017	0 - 0.5	1.7	*6.5*	7.1	*1.4*	0.5	*27.6*
Black Jack No. 1	BJ1-12-0006-S-02D	10/13/2017	0 - 0.5	1.8	*3.7*	5.9	*1.3*	0.5	26.6
Black Jack No. 1	BJ1-12-0612-S-01	10/9/2017	0.5 - 1	*2.4*	*4.8*	6.6	*0.8*	0.6	26.9
Black Jack No. 1	BJ1-13-0006-S-01	10/13/2017	0 - 0.5	1.6	*2.5*	*7.9*	*1.1*	0.6	*31*
Black Jack No. 1	BJ1-13-0612-S-01	10/13/2017	0.5 - 1	1.5	0.9	7.1	*0.8*	0.3	25.5
Black Jack No. 1	BJ1-14-0018-S-01	10/13/2017	0 - 1.5	*3.6*	*21.8*	*8.7*	*1.9*	*1.9*	*36*
Black Jack No. 1	BJ1-14-1824-S-01	10/13/2017	1.5 - 2	*2.8*	*18.5*	*8.4*	*1.4*	*1.4*	*34.8*
Black Jack No. 1	BJ1-14-3036-S-01	10/13/2017	2.5 - 3	*2.5*	*4.1*	7.8	*1.7*	*1.4*	21.2
Black Jack No. 1	BJ1-15-0036-S-01	10/13/2017	0 - 3	*16.3*	*57.8*	5.4	*8.9*	*15.1*	*36.3*
Black Jack No. 1	BJ1-15-3642-S-01	10/13/2017	3 - 3.5	*2.2*	*2.7*	*9*	*1.1*	*2.6*	*29.9*
Black Jack No. 1	BJ1-16-0024-S-01	10/13/2017	0 - 2	*6.1*	*28.2*	*8.1*	*3.8*	*1.7*	*32.9*
Black Jack No. 1	BJ1-16-2430-S-01	10/13/2017	3 - 3.5	*2.6*	*3.6*	7.5	*1.1*	0.8	*29*
Black Jack No. 1	BJ1-17-0024-S-01	10/13/2017	0 - 2	*7.6*	*29.7*	7.5	*2.8*	*1.9*	23.3
Black Jack No. 1	BJ1-17-2430-S-01	10/13/2017	2 - 2.5	1.4	*5.2*	7.1	*1*	0.6	19
Black Jack No. 1	BJ1-18-0006-S-01	10/13/2017	0 - 0.5	*2.3*	*8.5*	7.1	*0.9*	*1.8*	25
Black Jack No. 1	BJ1-18-0612-S-01	10/13/2017	0.5 - 1	*2.1*	*2.3*	7.7	*0.9*	0.6	23.6
Black Jack No. 1	BJ1-19-0006-S-01	10/13/2017	0 - 0.5	*1.9*	1.6	*9.1*	*1.4*	0.6	*30.9*
Black Jack No. 1	BJ1-19-0612-S-01	10/13/2017	0.5 - 1	1.6	1.5	*8.7*	*1.3*	0.6	*32.8*
Black Jack No. 1	BJ1-20-0006-S-01	10/13/2017	0 - 0.5	*2.1*	1.3	7.6	*1.2*	0.4	*35.5*
Black Jack No. 1	BJ1-20-0612-S-01	10/13/2017	0.5 - 1	1.8	1.4	*8.3*	*1.2*	0.4	*33.1*
Black Jack No. 1	BJ1-21-0006-S-01	10/13/2017	0 - 0.5	*125*	*650*	*14.2*	*105*	*37.8*	*89.3*
Black Jack No. 1	BJ1-21-0612-S-01	10/13/2017	0.5 - 1	*43.2*	*516*	*11.6*	*92.8*	*34.6*	*88.4*
Black Jack No. 1	BJ1-21-1218-S-01	10/13/2017	1 - 1.5	*60.9*	*210*	5.7	*27.3*	*15.7*	*45.4*
Black Jack No. 1	BJ1-21-2430-S-01	10/13/2017	2 - 2.5	*5.7*	*28*	*8.6*	*1.8*	*3.8*	*30.8*
Black Jack No. 1	BJ1-21-3642-S-01	10/13/2017	3 - 3.5	*1.9*	*2.8*	*8.5*	*1.2*	*1.2*	*30.1*
Black Jack No. 1	BJ1-21-4854-S-01	10/13/2017	4 - 4.5	*1.9*	*2*	7.8	*1*	0.6	*27.5*
Black Jack No. 1	BJ1-22-0006-S-01	10/13/2017	0 - 0.5	*139*	*162*	6.8	*18*	*133*	*73*
Black Jack No. 1	BJ1-22-0006-S-02D	10/13/2017	0 - 0.5	*111*	*86.9*	3.1	*10.8*	*85.3*	*32.2*
Black Jack No. 1	BJ1-22-0612-S-01	10/13/2017	0.5 - 1	*22.8*	*69.8*	1.7	*5.7*	*148*	13.1
Black Jack No. 1	BJ1-22-1218-S-01	10/13/2017	1 - 1.5	*2.2*	*30*	1.5	*3*	*63.1*	12.3
Black Jack No. 1	BJ1-23-0006-01	3/28/2019	0 - 0.5	*79.3*	*120*	--	--	--	--
Black Jack No. 1	BJ1-23-0618-01	3/28/2019	0.5 - 1.5	*10.7*	*51*	--	--	--	--
Black Jack No. 1	BJ1-23-1836-01	3/28/2019	1.5 - 3	*4.73*	*4.8*	--	--	--	--
Black Jack No. 1	BJ1-23-1836-02	3/28/2019	1.5 - 3	*5.69*	*6*	--	--	--	--
Black Jack No. 1	BJ1-23-3648-01	3/28/2019	3 - 4	1.35	1.3	--	--	--	--
Black Jack No. 1	BJ1-23-4860-01	3/28/2019	4 - 5	1.3	1.3	--	--	--	--

Table 2-3 Summary of Mine Site Soil Analytical Laboratory Data

Site	Sample ID	Collection Date	Depth (ft)	Ra-226 (pCi/g)	Uranium (mg/kg)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
Black Jack No. 1	BJ1-24-4860-01	3/28/2019	4 - 5	*61.3*	*78*	--	--	--	--
Black Jack No. 1	BJ1-24-6072-01	3/28/2019	5 - 6	*82.3*	*43*	--	--	--	--
Black Jack No. 1	BJ1-24-7284-01	3/28/2019	6 - 7	*38.6*	*40*	--	--	--	--
Black Jack No. 1	BJ1-24-8496-01	3/28/2019	7 - 8	*37.5*	*95*	--	--	--	--
Black Jack No. 1	BJ1-24-96108-01	3/28/2019	8 - 9	*5.2*	*180*	--	--	--	--
Black Jack No. 1	BJ1-25-0012-01	3/28/2019	0 - 1	*69*	*97*	--	--	--	--
Black Jack No. 1	BJ1-25-1224-01	3/28/2019	1 - 2	*4.92*	*74*	--	--	--	--
Black Jack No. 1	BJ1-25-2436-01	3/28/2019	2 - 3	1.39	1.4	--	--	--	--
Black Jack No. 1	BJ1-25-3648-01	3/28/2019	3 - 4	*1.82*	1.8	--	--	--	--
Black Jack No. 1	BJ1-26-0012-01	3/28/2019	0 - 1	*40.8*	*71*	--	--	--	--
Black Jack No. 1	BJ1-26-1224-01	3/28/2019	1 - 2	*8.8*	*66*	--	--	--	--
Black Jack No. 1	BJ1-26-2436-01	3/28/2019	2 - 3	*3.54*	*20*	--	--	--	--
Black Jack No. 1	BJ1-27-0012-01	3/28/2019	0 - 1	*9.2*	*18*	--	--	--	--
Black Jack No. 1	BJ1-27-1224-01	3/28/2019	1 - 2	*2.15*	*7.3*	--	--	--	--
Black Jack No. 1	BJ1-27-2436-01	3/28/2019	2 - 3	*1.9*	1.6	--	--	--	--
Black Jack No. 1	BJ1-27-3648-01	3/28/2019	3 - 4	1.7	1.6	--	--	--	--
Black Jack No. 1	BJ1-27-3648-02	3/28/2019	3 - 4	1.19	*2.1*	--	--	--	--
Black Jack No. 1	BJ1-28-0012-01	3/28/2019	0 - 1	*132*	*170*	--	--	--	--
Black Jack No. 1	BJ1-28-1224-01	3/28/2019	1 - 2	*12.3*	*30*	--	--	--	--
Black Jack No. 1	BJ1-28-2436-01	3/28/2019	2 - 3	*2.38*	*7.2*	--	--	--	--
Black Jack No. 1	BJ1-28-3648-01	3/28/2019	3 - 4	*2.08*	*2.9*	--	--	--	--
Black Jack No. 2	BJ2-1-0006-S-01	10/4/2017	0 - 0.5	1.2	0.7	2.8	0.3	0.1	14.3
Black Jack No. 2	BJ2-1-0612-S-01	10/4/2017	0.5 - 1	*3.7*	0.9	3.2	0.6	0.2	18.7
Black Jack No. 2	BJ2-2-0006-S-01	10/4/2017	0 - 0.5	*1.5*	1.2	3	0.3	0.3	17.6
Black Jack No. 2	BJ2-2-0612-S-01	10/4/2017	0.5 - 1	*1.4*	1.1	4	0.5	0.2	*20.7*
Black Jack No. 2	BJ2-3-0006-S-01	10/4/2017	0 - 0.5	*77.2*	*452*	*13.6*	*31.5*	*80.8*	*590*
Black Jack No. 2	BJ2-3-0612-S-01	10/4/2017	0.5 - 1	*5*	*116*	3.4	*3.3*	*1.1*	*20.6*
Black Jack No. 2	BJ2-3-1218-S-01	10/4/2017	1 - 1.5	*4.1*	*176*	3.5	*2.6*	0.2	*21.6*
Black Jack No. 2	BJ2-3-1824-S-01	10/4/2017	1.5 - 2	*3.8*	*169*	3.9	*3.9*	0.4	*24.3*
Black Jack No. 2	BJ2-3-2430-S-01	10/4/2017	2 - 2.5	*1.8*	*102*	4.5	*3.7*	0.2	*25.7*
Black Jack No. 2	BJ2-3-3642-S-01	10/4/2017	3 - 3.5	1.3	1	3.2	*1.8*	0.3	15.3
Black Jack No. 2	BJ2-4-0006-S-01	10/3/2017	0 - 0.5	*73.7*	*42.3*	4.9	*1.9*	*16.9*	*115*
Black Jack No. 2	BJ2-4-0612-S-01	10/3/2017	0.5 - 1	*12*	*7.9*	3.9	*1.1*	0.5	13.3
Black Jack No. 2	BJ2-4-1218-S-01	10/3/2017	1 - 1.5	*1.4*	*16.5*	*5.6*	*1.5*	0.2	15
Black Jack No. 2	BJ2-4-2430-S-01	10/3/2017	2 - 2.5	*1.5*	*34.3*	3.7	*1.8*	0.2	18.6
Black Jack No. 2	BJ2-4-3642-S-01	10/3/2017	3 - 3.5	1.2	*8.5*	2.8	0.5	0.2	14.5
Black Jack No. 2	BJ2-4-6066-S-01	10/3/2017	5 - 5.5	*2.7*	*14.6*	4.6	*2.2*	*1.5*	*27.3*
Black Jack No. 2	BJ2-4-96102-S-01	10/3/2017	8 - 8.5	*1.6*	*1.5*	4.4	0.6	0.2	*20.1*
Black Jack No. 2	BJ2-4-114120-S-01	10/3/2017	9.5 - 10	*2.4*	*2.2*	3.7	0.5	0.7	*22.7*
Black Jack No. 2	BJ2-4B-0006-S-01	10/3/2017	0 - 0.5	*162*	*52.4*	*5.8*	*4.5*	*21.7*	*144*
Black Jack No. 2	BJ2-4B-0612-S-01	10/3/2017	0.5 - 1	*159*	*325*	*9.9*	*24.8*	*57.6*	*570*
Black Jack No. 2	BJ2-4B-1218-S-01	10/3/2017	1 - 1.5	*1.7*	*554*	4.5	*7.2*	0.6	16.5
Black Jack No. 2	BJ2-4B-2430-S-01	10/3/2017	2 - 2.5	*1.4*	*27.7*	3.2	*1.2*	0.6	17.8
Black Jack No. 2	BJ2-4B-3642-S-01	10/3/2017	3 - 3.5	1.2	0.7	2.4	0.3	*1.1*	11.4
Black Jack No. 2	BJ2-4B-7278-S-01	10/3/2017	6 - 6.5	*2.1*	0.9	4.1	0.4	0.5	*23.8*
Black Jack No. 2	BJ2-4B-96102-S-01	10/3/2017	8 - 8.5	*1.5*	0.8	3.3	0.4	0.3	17
Black Jack No. 2	BJ2-4B-120126-S-01	10/3/2017	10 - 10.5	*1.9*	*1.7*	*5.8*	*6.1*	0.8	*35.5*
Black Jack No. 2	BJ2-4B-144150-S-01	10/3/2017	12 - 12.5	*1.4*	0.7	2.8	0.2	0.1	14.9
Black Jack No. 2	BJ2-4B-174180-S-01	10/3/2017	14.5 - 15	1.1	0.5	2.2	0.3	0.1	11.1
Black Jack No. 2	BJ2-4B-234240-S-01	10/3/2017	19.5 - 20	*2.3*	1.4	4.3	*1.2*	0.2	*27.6*
Black Jack No. 2	BJ2-5-0006-S-01	10/4/2017	0 - 0.5	*59*	*88*	*5.9*	*3.1*	*31.3*	*188*
Black Jack No. 2	BJ2-5-0612-S-01	10/4/2017	0.5 - 1	*25.4*	*108*	*8.9*	*2.4*	*16.2*	*124*
Black Jack No. 2	BJ2-5-1218-S-01	10/3/2017	1 - 1.5	*3*	*31*	4.5	*1.4*	0.6	*22.1*
Black Jack No. 2	BJ2-5-2430-S-01	10/12/2017	2 - 2.5	1.2	*2.4*	2.8	0.5	0.2	15.4
Black Jack No. 2	BJ2-6-0006-S-01	10/4/2017	0 - 0.5	*2.2*	*4.5*	*7.7*	*0.8*	*1*	*38.6*
Black Jack No. 2	BJ2-6-0006-S-02D	10/4/2017	0 - 0.5	*2.3*	*5.8*	*7.5*	*0.8*	0.8	*36.1*
Black Jack No. 2	BJ2-6-0612-S-01	10/4/2017	0.5 - 1	*1.6*	1.3	*5.1*	0.7	0.5	*28.6*
Black Jack No. 2	BJ2-7-0006-S-01	10/4/2017	0 - 0.5	*1.4*	1.1	3.7	0.4	0.2	*20.6*
Black Jack No. 2	BJ2-7-0612-S-01	10/4/2017	0.5 - 1	*1.7*	*27.9*	*5.8*	*1*	*4.3*	*48.5*
Black Jack No. 2	BJ2-8-0006-S-01	10/4/2017	0 - 0.5	*2.3*	*5*	*7*	0.7	*1*	*34.1*
Black Jack No. 2	BJ2-8-0612-S-01	10/4/2017	0.5 - 1	*1.4*	1.3	4	0.4	0.3	*24.6*
Black Jack No. 2	BJ2-9-0006-S-01	10/4/2017	0 - 0.5	1.3	*2.1*	3.9	0.5	*0.9*	15.7
Black Jack No. 2	BJ2-9-0612-S-01	10/4/2017	0.5 - 1	*1.4*	0.8	*6.9*	0.6	0.3	*24.6*

Table 2-3 Summary of Mine Site Soil Analytical Laboratory Data

Site	Sample ID	Collection Date	Depth (ft)	Ra-226 (pCi/g)	Uranium (mg/kg)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
Black Jack No. 2	BJ2-10-0006-S-01	10/4/2017	0 - 0.5	6.8	13.2	4.4	0.9	5	36.8
Black Jack No. 2	BJ2-10-0612-S-01	10/4/2017	0.5 - 1	3.8	4.1	4.1	0.5	0.8	24.7
Black Jack No. 2	BJ2-10-102108-S-01	10/4/2017	8.5 - 9	1.2	5.2	3.1	1.4	1.2	10.2
Black Jack No. 2	BJ2-10-1218-01	10/12/2017	1 - 1.5	16.5	97.4	3.2	1.1	1.6	25.5
Black Jack No. 2	BJ2-10-2430-S-01	10/4/2017	2 - 2.5	1.8	8.5	4.2	1.2	0.8	22.2
Black Jack No. 2	BJ2-10-4248-S-01	10/4/2017	3.5 - 4	33	55.8	5.8	4.1	38.4	146
Black Jack No. 2	BJ2-10-7278-S-01	10/4/2017	6 - 6.5	2.2	5.3	2.1	0.6	1.5	7
Black Jack No. 2	BJ2-10-138144-S-01	10/4/2017	11.5 - 12	2	2	5.8	0.6	0.2	34.8
Black Jack No. 2	BJ2-11-0006-S-01	10/3/2017	0 - 0.5	376	1110	15.4	39.1	124	978
Black Jack No. 2	BJ2-11-0612-S-01	10/4/2017	0.5 - 1	133	313	6.2	10.5	39.3	224
Black Jack No. 2	BJ2-11-1218-S-01	10/3/2017	1 - 1.5	38.4	363	6.5	11.8	32.9	186
Black Jack No. 2	BJ2-11-2430-S-01	10/3/2017	2 - 2.5	7.1	66.3	4.1	5.1	10.2	62.5
Black Jack No. 2	BJ2-11-3642-S-01	10/12/2017	3 - 3.5	2	3.3	3.9	0.5	2.7	20.8
Black Jack No. 2	BJ2-11-6066-S-01	10/3/2017	5 - 5.5	14.5	63.9	4.7	3.1	9.7	58.8
Black Jack No. 2	BJ2-11-96102-S-01	10/3/2017	8 - 8.5	1.2	1	3.9	0.5	0.3	14.1
Black Jack No. 2	BJ2-11-120126-S-01	10/3/2017	10 - 10.5	1.9	1.7	7.3	0.6	0.3	41.3
Black Jack No. 2	BJ2-11-150156-S-01	10/3/2017	12.5 - 13	1.4	0.6	2.9	0.2	0.1	12.2
Black Jack No. 2	BJ2-11-234240-S-01	10/3/2017	19.5 - 20	1.4	0.8	2.8	0.2	0.1	16.5
Black Jack No. 2	BJ2-11A-0024-S-01	10/4/2017	0 - 2	69.4	106	5.3	2.4	19	125
Black Jack No. 2	BJ2-11A-0024-S-02S	10/4/2017	0 - 2	57.4	114	5.6	2.4	16.5	125
Black Jack No. 2	BJ2-11A-3036-S-01	10/4/2017	2.5 - 3	1.3	27.9	2.9	1.4	0.3	13.9
Black Jack No. 2	BJ2-12-0012-S-01	10/3/2017	0 - 1	3.9	11.3	5.3	1.3	1.7	34.3
Black Jack No. 2	BJ2-12-1218-S-01	10/3/2017	1 - 1.5	1.3	0.8	3.4	0.5	0.3	19
Black Jack No. 2	BJ2-13-0006-S-01	10/3/2017	0 - 0.5	1.3	2.5	2.6	0.5	0.4	15.7
Black Jack No. 2	BJ2-13-0612-S-01	10/3/2017	0.5 - 1	1.3	0.8	3.4	0.7	0.3	17.5
Black Jack No. 2	BJ2-14-0018-S-01	10/4/2017	0 - 1.5	53.5	153	6.8	4.2	16.7	134
Black Jack No. 2	BJ2-14-0018-S-02D	10/4/2017	0 - 1.5	63	144	6.8	4.2	14.8	127
Black Jack No. 2	BJ2-14-1824-S-01	10/4/2017	1.5 - 2	2.1	127	3.8	2.9	0.2	22.9
Black Jack No. 2	BJ2-14-3036-S-01	10/12/2017	2.5 - 3	1.5	38.8	3.1	1.6	0.2	15.4
Black Jack No. 2	BJ2-15-0006-S-02S	10/4/2017	0 - 0.5	1.5	2.3	4.2	0.5	0.5	21.2
Black Jack No. 2	BJ2-15-0612-S-01	10/4/2017	0.5 - 1	1.7	57.1	2.7	0.7	0.6	17.2
Black Jack No. 2	BJ2-16-3036-S-01	10/12/2017	2.5 - 3	1.6	83.4	3.7	3.3	0.5	20.1
Black Jack No. 2	BJ2-17-0012-01	3/26/2019	0 - 1	76.9	10	--	--	--	--
Black Jack No. 2	BJ2-17-1224-01	3/26/2019	1 - 2	1.76	17	--	--	--	--
Black Jack No. 2	BJ2-17-2436-01	3/26/2019	2 - 3	1.12	21	--	--	--	--
Black Jack No. 2	BJ2-17-2436-02	3/26/2019	2 - 3	1.09	21	--	--	--	--
Black Jack No. 2	BJ2-17-3648-01	3/26/2019	3 - 4	1.13	23	--	--	--	--
Black Jack No. 2	BJ2-18-102120-01	3/26/2019	8.5 - 10	1.84	1.3	--	--	--	--
Black Jack No. 2	BJ2-18-120132-01	3/26/2019	10 - 11	1.91	1.3	--	--	--	--
Black Jack No. 2	BJ2-18-132144-01	3/26/2019	11 - 12	1.91	1.3	--	--	--	--
Black Jack No. 2	BJ2-18-144156-01	3/26/2019	12 - 13	1.6	0.98	--	--	--	--
Black Jack No. 2	BJ2-19-0012-01	3/27/2019	0 - 1	11.6	9.7	--	--	--	--
Black Jack No. 2	BJ2-19-1224-01	3/27/2019	1 - 2	1.32	3.5	--	--	--	--
Black Jack No. 2	BJ2-19-2436-01	3/27/2019	2 - 3	1.17	0.91	--	--	--	--
Black Jack No. 2	BJ2-19-3648-01	3/27/2019	3 - 4	1.48	0.77	--	--	--	--
Black Jack No. 2	BJ2-20-0012-01	3/27/2019	0 - 1	2.55	19	--	--	--	--
Black Jack No. 2	BJ2-20-1224-01	3/27/2019	1 - 2	2.09	3.1	--	--	--	--
Black Jack No. 2	BJ2-20-2436-01	3/27/2019	2 - 3	1.28	0.96	--	--	--	--
Black Jack No. 2	BJ2-20-3648-01	3/27/2019	3 - 4	1.24	0.68	--	--	--	--
Black Jack No. 2	BJ2-21-0012-01	3/27/2019	0 - 1	197	210	--	--	--	--
Black Jack No. 2	BJ2-21-1224-01	3/27/2019	1 - 2	10	220	--	--	--	--
Black Jack No. 2	BJ2-21-2436-01	3/27/2019	2 - 3	1.55	8.5	--	--	--	--
Black Jack No. 2	BJ2-21-3648-01	3/27/2019	3 - 4	1.23	1	--	--	--	--
Black Jack No. 2	BJ2-21-3648-02	3/27/2019	3 - 4	1.41	0.87	--	--	--	--
Black Jack No. 2	BJ2-22-0012-01	3/27/2019	0 - 1	14.6	48	--	--	--	--
Black Jack No. 2	BJ2-22-1224-01	3/27/2019	1 - 2	1.42	1.3	--	--	--	--
Black Jack No. 2	BJ2-22-2436-01	3/27/2019	2 - 3	1.3	1.2	--	--	--	--
Black Jack No. 2	BJ2-22-3648-01	3/27/2019	3 - 4	1.26	0.98	--	--	--	--
Mac No. 1	M1-1-0006-S-01	10/13/2017	0 - 0.5	11.6	18.6	3	0.8	4.7	54
Mac No. 1	M1-1-0612-S-01	10/13/2017	0.5 - 1	12	20.8	3.3	1.2	1.5	42
Mac No. 1	M1-1-1824-S-01	10/13/2017	1.5 - 2	1.2	7.09	3.5	0.8	0.2	24.9
Mac No. 1	M1-2-0012-S-01	10/13/2017	0 - 1	3.5	21.3	5.4	1.7	4	50.1
Mac No. 1	M1-2-1218-S-01	10/13/2017	1 - 1.5	2.1	24	16.9	1.8	3.5	51.3

Table 2-3 Summary of Mine Site Soil Analytical Laboratory Data

Site	Sample ID	Collection Date	Depth (ft)	Ra-226 (pCi/g)	Uranium (mg/kg)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
Mac No. 1	M1-2-2430-S-01	10/13/2017	2 - 2.5	2.9	4.96	8	0.7	2.3	29.4
Mac No. 1	M1-3-0006-S-01	10/13/2017	0 - 0.5	2.8	5.4	2.5	0.3	0.4	6.1
Mac No. 1	M1-3-0612-S-01	10/13/2017	0.5 - 1	1.6	3.05	2.3	0.5	0.4	9.2
Mac No. 1	M1-4-0018-S-01	10/13/2017	0 - 1.5	4.4	13.3	2.4	1.2	1	19.5
Mac No. 1	M1-4-0018-S-02S	10/13/2017	0 - 1.5	4.2	12.1	2.4	1.2	1.6	18.9
Mac No. 1	M1-4-1824-S-01	10/13/2017	1.5 - 2	4.1	12.6	2.5	0.6	1.2	19.4
Mac No. 1	M1-5-0012-S-01	10/13/2017	0 - 1	20.8	77	2.8	0.9	4.8	49.8
Mac No. 1	M1-5-1218-S-01	10/13/2017	1 - 1.5	3.2	23.8	1.9	0.8	2	19.1
Mac No. 1	M1-6-0006-S-01	10/13/2017	0 - 0.5	1.3	1.33	2.8	0.6	0.2	21.7
Mac No. 1	M1-6-0612-S-01	10/13/2017	0.5 - 1	1.3	1.02	3.1	0.4	0.1	23.8
Mac No. 1	M1-7-0024-S-01	10/13/2017	0 - 2	475	1490	14.6	9.8	23.5	1470
Mac No. 1	M1-7-0024-S-02S	10/13/2017	0 - 2	482	1590	12.3	9.5	24.1	1560
Mac No. 1	M1-7-2430-S-01	10/13/2017	2 - 2.5	118	332	2.4	3.9	4.5	235
Mac No. 1	M1-7-3642-S-01	10/13/2017	3 - 3.5	3.3	228	4.3	5.9	5.8	41.8
Mac No. 1	M1-8-0018-S-01	10/13/2017	0 - 1.5	27.7	117	3.3	2.7	5	116
Mac No. 1	M1-8-1824-S-01	10/13/2017	1.5 - 2	1.6	9.75	1.6	0.6	0.7	14.8
Mac No. 1	M1-9-0006-S-01	10/13/2017	0 - 0.5	8.6	61.7	2.4	0.9	1.7	35.7
Mac No. 1	M1-9-0006-S-02D	10/13/2017	0 - 0.5	10.8	43.1	2	0.8	1.2	33
Mac No. 1	M1-9-0612-S-01	10/13/2017	0.5 - 1	2.2	8.8	2.3	0.5	0.4	17.3
Mac No. 1	M1-10-0006-S-01	10/13/2017	0 - 0.5	19.6	71.7	2.3	0.8	2.8	46.5
Mac No. 1	M1-10-0006-S-02D	10/13/2017	0 - 0.5	23.3	88.4	2.7	0.8	3.4	60
Mac No. 1	M1-10-0612-S-01	10/13/2017	0.5 - 1	14.6	14	5.7	0.8	1.9	18.8
Mac No. 1	M1-11-0012-S-01	10/13/2017	0 - 1	40.8	45.5	4.1	2.1	9.1	72.9
Mac No. 1	M1-11-0012-S-02S	10/13/2017	0 - 1	44.6	44.7	4.6	2.3	12.1	108
Mac No. 1	M1-11-1218-S-01	10/13/2017	1 - 1.5	3.2	41.4	3.1	1.3	0.7	15.9
Mac No. 1	M1-12-0018-S-01	10/13/2017	0 - 1.5	57.5	235	3.3	5.4	12.6	114
Mac No. 1	M1-12-1824-S-01	10/13/2017	1.5 - 2	4.9	111	2.5	3	2.2	20.1
Mac No. 1	M1-13-0006-S-01	10/13/2017	0 - 0.5	638	525	12.4	29.2	44.9	921
Mac No. 1	M1-13-0612-S-01	10/13/2017	0.5 - 1	71	564	4.7	16.5	4.1	306
Mac No. 1	M1-13-1824-S-01	10/13/2017	1.5 - 2	8.6	215	3.2	5.6	0.7	97.7
Mac No. 1	M1-13-2430-S-01	10/13/2017	2 - 2.5	16.1	88	8	3.2	1.5	99.5
Mac No. 1	M1-13-3642-S-01	10/13/2017	3 - 3.5	3.1	4.73	4.9	0.6	0.8	14.3
Mac No. 1	M1-14-0212-01	3/27/2019	0 - 1	3.67	65	--	--	--	--
Mac No. 1	M1-14-1224-01	3/27/2019	1 - 2	2.26	22	--	--	--	--
Mac No. 1	M1-14-2430-01	3/27/2019	2 - 2.5	5.08	7.9	--	--	--	--
Mac No. 1	M1-14-3034-01	3/27/2019	2.5 - 2.8	3.12	1.6	--	--	--	--
Mac No. 1	M1-15-0012-01	3/27/2019	0 - 1	19.8	8.1	--	--	--	--
Mac No. 1	M1-15-1224-01	3/27/2019	1 - 2	2.1	2.7	--	--	--	--
Mac No. 1	M1-15-2436-01	3/27/2019	2 - 3	5.97	3.6	--	--	--	--
Mac No. 1	M1-15-3648-01	3/27/2019	3 - 4	0.69	40	--	--	--	--
Mac No. 1	M1-16-0006-01	3/27/2019	0 - 0.5	94	130	--	--	--	--
Mac No. 1	M1-16-0612-01	3/27/2019	0.5 - 1	3.92	51	--	--	--	--
Mac No. 1	M1-16-1226-01	3/27/2019	1 - 2.2	6.82	27	--	--	--	--
Mac No. 1	M1-17-0012-01	3/27/2019	0 - 1	12.1	54	--	--	--	--
Mac No. 1	M1-17-1224-01	3/27/2019	1 - 2	1.24	12	--	--	--	--
Mac No. 1	M1-18-0012-01	3/27/2019	0 - 1	2.55	2.8	--	--	--	--
Mac No. 1	M1-18-1230-01	3/27/2019	1 - 2.5	1.4	0.75	--	--	--	--
Mac No. 1	M1-18-1230-02	3/27/2019	1 - 2.5	1.54	0.83	--	--	--	--
Mac No. 1	M1-18-3048-01	3/27/2019	2.5 - 4	1.28	1.3	--	--	--	--
Mac No. 1	M1-19-0012-01	3/27/2019	0 - 1	4.81	15	--	--	--	--
Mac No. 1	M1-19-1224-01	3/27/2019	1 - 2	2.08	8.3	--	--	--	--
Mac No. 2	M2-1-0006-S-01	10/12/2017	0 - 0.5	3.7	3.1	4.8	0.9	0.6	25.3
Mac No. 2	M2-1-0612-S-01	10/12/2017	0.5 - 1	1.8	3.2	6.2	0.8	0.3	27
Mac No. 2	M2-2-0006-S-01	10/12/2017	0 - 0.5	1.3	1	7.7	0.5	0.2	27.7
Mac No. 2	M2-2-0612-S-01	10/12/2017	0.5 - 1	1.2	1.3	8	0.5	0.2	21.4
Mac No. 2	M2-3-0006-S-01	10/12/2017	0 - 0.5	1	1.6	8	0.5	0.2	19.4
Mac No. 2	M2-3-0612-S-01	10/12/2017	0.5 - 1	1.4	1.1	7.3	0.4	0.2	23.9
Mac No. 2	M2-4-0006-S-01	10/11/2017	0 - 0.5	71	99.7	9.3	6	12.8	320
Mac No. 2	M2-4-0006-S-02D	10/11/2017	0 - 0.5	90.6	77.4	8.9	3.7	12.8	207
Mac No. 2	M2-4-0612-S-01	10/11/2017	0.5 - 1	10.3	126	9.5	4.7	11.5	184
Mac No. 2	M2-4-1824-S-01	10/11/2017	1.5 - 2	5.9	15.4	7.2	0.9	32.8	31.5
Mac No. 2	M2-5-0006-S-01	10/11/2017	0 - 0.5	12.9	42.4	6.5	1.2	2.9	81.2
Mac No. 2	M2-5-0612-S-01	10/11/2017	0.5 - 1	2.8	14.3	7	0.8	0.8	40

Table 2-3 Summary of Mine Site Soil Analytical Laboratory Data

Site	Sample ID	Collection Date	Depth (ft)	Ra-226 (pCi/g)	Uranium (mg/kg)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
Mac No. 2	M2-5-1824-S-01	10/12/2017	1.5 - 2	*1.6*	1.1	*6*	0.4	0.2	*24.6*
Mac No. 2	M2-6-0018-S-01	10/11/2017	0 - 1.5	*17.3*	*37.1*	*6.5*	*2.1*	*1.7*	*68.9*
Mac No. 2	M2-6-0018-S-02S	10/11/2017	0 - 1.5	*14.2*	*38.3*	*7.3*	*1.3*	*1.9*	*66.7*
Mac No. 2	M2-6-1824-S-01	10/11/2017	1.5 - 2	1	*5.2*	*7*	0.5	0.2	*35.4*
Mac No. 2	M2-7-0006-S-01	10/11/2017	0 - 0.5	*9.8*	*26.7*	*7.6*	*0.9*	*1.1*	*55.5*
Mac No. 2	M2-7-0612-S-01	10/11/2017	0.5 - 1	*9.5*	*33.1*	*6.8*	*1.1*	*1.2*	*55.4*
Mac No. 2	M2-7-1218-S-01	10/11/2017	1 - 1.5	*3.1*	*11*	*6.7*	*0.9*	0.4	*36.5*
Mac No. 2	M2-8-0006-S-01	10/11/2017	0 - 0.5	*6.4*	*31*	*7.7*	*1.2*	*1.6*	*62.2*
Mac No. 2	M2-8-0612-S-01	10/11/2017	0.5 - 1	*2.1*	*3.7*	*7*	0.6	0.3	*37.6*
Mac No. 2	M2-8-1824-S-01	10/11/2017	1.5 - 2	*1.5*	1.3	*5.8*	0.5	0.3	16.4
Mac No. 2	M2-9-0006-S-01	10/11/2017	0 - 0.5	*2.1*	*2.3*	*6*	0.5	0.2	*28.2*
Mac No. 2	M2-9-0612-S-01	10/11/2017	0.5 - 1	*1.8*	*2.4*	*7.9*	*0.9*	0.4	*29.6*
Mac No. 2	M2-9-1824-S-01	10/11/2017	1.5 - 2	*1.6*	0.8	*5*	0.4	0.3	13.4
Mac No. 2	M2-10-0006-S-01	10/11/2017	0 - 0.5	*2.7*	*3.1*	*5.5*	0.6	0.3	*27.8*
Mac No. 2	M2-10-0612-S-01	10/11/2017	0.5 - 1	*2.7*	*4.1*	*7*	0.6	0.2	*30*
Mac No. 2	M2-10-1824-S-01	10/11/2017	1.5 - 2	*2*	*2.3*	*5*	0.5	0.3	16.9
Mac No. 2	M2-11-0006-S-01	10/11/2017	0 - 0.5	*1.9*	*2.7*	*6.1*	0.6	0.2	*27.2*
Mac No. 2	M2-11-0612-S-01	10/11/2017	0.5 - 1	*1.7*	1.2	*7.5*	0.5	0.2	*29*
Mac No. 2	M2-11-1824-S-01	10/11/2017	1.5 - 2	*1.4*	0.6	4.7	0.3	0.2	11.9
Mac No. 2	M2-12-0006-S-01	10/12/2017	0 - 0.5	1	1.4	2	0.2	0.1	11.8
Mac No. 2	M2-12-0612-S-01	10/12/2017	0.5 - 1	*1.5*	0.6	2	0.4	0.1	9.5
Mac No. 2	M2-13-0006-S-01	10/12/2017	0 - 0.5	*2.1*	*4.2*	3.8	0.5	0.3	*23.8*
Mac No. 2	M2-13-0612-S-01	10/12/2017	0.5 - 1	*1.4*	0.9	3.8	0.3	0.1	18.7
Mac No. 2	M2-14-0006-S-01	10/11/2017	0 - 0.5	*42.1*	*65.8*	*7*	*4.5*	*8.7*	*187*
Mac No. 2	M2-14-0612-S-01	10/11/2017	0.5 - 1	*18.7*	*57.2*	*6.6*	*3.4*	*3.5*	*140*
Mac No. 2	M2-14-1218-S-01	10/11/2017	1 - 1.5	*5.7*	*88.2*	*8.5*	*3.1*	*3.6*	*92.5*
Mac No. 2	M2-15-0006-S-01	10/11/2017	0 - 0.5	*2.4*	*3.1*	3.5	0.7	0.5	18.1
Mac No. 2	M2-15-0612-S-01	10/11/2017	0.5 - 1	*1.4*	*1.9*	3.5	0.5	0.2	*21.2*
Mac No. 2	M2-15-1824-S-01	10/11/2017	1.5 - 2	1	0.9	4.1	0.5	0.2	14.7
Mac No. 2	M2-16-0006-S-01	10/11/2017	0 - 0.5	*1.4*	0.7	4.7	0.4	0.1	15.2
Mac No. 2	M2-16-0612-S-01	10/11/2017	0.5 - 1	*1.4*	0.7	4.3	0.3	0.1	16.8
Mac No. 2	M2-17-0006-S-01	10/11/2017	0 - 0.5	*1.8*	*2.5*	*5.2*	0.4	0.2	*21.1*
Mac No. 2	M2-17-0006-S-02S	10/11/2017	0 - 0.5	*2.2*	*1.5*	*5*	0.4	0.2	*22.5*
Mac No. 2	M2-17-0612-S-01	10/11/2017	0.5 - 1	*2*	*2.6*	*5.8*	0.7	0.3	*22.8*
Mac No. 2	M2-18-0006-S-01	10/11/2017	0 - 0.5	*1.8*	1.2	*7*	0.7	0.1	18.4
Mac No. 2	M2-18-0006-S-02D	10/11/2017	0 - 0.5	*1.4*	1.2	*5.3*	0.6	0.1	18.2
Mac No. 2	M2-18-0612-S-01	10/11/2017	0.5 - 1	*2*	*1.8*	*9.9*	0.7	0.1	19.4
Mac No. 2	M2-18-3036-S-01	10/12/2017	2.5 - 3	*1.5*	1	*14*	*1.1*	0.1	14.9
Mac No. 2	M2-19-0036-S-01	10/11/2017	0 - 3	*151*	*378*	*6.4*	*5.1*	*8.1*	*425*
Mac No. 2	M2-19-4854-S-01	10/11/2017	4 - 4.5	*462*	*108*	3.8	*2.8*	*2.3*	*61.5*
Mac No. 2	M2-19A-0030-S-02S	10/11/2017	0 - 2.5	*36.4*	*97.1*	*5*	*1.5*	*2.7*	*131*
Mac No. 2	M2-19A-0036-S-01	10/11/2017	0 - 3	*2.5*	*112*	*10.4*	*2.3*	0.5	*22.6*
Mac No. 2	M2-19A-3036-S-01	10/11/2017	2.5 - 3	*46.1*	*74.1*	*5.4*	*2.5*	*5*	*168*
Mac No. 2	M2-21-0006-S-01	10/11/2017	0 - 0.5	*10.5*	*61.2*	*7.3*	*1.9*	*2.1*	*88.9*
Mac No. 2	M2-21-0612-S-01	10/11/2017	0.5 - 1	*2.9*	*31.6*	*9.3*	*1.3*	0.5	*40.3*
Mac No. 2	M2-21-1824-S-01	10/11/2017	1.5 - 2	*1.9*	*12.5*	*6.9*	*1.1*	*1.5*	*53.6*
Mac No. 2	M2-22-0006-S-01	10/12/2017	0 - 0.5	*1.4*	1.1	4.6	0.6	0.1	17.9
Mac No. 2	M2-22-0612-S-01	10/12/2017	0.5 - 1	*1.8*	1.3	3.8	0.4	0.1	18.4
Mac No. 2	M2-23-0006-S-01	10/12/2017	0 - 0.5	*6.8*	*14.3*	*7.7*	*1*	*0.9*	*57.2*
Mac No. 2	M2-23-0612-S-01	10/12/2017	0.5 - 1	*1.6*	*5.9*	*7*	0.5	0.2	*26*
Mac No. 2	M2-24-0011-01	3/26/2019	0 - 0.9	*1.69*	*4.5*	--	--	--	--
Mac No. 2	M2-24-1830-01	3/26/2019	1.5 - 2.5	*1.75*	0.67	--	--	--	--
Mac No. 2	M2-25-0018-01	3/26/2019	0 - 1.5	*7.15*	*12*	--	--	--	--
Mac No. 2	M2-25-1836-01	3/26/2019	1.5 - 3	*1.43*	*4.4*	--	--	--	--
Mac No. 2	M2-25-1836-02	3/26/2019	1.5 - 3	*1.63*	*2.4*	--	--	--	--
Mac No. 2	M2-26-0212-01	3/26/2019	0.2 - 1	*3.66*	*4.6*	--	--	--	--
Mac No. 2	M2-26-1224-01	3/26/2019	1 - 2	*5.55*	*31*	--	--	--	--
Mac No. 2	M2-26-2434-01	3/26/2019	2 - 2.8	1.05	0.61	--	--	--	--
Mac No. 2	M2-27-0012-01	3/26/2019	0 - 1	*6.75*	*110*	--	--	--	--
Mac No. 2	M2-27-1228-01	3/26/2019	1 - 2.3	*4.86*	*8.2*	--	--	--	--
Mac No. 2	M2-28-0012-01	3/26/2019	0 - 1	1.12	1.1	--	--	--	--
Mac No. 2	M2-28-1224-01	3/26/2019	1 - 2	1.21	0.74	--	--	--	--
Mac No. 2	M2-28-2436-01	3/26/2019	2 - 3	1.1	0.71	--	--	--	--

Table 2-3 Summary of Mine Site Soil Analytical Laboratory Data

Site	Sample ID	Collection Date	Depth (ft)	Ra-226 (pCi/g)	Uranium (mg/kg)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
Mac No. 2	M2-28-3648-01	3/26/2019	3 - 4	1.06	0.81	--	--	--	--
Mac No. 2	M2-28-4858-01	3/26/2019	4 - 4.8	1.1	0.5	--	--	--	--
Mac No. 2	M2-29-0012-01	3/26/2019	0 - 1	*8.1*	*10*	--	--	--	--
Mac No. 2	M2-29-1220-01	3/26/2019	1 - 1.7	*4.01*	*14*	--	--	--	--
Mac No. 2	M2-29-2030-01	3/26/2019	1.7 - 2.5	0.84	*5.2*	--	--	--	--
Mac No. 2	M2-30-0012-01	3/26/2019	0 - 1	*32.6*	*22*	--	--	--	--
Mac No. 2	M2-30-1224-01	3/26/2019	1 - 2	*226*	*390*	--	--	--	--
Mac No. 2	M2-30-2436-01	3/26/2019	2 - 3	*2.09*	*180*	--	--	--	--
Mac No. 2	M2-30-3642-01	3/26/2019	3 - 3.5	0.87	*4.1*	--	--	--	--

Notes:

Shaded cells — Concentration exceeds response action goal (RAG), RAGs are listed in Table 2-5

Italics — Concentration exceeds background threshold value (BTV), BTVs are listed in Table 2-8

-- Supplemental Characterization Analysis was limited to uranium and radium-226

ft = feet

pCi/g = picocuries per gram

mg/kg = milligrams per kilogram

Table 2-4 Summary Statistics for Borehole Sample Analytical Data at Each Mine Site

Black Jack No. 1

Statistic	Ra-226 (pCi/g)	Uranium (mg/kg)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
n	77	77	53	53	53	53
Mean	15.7	43.3	7.9	6.3	9.9	33.7
Median	2.5	7.3	8.1	1.4	1.0	31
Minimum	1.3	0.7	1.5	0.5	0.3	12.3
Maximum	139	650	14.2	105	148	89.3
Std. Dev	30	100	1.9	19	28	14

Black Jack No. 2

Sample ID	Ra-226 (pCi/g)	Uranium (mg/kg)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
n	94	94	71	71	71	71
Mean	18.7	60.8	4.7	3.1	7.8	68.6
Median	1.8	5.3	4	1.1	0.5	22.1
Minimum	1.1	0.5	2.1	0.2	0.1	7
Maximum	376	1110	15.4	39.1	124	978
Std. Dev	52	148	2.3	6.6	20	149

Mac No. 1

Statistic	Ra-226 (pCi/g)	Uranium (mg/kg)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
n	50	50	32	32	32	32
Mean	35.2	97.0	4.5	3.3	4.7	127.4
Median	4	21.1	3.2	1.1	2.0	33.8
Minimum	0.69	0.75	1.6	0.3	0.1	6.1
Maximum	638	1490	16.9	29.2	44.9	1470
Std. Dev	111	234	3.7	5.8	8.7	296

Mac No. 2

Sample ID	Ra-226 (pCi/g)	Uranium (mg/kg)	Arsenic (mg/kg)	Molybdenum (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)
n	77	77	57	57	57	57
Mean	16.8	29.5	6.3	1.2	1.9	55.5
Median	2.0	3.9	6.5	0.7	0.3	27.7
Minimum	0.84	0.5	2	0.2	0.1	9.5
Maximum	462	390	14	6	32.8	425
Std. Dev	60	68	2.0	1.3	4.9	75

Notes:

Where the minimum detection limit (MDL) was not met, the MDL was substituted for the sample result (four samples collected at Black Jack No. 2 and Mac No. 2 had selenium values below the MDL)

mg/kg = milligram per kilogram

pCi/g = picocuries per gram

n = number

Table 2-5 Proposed Response Action Goals

Mine Site	COC/COEC	Units	Proposed Removal Action Goal
Black Jack No. 1	Arsenic	mg/kg	7.8
	Molybdenum	mg/kg	--
	Selenium	mg/kg	5.1 (--)
	Uranium	mg/kg	3
	Vanadium	mg/kg	--
	Radium 226	pCi/g	1.8
Black Jack No. 2	Arsenic	mg/kg	4.9
	Molybdenum	mg/kg	--
	Selenium	mg/kg	5.1 (--)
	Uranium	mg/kg	3
	Vanadium	mg/kg	51 (55)
	Radium 226	pCi/g	1.3
Mac No. 1	Arsenic	mg/kg	4.9
	Molybdenum	mg/kg	--
	Selenium	mg/kg	5.1 (--)
	Uranium	mg/kg	3
	Vanadium	mg/kg	51 (56)
	Radium 226	pCi/g	1.3
Mac No. 2	Arsenic	mg/kg	4.9
	Molybdenum	mg/kg	--
	Selenium	mg/kg	--
	Uranium	mg/kg	3.1
	Vanadium	mg/kg	--
	Radium 226	pCi/g	1.3

Notes:
(14) = values in parentheses are applicable for mining-related materials deeper than 2 feet below ground surface
-- Constituent is not an applicable COC or COEC at the site
COC - contaminant of concern
COEC - contamaninat of ecological concern
mg/kg - milligrams per kilogram
pCi/g - picocuries per gram

Table 2-6 Estimated Depth of Mining-Related Material Exceeding Response Action Goals in Boreholes

Mac No. 1		Mac No. 2		Black Jack No. 1		Black Jack No. 2	
Borehole ID	Depth of MRM (ft)	Borehole ID	Depth of MRM (ft)	Borehole ID	Depth of MRM (ft)	Borehole ID	Depth of MRM (ft)
M1-1	2	M2-1	1	BJ1-1	0.5	BJ2-1	1
M1-2	2.5	M2-2	1	BJ1-2	--	BJ2-2	1
M1-3	1	M2-3	1	BJ1-3	1.5	BJ2-3	2.5
M1-4	2	M2-4	2	BJ1-4	2	BJ2-4	10
M1-5	1.5	M2-5	2	BJ1-5	3.5	BJ2-4B	20
M1-6	--	M2-6	2	BJ1-6	1.5	BJ2-4C	**7**
M1-7	3.5	M2-7	1.5	BJ1-7	2.5	BJ2-4D	**2**
M1-8	2	M2-8	2	BJ1-8	1	BJ2-4E	**1.5**
M1-9	1	M2-9	2	BJ1-9	1	BJ2-4F	**6**
M1-10	*1*	M2-10	2	BJ1-10	1	BJ2-5	1.5
M1-11	*1.5*	M2-11	2	BJ1-11	1	BJ2-6	1
M1-12	*2*	M2-12	1	BJ1-12	1	BJ2-7	1
M1-13	*3.5*	M2-13	1	BJ1-13	0.5	BJ2-8	1
M1-14	*2.8*	M2-14	*1.5*	BJ1-14	3	BJ2-9	1
M1-15	*4*	M2-15	1	BJ1-15	3.5	BJ2-10	12
M1-16	*2.2*	M2-16	1	BJ1-16	3.5	BJ2-10B	***9***
M1-17	*2*	M2-17	1	BJ1-17	2.5	BJ2-11	20
M1-18	2.5	M2-18	3	BJ1-18	1	BJ2-11A	3
M1-19	*2*	M2-19	*4.5*	BJ1-19	1	BJ2-11B	**2**
		M2-19A	*3*	BJ1-20	1	BJ2-11C	**2**
		M2-20	**1.5**	BJ1-21	4.5	BJ2-12	1
		M2-21	2	BJ1-22	1.5	BJ2-13	--
		M2-22	1	BJ1-23	3	BJ2-14	3
		M2-23	1	BJ1-24	9	BJ2-15	1
		M2-24	*2.5*	BJ1-25	4	BJ2-16	3
		M2-25	3	BJ1-26	3	BJ2-17	4
		M2-26	2	BJ1-27	3	BJ2-18	13
		M2-27	2.3	BJ1-28	4	BJ2-19	4
		M2-28	--			BJ2-20	2
		M2-29	*2.5*			BJ2-21	4
		M2-30	*3.5*			BJ2-22	2

Notes:

Shaded cells — Concentration(s) of contaminants of concern in sample collected deepest in borehole exceed response action goal(s)

Italic / Underlined — MRM extends to bedrock

Bold Text — No samples collected in borehole, MRM depth estimate based on downhole gamma survey results

ft = feet

MRM = mining-related material

Table 2-7 Estimated Volume of Mining Related Material

		Black Jack No. 1	Black Jack No. 2	Mac No. 1	Mac No. 2	Volume Total
Volume Calculation RSE Report & Supplemental Characterization	Average depth ≥ 2 (ft)	3.6	6.5	2.5	2.5	
	Average depth < 2 (ft)	1.0	1.1	1.2	1.1	
	Area ≥ 2 (SF)	1,068,481	365,764	354,914	217,472	
	Area < 2 (SF)	5,837,851	2,435,826	621,309	1,643,367	
	Volume ≥ 2 (CF)	3,892,324	2,386,610	900,936	541,122	
	Volume ≥ 2 (CY)	144,160	88,393	33,368	20,042	
	Volume < 2 (CF)	6,062,384	2,679,409	745,571	1,832,986	
	Volume < 2 (CY)	224,533	99,237	27,614	67,888	
	Total Volume (CF)	9,954,707	5,066,019	1,646,506	2,374,108	
	Total Volume (CY)	368,693	187,630	60,982	87,930	705,235
	Est. Total Volume (CY)	370,000	190,000	61,000	89,000	710,000

Notes:
ft = feet
SF = square feet
CF = cubic feet
CY = cubic yards

Table 2-8 Summary of Human Health and Ecological PRGs

Black Jack No. 1

COC and/or COEC [a]		Background	Human Health PRG	Ecological PRG	Site Response Action Goal			
					0 - 2 ft bgs	basis	2 - 10 ft bgs	basis
Arsenic	COC	7.8	2.1	-	7.8	background	7.8	background
Radium 226	COC & COEC	1.8	0.049	8.2	1.8	background	1.8	background
Selenium	COEC	0.80	-	5.1	5.1	ecological	-	-
Uranium	COC	1.8	3.0	-	3.0	human health	3.0	human health

Black Jack No. 2

COC and/or COEC [a]		Background	Human Health PRG	Ecological PRG	Site Response Action Goal			
					0 - 2 ft bgs	basis	2 - 10 ft bgs	basis
Arsenic	COC	4.9	2.1	-	4.9	background	4.9	background
Radium 226	COC & COEC	1.3	0.049	8.2	1.3	background	1.3	background
Selenium	COEC	0.80	-	5.1	5.1	ecological	-	-
Uranium	COC & COEC	1.4	3.0	480	3.0	human health	3.0	human health
Vanadium	COC & COEC	20	55	51	51	ecological	55	human health

Mac No. 1

COC and/or COEC [a]		Background	Human Health PRG	Ecological PRG	Site Response Action Goal			
					0 - 2 ft bgs	basis	2 - 10 ft bgs	basis
Arsenic	COC	4.9	2.2	-	4.9	background	4.9	background
Radium 226	COC & COEC	1.3	0.049	8.2	1.3	background	1.3	background
Selenium	COEC	0.80	-	5.1	5.1	ecological	-	-
Uranium	COC & COEC	1.4	3.0	480	3.0	human health	3.0	human health
Vanadium	COC & COEC	20	56	51	51	ecological	56	human health

Mac No. 2

COC and/or COEC [a]		Background	Human Health PRG	Ecological PRG	Site Response Action Goal			
					0 - 2 ft bgs	basis	2 - 10 ft bgs	basis
Arsenic	COC	4.9	2.3	-	4.9	background	4.9	background
Radium 226	COC & COEC	1.3	0.052	8.2	1.3	background	1.3	background
Uranium	COC	1.4	3.1	-	3.1	human health	3.1	human health

Notes:

[a] Refer to Appendix C of this report for COC and COEC determinations for each mine.

Metals concentrations are in units of milligrams per kilogram (mg/kg); radium 226 activities are in units of picocuries per gram (pCi/g).

- Indicates not applicable - analyte not selected as a COC / COEC for this mine. Note that subsurface soil was not evaluated for ecological receptors.

bgs - below ground surface
COC - constituent of concern
COEC - constituent of ecological concern
ft - feet
PRG - preliminary remediation goal

Table 4-1 Technologies Considered

Response Action	Technology Type	Preliminary Technology	Effectiveness, Implementability, and Cost	Screened out/Retained
No Action	No Action	No Action	Does not achieve RAOs. Easy to implement. No cost.	Retained for use as baseline comparison for other alternatives.
Engineered Containment	Horizontal Barriers	Evapotranspiration Cover	Prevents direct contact with humans. With proper construction and maintenance, erosion and release of MRM back into environment is unlikely. Easy to construct with conventional construction equipment and readily available materials.	Retained
		Bottom Liner	Prevents MRM from contacting native ground. Serves no practical purpose for protection of environment due to precipitation-deficient environment, and the retained technology of an ET cover. High cost, time-consuming installation, and increases carbon footprint.	Screened out due to low effectiveness/high cost
In-Situ Treatment	Physical Stabilization	In-Situ Solidification	Uranium minerals and soluble radionuclides are physically encapsulated. Solidification does not address radiation concerns. Requires a large quantity of water. Must be placed in repository after stabilization; greatly increases volume.	Screened out due to low effectiveness/high cost
		Stabilization	Uranium minerals and soluble radionuclides are chemically altered. Stabilization does not address radiation concerns. Requires a large quantity of water. Must be placed in repository after stabilization; increases volume.	Screened out due to low effectiveness/high cost
	Chemical Treatment	Phytoremediation	Uses plants to absorb radionuclides and metals. Limited planting area, access and depth of root penetration, infeasible for the Sites.	Screened out due to low effectiveness/high cost
	Ablation	Ablation	Applied to sandstone-hosted uranium mineralization. Ablation technologies have not demonstrated sufficient throughput to address a large volume of waste rock.	Screened out due to low effectiveness/high cost.
Ex-Situ Treatment	Chemical Treatment	Soil Washing	Washing MRM with water in a heap, vat, or agitate vessel. Precipitates may form a sludge requiring additional treatment. Soil washing likely would not meet cleanup goals.	Screened out due to low effectiveness/high cost
		Acid Extraction	Acidic solution is applied to waste rock in a heap, vat, or agitate vessel. Acid extraction would likely not decrease concentrations of all contaminants below cleanup levels.	Screened out due to low effectiveness/high cost
	Excavation	Milling	Off-Site process removes uranium by pulverization and acid extraction. Milling does not remove radium.	Screened out due to low effectiveness/high cost
Excavation	Excavation	Excavation and On-Site Consolidation/Engineered Containment	Reduces direct contact with humans by consolidating in one location and capping with cover. Increased construction traffic short-term. Easy to implement with conventional construction equipment and readily available materials.	Retained
		Excavation and Off-Site Consolidation/Engineered Containment	Removes all MRM from Sites, reduces direct contact with humans by consolidating in one location off-site and capping with cover. Increased construction traffic and off-site transportation of MRM short-term. Moderately easy to implement using conventional construction equipment. Additional time and equipment necessary to haul off-site.	Retained
		Excavation and Off-Navajo Disposal/Processing	Removes all MRM, eliminates direct contact with humans long-term. Increased construction traffic on-Site and while transporting MRM off-Site for period of time. Moderately easy to implement using conventional construction equipment. Additional time and equipment necessary to haul off-Site.	Retained
	Excavation/ Segregation	Excavation and segregate material based on Ra-226 level. On-Site consolidation/Engineered containment	Reduces direct contact with humans by consolidating in one location and capping with cover. Increased construction traffic short-term. Moderately easy to implement using conventional construction equipment. Additional time and characterization necessary to classify and segregate waste.	Retained

Table 4-2 Alternatives Overview

Alternative	Description	Components
Alternative 1: No Action	Alternative 1 includes no further actions at the Sites. No active remediation or Site work activities will be performed. No action will be taken to treat, contain, remove, or monitor any areas with impacted soil at the Sites. No Site access controls or security would be maintained under Alternative 1.	Alternative 1 does not include any components.
Alternative 2: Consolidate and Cap In-Place at Each Site	Alternative 2 assumes that MRM with concentrations above the Response Action Goal (RAG) would be excavated and consolidated at each of the four Sites (Mac No. 1, Mac No. 2, Black Jack No. 1 and Black Jack No. 2), combined with engineering and institutional controls. Each Site would have a repository of varying capacities (61,000 cy, 89,000 cy, 370,000 cy, and 190,000 cy) containing the MRM.	Design and Site preparation
		Clear vegetation at each Site
		Excavate MRM for the four Sites, and place in repository located at each Site
		Regrade excavated areas with borrow material
		Place topsoil and revegetate disturbed areas
		Construct ET cover at each Site
		Dust suppression and oversight
		PRSC Costs for 100 years
Alternative 3a and 3b: Consolidate Four Homestake Sites at One Repository Site	Alternatives 3a and 3b assume that MRM with concentrations above the RAG would be excavated from the four Sites (Mac No. 1, Mac No. 2, Black Jack No. 1 and Black Jack No. 2) and consolidated at one of the Sites, combined with engineering and institutional controls. The total approximate volume of MRM from the four Sites is 710,000 cy.	Design and Site preparation
		Clear vegetation at each Site
		Excavate MRM and place in one repository
		Regrade excavated areas with borrow material
		Place topsoil and revegetate disturbed areas
		Transport interSite MRM to repository Site
		Construct ET cover
		Dust suppression and oversight
		PRSC Costs for 100 years
Alternative 4a: Regional Repository at Mac No. 1	Alternative 4a assumes that MRM with concentrations above the RAG at the four mine Sites would be excavated and placed at a regional repository located at the Mac No. 1 Site, combined with engineering and institutional controls. The total approximate volume of MRM from the four mines is 710,000 CY, although the repository could accommodate up to 1,049,000 cy to accommodate MRM from the Mariano Lake site.	Design and Site preparation
		Clear vegetation at each Site
		Excavate MRM and place in one repository
		Regrade excavated areas with borrow material
		Place topsoil and revegetate disturbed areas
		Transport interSite MRM to repository Site
		Construct ET cover
		Dust suppression and oversight
		PRSC Costs for 100 years
Alternative 4b: Regional Repository at Black Jack 1	Alternative 4b assumes that MRM with concentrations above the RAG at the four mine Sites would be excavated and placed at a regional repository located at the Black Jack No. 1 Site, combined with engineering and institutional controls. The total approximate volume from the four mines is 710,000 CY, although the repository could accommodate up to 1,049,000 cy to accommodate MRM from the Mariano Lake site.	Design and Site preparation
		Clear vegetation at each Site
		Excavate MRM and place in one repository
		Regrade excavated areas with borrow material
		Place topsoil and revegetate disturbed areas
		Transport interSite MRM to repository Site
		Construct ET cover
		Dust suppression and oversight
		PRSC Costs for 100 years

Table 4-2 Alternatives Overview

Alternative	Description	Components
Alternative 4c: Two Regional Repositories: one at Mac No. 1 and another at Black Jack No. 1	Alternative 4c assumes that MRM with concentrations above the RAG at the four mine Sites would be excavated and placed at one of two regional repositories, combined with engineering and institutional controls. One repository would be located at the Mac No. 1 Site and could accommodate up to about 510,000 CY to accommodate MRM from the Mariano Lake site. The second repository located at the Black Jack No. 1 Site could accommodate up to about 539,000 CY.	Design and Site preparation
		Clear vegetation at each Site
		Excavate MRM and place in one of two repositories
		Regrade excavated areas with borrow material
		Place topsoil and revegetate disturbed areas
		Transport interSite MRM to repository Site
		Construct ET cover at each Site
		Dust suppression and oversight
		PRSC Costs for 100 years
Alternative 5: Excavation and Off-Navajo Disposal within 100 Miles	Alternative 5 assumes that mine wastes with concentrations above the RAG at each of the four Homestake mine Sites would be excavated and transported off the Sites and moved off of Navajo Nation at a location near Ambrosia Lake, NM (Township 14N, Range 10W, Section 13). A repository would be designed and built at the Off-Site location to contain the MRM, combined with engineering and institutional controls. The total approximate volume of MRM from the four Sites is 710,000 cy.	Design and Site preparation
		Clear vegetation at each Site
		Excavate and place MRM in Off-Site repository
		Regrade excavated areas with borrow material
		Place topsoil and revegetate disturbed areas
		Transport MRM to Off-Site repository Site
		Construct ET cover
		Dust suppression and oversight
		PRSC Costs for 5 years at the four M&BJ sites; PRSC Costs for 12 years at the off-site repository location
Alternative 6: Excavation and Off-Navajo Disposal at an Existing Licensed Facility	Alternative 6 assumes that mine wastes with concentrations above the RAG at each of the four Homestake mine Sites would be excavated and transported off the Sites and off of Navajo Nation. The MRM would be transported to the Clean Harbors Deer Trail, CO facility for disposal.	Design and Site preparation
		Clear vegetation at each Site
		Excavate and place MRM in local staging area
		Regrade excavated areas with borrow material
		Place topsoil and revegetate disturbed areas
		Consolidate MRM at Black Jack No. 1 staging area
		Transport MRM to Off-Site disposal facility
		Environmental waste disposal
		Dust suppression and oversight
		PRSC Costs at the four M&BJ sites for 5 years

Table 4-3 Alternatives Cost Summary

Alternative/Criteria	Response Activity	Capital Cost Estimate[1]	Estimated Working Days to Complete	Total Capital Cost[1]	Total Cost with PRSC Costs	Total Capital Cost Range	
						-15%	+30%
Alternative 1: No Action	No Action	0	-	0	0	0	0
Alternative 2: Consolidate and Cap In-Place at Each Site	Design and Site Prep	1,290,322	579	$22,199,094	$22,580,703	$18,869,230	$28,858,823
	Clear Vegetation	300,323					
	Excavate MRM and place in repository on each site.	5,284,494					
	Regrade excavated areas with borrow material	1,146,802					
	Place topsoil and revegetate disturbed areas	3,110,711					
	Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture	4,728,296					
	Dust Suppression and Oversight	3,592,044					
	PRSC Costs for 100 years	381,609					
Alternative 3a: Consolidate Four Homestake Sites at One Repository Site (Mac 1 site)	Design and Site Prep	1,454,468	657	$32,627,055	$32,876,753	$27,732,997	$42,415,172
	Clear vegetation	408,162					
	Excavate MRM and place in one repository.	9,507,979					
	Regrade excavated areas with borrow material	2,460,321					
	Place topsoil and revegetate disturbed areas	4,275,121					
	Transport MRM, weighted average haul distance to Mac 1 site 11 miles	4,456,476					
	Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture	1,968,367					
	Dust Suppression and Oversight	4,060,083					
	PRSC Costs for 100 years	249,698					
Alternative 3b: Consolidate Four Homestake Sites at One Repository Site (BJ1 site)	Design and Site Prep	1,485,456	672	$30,241,781	$30,382,101	$25,705,513	$39,314,315
	Clear vegetation	353,050					
	Excavate MRM and place in one repository.	9,507,979					
	Regrade excavated areas with borrow material	2,157,301					
	Place topsoil and revegetate disturbed areas	3,680,050					
	Transport MRM, weighted average haul distance to BJ 1 site 8 miles	2,021,091					
	Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture	3,147,403					
	Dust Suppression and Oversight	4,148,440					
	PRSC Costs for 100 years	140,321					
Alternative 4a: Regional Repository at Mac No. 1	Design and Site Prep	1,454,468	657	$32,624,838	$32,874,537	$27,731,113	$42,412,290
	Clear vegetation	408,162					
	Excavate MRM and place in repository at Mac No. 1.	9,507,979					
	Regrade excavated areas with borrow material	2,460,321					
	Place topsoil and revegetate disturbed areas	4,275,121					
	Transport MRM to Mac No. 1 site (11 miles)	4,456,476					
	Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture	1,968,367					
	Dust Suppression and Oversight	4,060,083					
	PRSC Costs for 100 years	249,698					
Alternative 4b: Regional Repository at Black Jack No. 1	Design and Site Prep	1,485,456	670	$30,186,876	$30,327,197	$25,658,845	$39,242,939
	Clear vegetation	353,050					
	Excavate MRM and place in repository at Black Jack No. 1.	9,507,979					
	Regrade excavated areas with borrow material	2,157,301					
	Place topsoil and revegetate disturbed areas	3,680,050					
	Transport MRM to Black Jack No. 1 site (8 miles)	2,021,091					
	Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture	3,147,403					
	Dust Suppression and Oversight	4,148,440					
	PRSC Costs for 100 years	140,321					

Table 4-3 Alternatives Cost Summary

Alternative/Criteria	Response Activity	Capital Cost Estimate[1]	Estimated Working Days to Complete	Total Capital Cost[1]	Total Cost with PRSC Costs	Total Capital Cost Range	
						-15%	+30%
Alternative 4c: Two Regional Repositories: one at Mac No. 1 and another at Black Jack No. 1	Design and Site Prep	1,287,072	578	$24,616,932	$24,910,305	$20,924,392	$32,002,012
	Clear vegetation	334,197					
	Excavate MRM and place in one of two repositories	6,215,281					
	Regrade excavated areas with borrow material	1,417,004					
	Place topsoil and revegetate disturbed areas	3,476,472					
	Transport MRM to Mac No. 1 Site (9.5 miles)	1,727,732					
	Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture	3,531,200					
	Dust Suppression and Oversight	3,582,776					
	PRSC Costs for 100 years	293,373					
Alternative 5: Excavation and Off-Navajo Disposal within 100 Miles	Design and Site Prep	1,961,165	898	$40,500,960	$40,654,446	$34,425,816	$52,651,249
	Clear vegetation	429,916					
	Excavate total of 710,000 CY of MRM and place in repository near Ambrosia Lake	9,507,979					
	Regrade excavated areas with borrow material	2,733,293					
	Place topsoil and revegetate disturbed areas	4,510,018					
	Transport 710,000 CY of MRM to Ambrosia lake area	7,145,519					
	Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture	3,698,116					
	Dust Suppression and Oversight	5,504,849					
	PRSC Costs for 5 years at M&BJ sites; PRSC for 12 years at off-site Repository site	153,486					
Alternative 6: Excavation and Off-Navajo Disposal at an Existing Licensed Facility	Design and Site Prep	3,240,540	1,505	$168,879,252	$168,943,338	$143,547,364	$219,543,028
	Clear vegetation	429,916					
	Excavate total of 710,000 CY of MRM and haul to offsite disposal facility	6,736,720					
	Regrade excavated areas with borrow material	2,733,293					
	Place topsoil and revegetate disturbed areas	4,510,018					
	Load and Transport materials to staging area at BJ 1	1,886,128					
	Transport 710,000 CY of MRM 528 miles to offsite disposal facility	41,334,286					
	Environmental waste disposal fee	78,307,512					
	Dust Suppression and Oversight	8,809,902					
	PRSC Costs for 5 years	64,085					

Notes:

1. The Total Capital Cost has an escalation applied to it for three years. The sum of the individual activities in the Capital Cost Estimate will not equal the Total Capital Cost because of this. Please refer to the detailed cost estimate (Appendix F) for each alternative to see how the escalation was applied to the total costs.

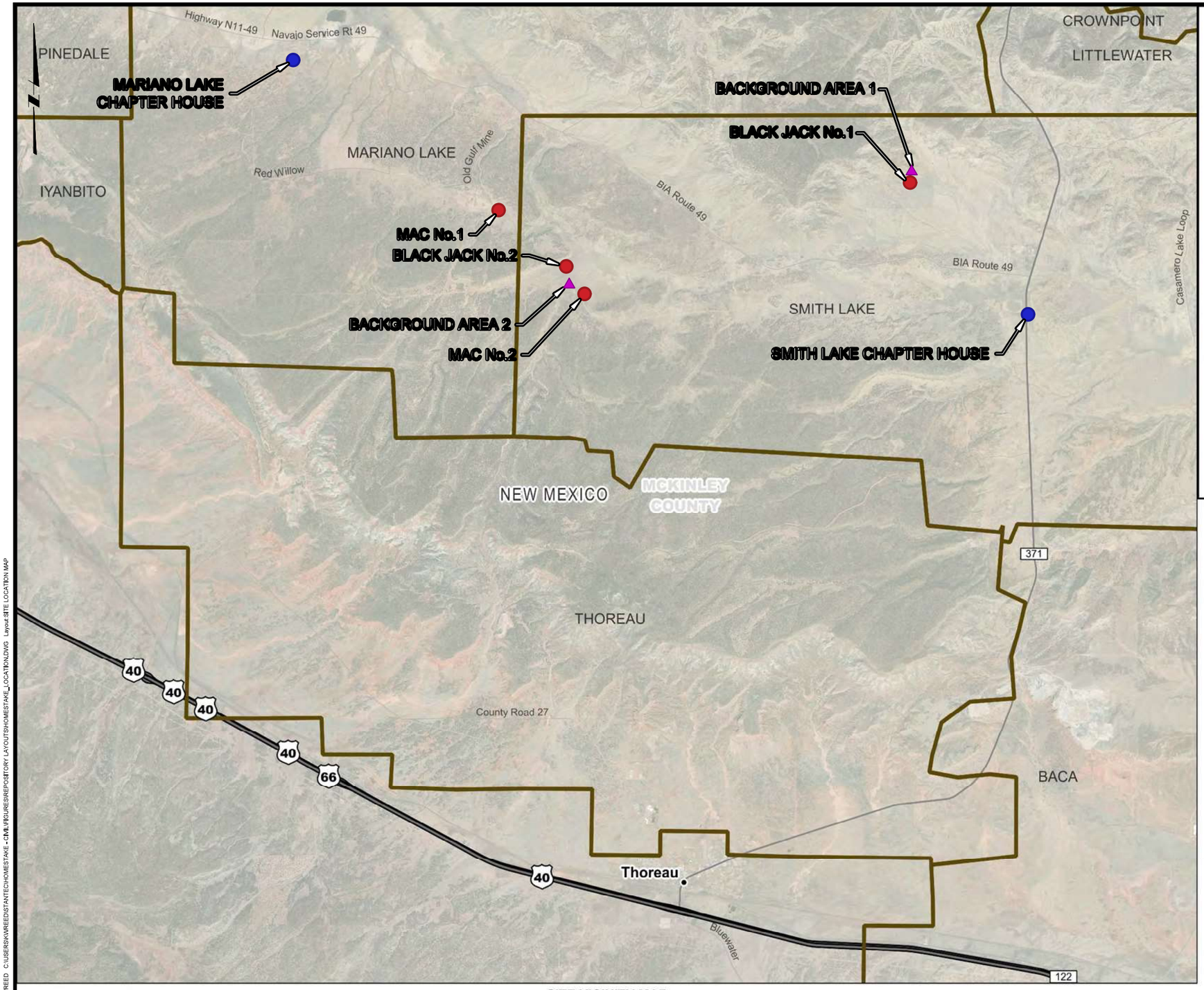
Table 4-8 Comparative Analysis Ranking Summary

Response Action Alternative	Description	Threshold Criteria		Effectiveness		Implementability		Cost
		Protective of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Short-Term Effectiveness	Technical Feasibility	Administrative Feasibility	Cost
Alternative 1	No Action	No	No	Very Poor	Very Good	Very Good	Very Good	Very Good
Alternative 2	Consolidate and Cap In-Place at Each Site	Yes	Yes	Medium	Very Good	Good	Good	Very Good
Alternative 3a	Consolidate four Homestake Sites at One Repository Site (Mac No. 1)	Yes	Yes	Good	Good	Good	Good	Good
Alternative 3b	Consolidate four Homestake Sites at One Repository Site (Black Jack No. 1)	Yes	Yes	Good	Good	Good	Good	Good
Alternative 4a	Regional repository: Mac No. 1	Yes	Yes	Good	Good	Good	Good	Good
Alternative 4b	Regional repository: Black Jack No. 2	Yes	Yes	Good	Good	Good	Good	Good
Alternative 4c	Two regional Repositories: Mac No. 1 and Black Jack No. 1	Yes	Yes	Good	Good	Good	Good	Very Good
Alternative 5	Off-Sites Repository (near Ambrosia Lake, NM)	Yes	Yes	Good	Medium	Good	Good	Good
Alternative 6	Off-Sites Disposal (Clean Harbors Deer Trail, CO)	Yes	Yes	Very Good	Very Poor	Good	Good	Very Poor

Notes:

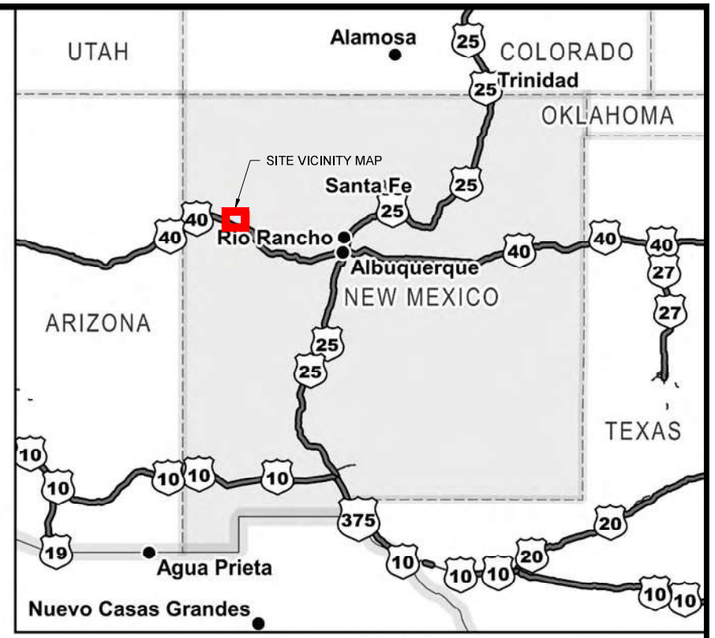
1. Ranking System:
   - Very Poor
   - Poor
   - Medium
   - Good
   - Very Good

FIGURES



SITE VICINITY MAP

5 0 5 Miles



SITE LOCATION MAP

100 0 100 Miles

LEGEND:

- NAVAJO NATION BOUNDARIES
- HOMESTAKE MINING CO.
- BACKGROUND AREA
- CHAPTER HOUSE

Index of Drawings

Sheet Number	Sheet Title
1	SITE LOCATION MAP
2	MAC NO.1 - GAMMA RADIATION SURVEY
3	MAC NO. 2 - GAMMA RADIATION SURVEY
4	BLACK JACK NO. 1
5	BLACK JACK NO. 2
6	MAC NO.1 - ALTERNATIVE 2
7	MAC NO.2 - ALTERNATIVE 2
8	BLACK JACK NO.1 - ALTERNATIVE 2
9	BLACK JACK NO.2 - ALTERNATIVE 2
10	PRELIMINARY MAC NO.1 - ALTERNATIVE 3A
11	PRELIMINARY BLACK JACK NO.1 - ALTERNATIVE 3B
12	PRELIMINARY MAC NO.1 - ALTERNATIVE 4A
13	PRELIMINARY BLACK JACK NO.1 - ALTERNATIVE 4B
14	PRELIMINARY MAC NO.1 - ALTERNATIVE 4C
15	PRELIMINARY BLACK JACK NO.1 - ALTERNATIVE 4C
16	PRELIMINARY MAC NO.1 - ALTERNATIVES 2, 3A, 4A, AND 4C PROFILES A AND B
17	PRELIMINARY MAC NO.2 - ALTERNATIVE 2 PROFILES C AND D
18	PRELIMINARY BLACK JACK NO.1 - ALTERNATIVES 2, 3B, 4B, AND 4C PROFILES E AND F
19	PRELIMINARY BLACK JACK NO.2 - ALTERNATIVE 2 PROFILES G AND H
20	SECTION 13 LOCATION

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	02/2022	KR	REVISED PER USEPA COMMENTS
A	08/2019	KR	ISSUED FOR REVIEW

DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

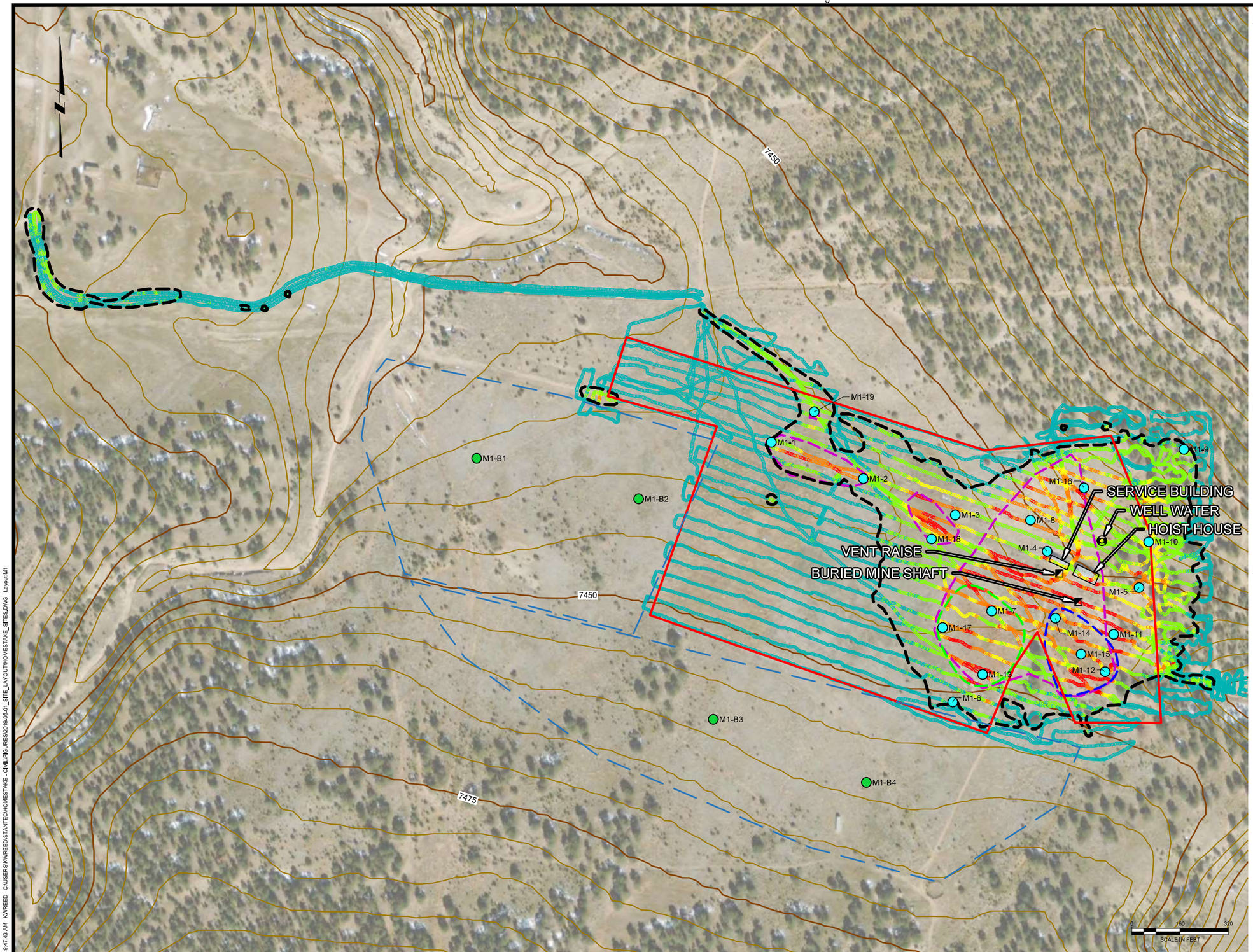
Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
SITE LOCATION MAP

FIGURE
1
233001331

Wednesday, July 19, 2023 9:46:22 AM KWREED C:\USERS\KWREED\STANTECHOMESTAKE - CIVIL\FIGURES\REPOSITORY LAYOUTS\HOMESTAKE_LOCATION.DWG Layout:SITE LOCATION MAP



LEGEND:

- 6200 — EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET
- MINE CLAIM BOUNDARY
- PROPOSED BORROW AREA
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MINE WASTE PILES
- ORE PILES
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- COPC BORING LOCATION (SEE NOTE 5)
- BORROW SOURCE BORING LOCATION

GAMMA EXPOSUSRE RATE -
MICROROENTGEN PER HOUR (uR/HR) (SEE NOTES 3 & 4)

	9.3 - 13.7	MIN - UTL
	13.7 - 20.6	UTL - 1.5 x UTL
	20.6 - 27.4	1.5 x UTL - 2 x UTL
	27.4 - 41.1	2 x UTL - 3 x UTL
	41.1 - 122.3	3 x UTL - MAX

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MIKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
2. LIMITS OF IMPACTED AREA INDICATE AREA OF SITE WHERE GAMMA RADIATION CONSISTENTLY EXCEEDS BACKGROUND GAMMA RADIATION LEVELS. SURFACE SOILS WITHIN THIS AREA ARE ASSUMED TO BE IMPACTED BY HISTORICAL MINING ACTIVITIES.
3. GAMMA SURVEY MEASUREMENTS WERE CONVERTED TO GAMMA EXPOSURE RATES USING THE FOLLOWING CORRELATION EQUATION: GAMMA MEASUREMENT = (EXPOSURE RATE - 5.86) / 0.00049
4. BIN RANGES ARE BASED ON MINIMUM GAMMA SURVEY MEASUREMENT, 95% UTL OF BACKGROUND AREA 2, MULTIPLES OF THE UTL, AND THE MAXIMUM GAMMA SURVEY MEASUREMENT.
5. ALL COPC BORING LOCATIONS CONTAIN COPC CONCENTRATIONS THAT EXCEED ONE OR MORE HUMAN HEALTH OR ECO RISK-BASED SCREENING LEVEL AND BACKGROUND THRESHOLD VALUE.
6. MRM - MINING RELATED MATERIALS
7. COPC - CONSTITUENT OF POTENTIAL CONCERN
8. UTL - UPPER TOLERANCE LIMIT

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	04/2022	KR	REVISED PER USEPA COMMENTS

DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

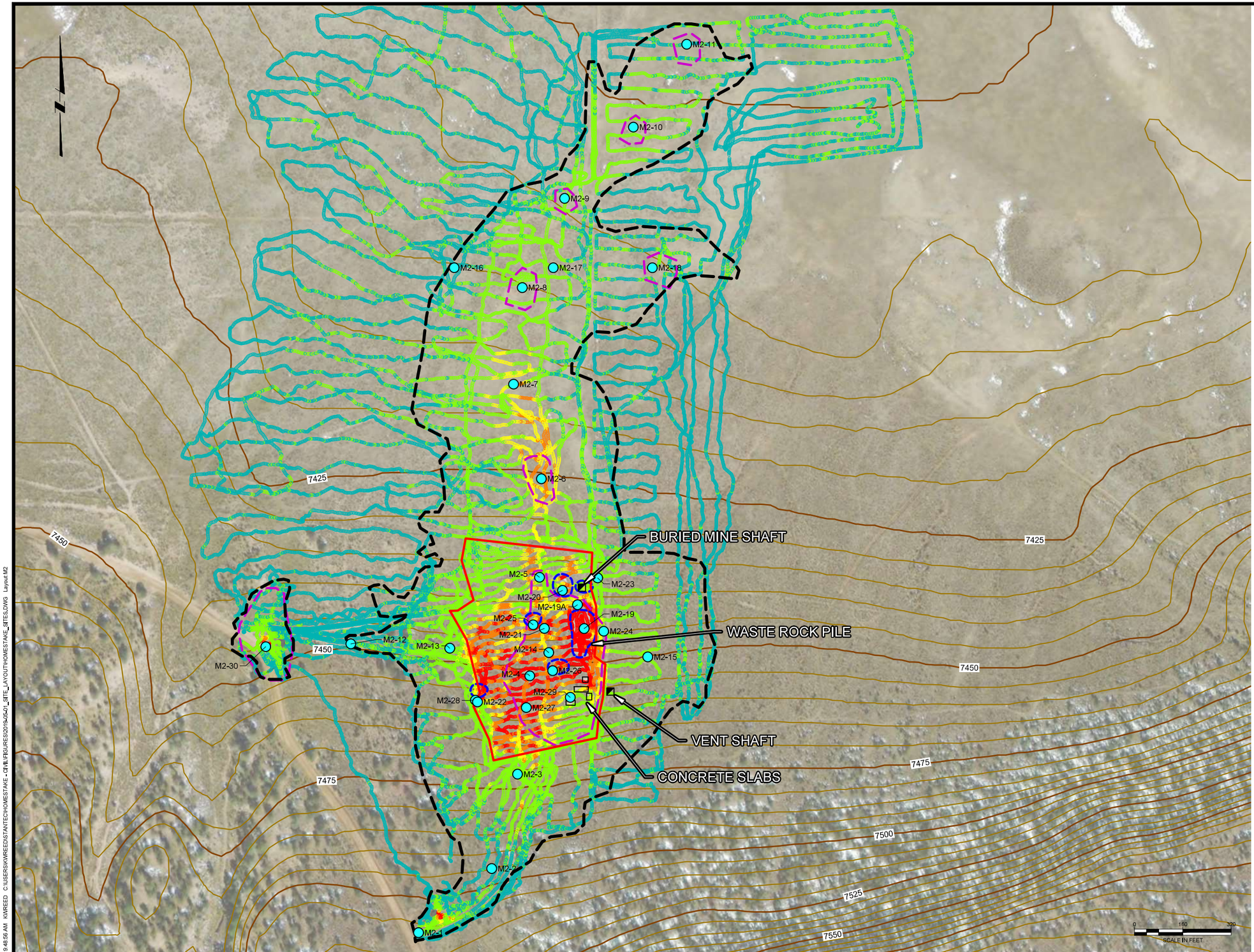
Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
MAC NO.1
GAMMA RADIATION SURVEY

FIGURE
2
233001331

Wednesday, July 19, 2023 9:47:43 AM KWREED C:\USERS\KWREED\STANTECHOMESTAKE - CIVIL\FIGURES\2015\0520_SITE_LAYOUTHOMESTAKE_SITES.DWG Layout:M1



LEGEND:

- 6200 — EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET
- MINE CLAIM BOUNDARY
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MINE WASTE PILES
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- COPC BORING LOCATION (SEE NOTE 5)

GAMMA EXPOSUSRE RATE -
MICROROENTGEN PER HOUR (uR/HR) (SEE NOTES 3 & 4)

9.5 - 13.7	MIN - UTL
13.7 - 20.6	UTL - 1.5 x UTL
20.6 - 27.4	1.5 x UTL - 2 x UTL
27.4 - 41.1	2 x UTL - 3 x UTL
41.1 - 316.6	3 x UTL - MAX

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MIKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
2. LIMITS OF IMPACTED AREA INDICATE AREA OF SITE WHERE GAMMA RADIATION CONSISTENTLY EXCEEDS BACKGROUND GAMMA RADIATION LEVELS. SURFACE SOILS WITHIN THIS AREA ARE ASSUMED TO BE IMPACTED BY HISTORICAL MINING ACTIVITIES.
3. GAMMA SURVEY MEASUREMENTS WERE CONVERTED TO GAMMA EXPOSURE RATES USING THE FOLLOWING CORRELATION EQUATION: GAMMA MEASUREMENT = (EXPOSURE RATE - 5.86) / 0.00049
4. BIN RANGES ARE BASED ON MINIMUM GAMMA SURVEY MEASUREMENT, 95% UTL OF BACKGROUND AREA 2, MULTIPLES OF THE UTL, AND THE MAXIMUM GAMMA SURVEY MEASUREMENT.
5. ALL COPC BORING LOCATIONS CONTAIN COPC CONCENTRATIONS THAT EXCEED THE HUMAN HEALTH OR ECO RISK-BASED SCREENING LEVEL AND BACKGROUND THRESHOLD VALUE, EXCEPT FOR M2-28.
6. MRM - MINING RELATED MATERIALS
7. COPC - CONSTITUENT OF POTENTIAL CONCERN
8. UTL - UPPER TOLERANCE LIMIT

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	04/2022	KR	REVISED PER USEPA COMMENTS

DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

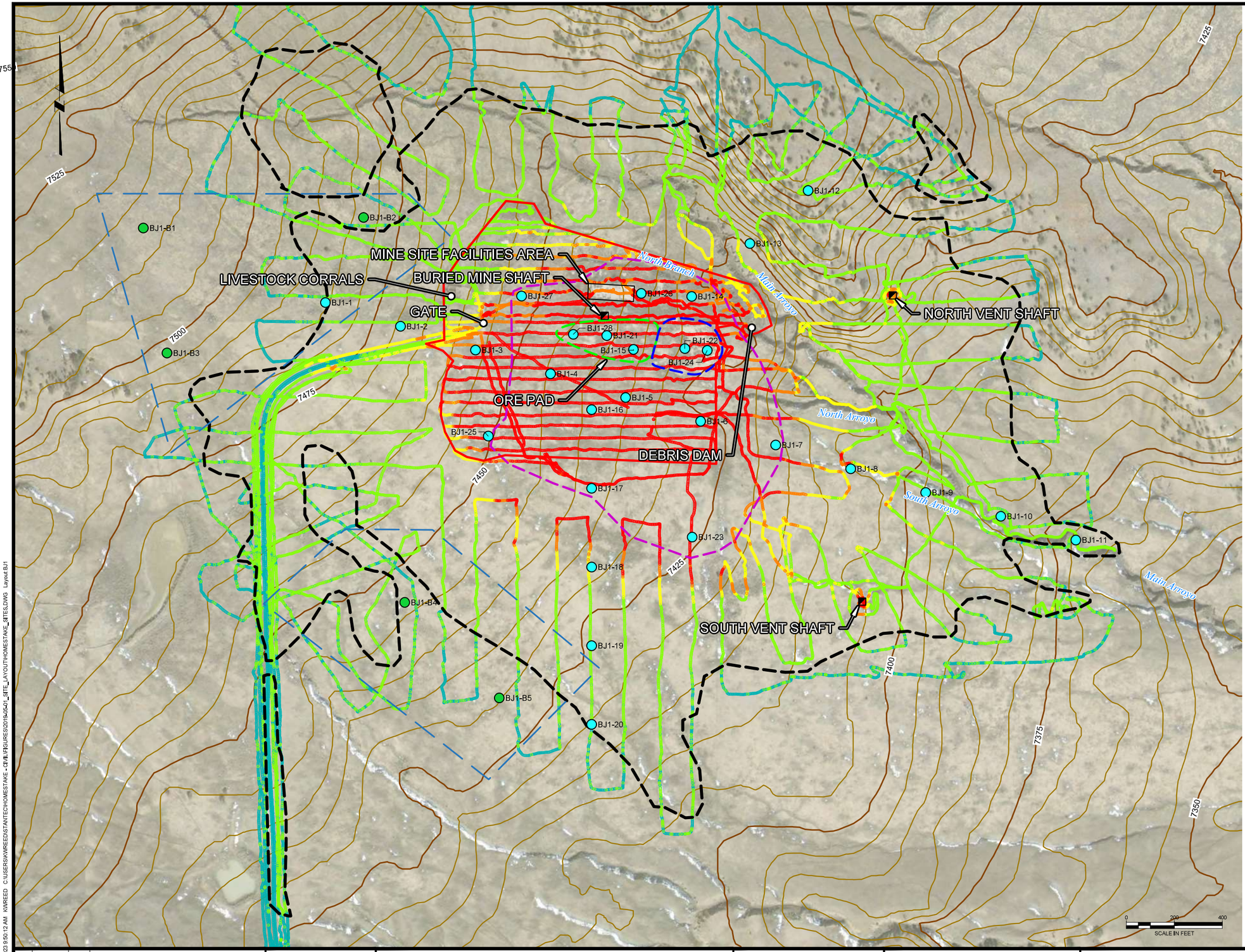
Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
MAC NO. 2
GAMMA RADIATION SURVEY

FIGURE
3
233001331

Wednesday, July 19, 2023 9:48:56 AM KWREED C:\USERS\KWREED\STANTEC\HOMESTAKE - CIVIL\FIGURES\2019\5421_SITE_LAYOUT\HOMESTAKE_SITES.DWG Layout:M2



LEGEND:

- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET (6200)
- MINE CLAIM BOUNDARY
- PROPOSED BORROW AREA
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MINE WASTE PILES
- ORE PILES
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- COPC BORING LOCATION (SEE NOTE 5)
- BORROW SOURCE BORING LOCATION

GAMMA EXPOSUSRE RATE -
MICROROENTGEN PER HOUR (uR/HR) (SEE NOTES 3 & 4)

8.7 - 14.9	MIN - UTL
14.9 - 22.4	UTL - 1.5 x UTL
22.4 - 29.8	1.5 x UTL - 2 x UTL
29.8 - 44.7	2 x UTL - 3 x UTL
44.7 - 365.7	3 x UTL - MAX

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MIKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
2. LIMITS OF IMPACTED AREA INDICATE AREA OF SITE WHERE GAMMA RADIATION CONSISTENTLY EXCEEDS BACKGROUND GAMMA RADIATION LEVELS. SURFACE SOILS WITHIN THIS AREA ARE ASSUMED TO BE IMPACTED BY HISTORICAL MINING ACTIVITIES.
3. GAMMA SURVEY MEASUREMENTS WERE CONVERTED TO GAMMA EXPOSURE RATES USING THE FOLLOWING CORRELATION EQUATION: GAMMA MEASUREMENT = (EXPOSURE RATE - 5.86) / 0.00049
4. BIN RANGES ARE BASED ON MINIMUM GAMMA SURVEY MEASUREMENT, 95% UTL OF BACKGROUND AREA 1, MULTIPLES OF THE UTL, AND THE MAXIMUM GAMMA SURVEY MEASUREMENT.
5. ALL COPC BORING LOCATIONS CONTAIN COPC CONCENTRATIONS THAT EXCEED ONE OR MORE HUMAN HEALTH OR ECO RISK-BASED SCREENING LEVEL AND BACKGROUND THRESHOLD VALUE.
6. MRM - MINING RELATED MATERIALS
7. COPC - CONSTITUENT OF POTENTIAL CONCERN
8. UTL - UPPER TOLERANCE LIMIT

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	04/2022	KR	REVISED PER USEPA COMMENTS

DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

HOMESTAKE

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
BLACK JACK NO. 1
GAMMA RADIATION SURVEY

FIGURE
4
233001331

Wednesday, July 19, 2023 9:50:12 AM KWREED C:\USERS\KWREED\STANTEC\HOMESTAKE - CIVIL\FIGURES\2019\25471_SITE_LAYOUT\HOMESTAKE_SITES.DWG Layout:BJ1

NORTH VENT SHAFT
POWDER MAGAZINE
SOUTH VENT SHAFT
MINE SHAFT
HOIST HOUSE
7500
7475
7450
7425
7400
BJ2-1
BJ2-2
BJ2-3
BJ2-4
BJ2-4B
BJ2-4E
BJ2-4F
BJ2-4G
BJ2-5
BJ2-6
BJ2-7
BJ2-8
BJ2-9
BJ2-10
BJ2-10B
BJ2-11
BJ2-11A
BJ2-11B
BJ2-11C
BJ2-12
BJ2-13
BJ2-14
BJ2-15
BJ2-16
BJ2-17
BJ2-18
BJ2-19
BJ2-20
BJ2-21
BJ2-22
0 200 400
SCALE IN FEET

LEGEND:

- 6200 — EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET
- MINE CLAIM BOUNDARY
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- COPC BORING LOCATION (SEE NOTE 5)

GAMMA EXPOSUSRE RATE -
MICROROENTGEN PER HOUR (uR/HR) (SEE NOTES 3 & 4)

	8.8 - 13.7	MIN - UTL
	13.7 - 20.6	UTL - 1.5 x UTL
	20.6 - 27.4	1.5 x UTL - 2 x UTL
	27.4 - 41.4	2 x UTL - 3 x UTL
	41.4 - 340.5	3 x UTL - MAX

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MIKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
2. LIMITS OF IMPACTED AREA INDICATE AREA OF SITE WHERE GAMMA RADIATION CONSISTENTLY EXCEEDS BACKGROUND GAMMA RADIATION LEVELS. SURFACE SOILS WITHIN THIS AREA ARE ASSUMED TO BE IMPACTED BY HISTORICAL MINING ACTIVITIES.
3. GAMMA SURVEY MEASUREMENTS WERE CONVERTED TO GAMMA EXPOSURE RATES USING THE FOLLOWING CORRELATION EQUATION: GAMMA MEASUREMENT = (EXPOSURE RATE - 5.86) / 0.00049
4. BIN RANGES ARE BASED ON MINIMUM GAMMA SURVEY MEASUREMENT, 95% UTL OF BACKGROUND AREA 2, MULTIPLES OF THE UTL, AND THE MAXIMUM GAMMA SURVEY MEASUREMENT.
5. ALL COPC BORING LOCATIONS CONTAIN COPC CONCENTRATIONS THAT EXCEED ONE OR MORE HUMAN HEALTH OR ECO RISK-BASED SCREENING LEVEL AND BACKGROUND THRESHOLD VALUE.
6. MRM - MINING RELATED MATERIALS
7. COPC - CONSTITUENT OF POTENTIAL CONCERN
8. UTL - UPPER TOLERANCE LIMIT

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	04/2022	KR	REVISED PER USEPA COMMENTS

DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
BLACK JACK NO. 2
GAMMA RADIATION SURVEY

FIGURE
5
233001331

Wednesday, July 19, 2023 9:51:26 AM KWREED C:\USERS\KWREED\STANTEC\HOMESTAKE - C\1\WLR\GIS\RES\2018\0540_SITE_LAYOUT\HOMESTAKE_SITES.DWG Layout:B2

ALLOTEE PARCEL 1191

ALLOTEE PARCEL 1183

ALLOTEE PARCEL 1873

SERVICE BUILDING
WATER WELL
HOIST HOUSE

VENT RAISE

BURIED MINE SHAFT

TRAILER

M1-1 M1-2 M1-3 M1-4 M1-5 M1-6 M1-7 M1-8 M1-9 M1-10 M1-11 M1-12 M1-13 M1-14 M1-15 M1-16 M1-17 M1-18 M1-19

M1-B1 M1-B2 M1-B3 M1-B4

B 17

0+00 5+00 10+00 15+00 20+00 25+00

7425 7445 7450 7475 7500

0 160 320
SCALE IN FEET

LEGEND:

- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET (7475)
- PROPOSED SURFACE CONTOUR & ELEVATION, FEET (7500)
- CULTURAL RESOURCE INVENTORY BOUNDARY
- BIOLOGICAL RESOURCE SURVEY BOUNDARY
- ALLOTEE PARCEL
- LIMIT OF PROPOSED REPOSITORY (SEE NOTE 5)
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MINE WASTE PILES
- ORE PILES
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- PROPOSED BORROW AREA (SEE NOTE 6)
- ARROYO (AVOIDED)
- ROCK OUTCROP (NOT INCLUDED IN AVAILABLE BORROW CALCULATIONS)
- STRUCTURES (TO BE REMOVED) (SEE NOTE 7)
- POTENTIAL STOCKPILE AREA
- COPC BORING LOCATION (SEE NOTE 8)
- BORROW SOURCE BORING LOCATION
- B / 12 — SECTION NAME AND VIEW DIRECTION; SHEET NUMBER OF SECTION VIEW

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MICKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
2. LIMITS OF IMPACTED AREA INDICATE AREA OF SITE WHERE GAMMA RADIATION CONSISTENTLY EXCEEDS BACKGROUND GAMMA RADIATION LEVELS. SURFACE SOILS WITHIN THIS AREA ARE ASSUMED TO BE IMPACTED BY HISTORICAL MINING ACTIVITIES.
3. MRM - MINING RELATED MATERIALS
4. COPC - CONSTITUENT OF POTENTIAL CONCERN
5. REPOSITORY VOLUME: 61,000 CY
6. PROPOSED BORROW AREA IS A SOIL BORROW SOURCE. ANY ROCK MATERIAL WILL BE IMPORTED FROM AN OFF-SITE SOURCE.
7. EXISTING WELLS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE ABANDONED. EXISTING BUILDINGS, STRUCTURES, AND OTHER DEBRIS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE REMOVED, DEMOLISHED AND DISPOSED OF IN THE REPOSITORY.
8. ALL COPC BORING LOCATIONS CONTAIN COPC CONCENTRATIONS THAT EXCEED ONE OR MORE HUMAN HEALTH OR ECO RISK-BASED SCREENING LEVEL AND BACKGROUND THRESHOLD VALUE.

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	02/2022	KR	REVISED PER USEPA COMMENTS
A	08/2019	KR	ISSUED FOR REVIEW

DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
MAC NO.1 - ALTERNATIVE 2
PRELIMINARY

FIGURE
6
233001331

Wednesday, July 19, 2023 9:52:11 AM KWREED C:\USERS\KWREED\STANTEC\HOMESTAKE - CIVIL\FIGURES\REPOSITORY LAYOUTS\HOMESTAKE_PRELIM REPOSITORY LAYOUTS 24.DWG Layout:MAC NO.1-ALTERNATIVE 2

ALLOTEE PARCEL 1179

ALLOTEE PARCEL 1870

ALLOTEE PARCEL 1182

ALLOTEE PARCEL 1868

M2-11
M2-10
M2-9
M2-16
M2-17
M2-18
M2-8
M2-7
M2-6
M2-5
M2-23
M2-20
M2-19A
M2-19
M2-24
M2-25
M2-21
M2-14
M2-13
M2-12
M2-30
M2-15
M2-26
M2-4
M2-28
M2-29
M2-22
M2-27
M2-3
M2-2
M2-1

D
18

C
18

0+00
5+00
10+00
15+00
20+00
20+50
13+56

7425
7450
7475
7500
7525
7550

BURIED MINE SHAFT

VENT SHAFT

CONCRETE SLABS

0 160 320
SCALE IN FEET

LEGEND:

- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET (7475)
- PROPOSED SURFACE CONTOUR & ELEVATION, FEET (7500)
- CULTURAL RESOURCE INVENTORY BOUNDARY
- BIOLOGICAL RESOURCE SURVEY BOUNDARY
- ALLOTEE PARCEL
- LIMIT OF PROPOSED REPOSITORY (SEE NOTE 5)
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MINE WASTE PILES
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- COPC BORING LOCATION (SEE NOTE 7)
- B / 12 — SECTION NAME AND VIEW DIRECTION; SHEET NUMBER OF SECTION VIEW

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MICKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
2. LIMITS OF IMPACTED AREA INDICATE AREA OF SITE WHERE GAMMA RADIATION CONSISTENTLY EXCEEDS BACKGROUND GAMMA RADIATION LEVELS. SURFACE SOILS WITHIN THIS AREA ARE ASSUMED TO BE IMPACTED BY HISTORICAL MINING ACTIVITIES.
3. MRM - MINING RELATED MATERIALS
4. COPC - CONSTITUENT OF POTENTIAL CONCERN
5. REPOSITORY VOLUME: 88,000 CY
6. EXISTING WELLS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE ABANDONED. EXISTING BUILDINGS, STRUCTURES, AND OTHER DEBRIS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE REMOVED, DEMOLISHED AND DISPOSED OF IN THE REPOSITORY.
7. ALL COPC BORING LOCATIONS CONTAIN COPC CONCENTRATIONS THAT EXCEED ONE OR MORE HUMAN HEALTH OR ECO RISK-BASED SCREENING LEVEL AND BACKGROUND THRESHOLD VALUE, EXCEPT FOR M2-28.

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	02/2022	KR	REVISED PER USEPA COMMENTS
A	08/2019	KR	ISSUED FOR REVIEW

DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO
MAC AND BLACK JACK EE/CA REPORT
MAC NO.2 - ALTERNATIVE 2
PRELIMINARY

FIGURE
7
233001331

Wednesday, July 19, 2023 9:52:21 AM KWREED C:\USERS\KWREED\STANTECHOMESTAKE - CIVIL\FIGURES\REPOSITORY LAYOUTS\HOMESTAKE_PRELIM REPOSITORY LAYOUTS 24x30.DWG Layout:MAC NO.2 - ALTERNATIVE 2

ALLOTEE PARCEL 1044

ALLOTEE PARCEL 1043

ALLOTEE PARCEL 1046

ALLOTEE PARCEL 1045

MINE SITE FACILITIES AREA

LIVESTOCK CORRALS

BURIED MINE SHAFT

GATE

NORTH VENT SHAFT

DEBRIS DAM

SOUTH VENT SHAFT

North Branch

Main Arroyo

North Arroyo

South Arroyo

BJ1-B1 BJ1-B2 BJ1-B3 BJ1-B4 BJ1-B5

BJ1-1 BJ1-2 BJ1-3 BJ1-4 BJ1-5 BJ1-6 BJ1-7 BJ1-8 BJ1-9 BJ1-10 BJ1-11 BJ1-12 BJ1-13 BJ1-14 BJ1-15 BJ1-16 BJ1-17 BJ1-18 BJ1-19 BJ1-20 BJ1-21 BJ1-22 BJ1-23 BJ1-24 BJ1-25 BJ1-26 BJ1-27 BJ1-28

E 19 0+00

5+00 10+00 15+00 20+00 25+00 30+00 35+00 38+00

F 19 0+00

7575 7550 7525 7500 7475 7450 7425 7400 7375 7350

0 200 400
SCALE IN FEET

LEGEND:

- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET (7475)
- PROPOSED SURFACE CONTOUR & ELEVATION, FEET (7500)
- CULTURAL RESOURCE INVENTORY BOUNDARY
- BIOLOGICAL RESOURCE SURVEY BOUNDARY
- ALLOTEE PARCEL
- EXISTING OVERHEAD ELECTRIC (E)
- LIMIT OF PROPOSED REPOSITORY (SEE NOTE 5)
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MINE WASTE PILES
- ORE PILES
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- PROPOSED BORROW AREA (SEE NOTE 6)
- ARROYO (AVOIDED)
- TREES (AVOIDED)
- POTENTIAL STOCKPILE AREA
- COPC BORING LOCATION (SEE NOTE 8)
- BORROW SOURCE BORING LOCATION
- B / 12 — SECTION NAME AND VIEW DIRECTION; SHEET NUMBER OF SECTION VIEW

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MICKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
2. LIMITS OF IMPACTED AREA INDICATE AREA OF SITE WHERE GAMMA RADIATION CONSISTENTLY EXCEEDS BACKGROUND GAMMA RADIATION LEVELS. SURFACE SOILS WITHIN THIS AREA ARE ASSUMED TO BE IMPACTED BY HISTORICAL MINING ACTIVITIES.
3. MRM - MINING RELATED MATERIALS
4. COPC - CONSTITUENT OF POTENTIAL CONCERN
5. REPOSITORY VOLUME: 370,000 CY
6. PROPOSED BORROW AREA IS A SOIL BORROW SOURCE. ANY ROCK MATERIAL WILL BE IMPORTED FROM AN OFF-SITE SOURCE.
7. EXISTING WELLS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE ABANDONED. EXISTING BUILDINGS, STRUCTURES, AND OTHER DEBRIS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE REMOVED, DEMOLISHED AND DISPOSED OF IN THE REPOSITORY.
8. ALL COPC BORING LOCATIONS CONTAIN COPC CONCENTRATIONS THAT EXCEED ONE OR MORE HUMAN HEALTH OR ECO RISK-BASED SCREENING LEVEL AND BACKGROUND THRESHOLD VALUE.

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	02/2022	KR	REVISED PER USEPA COMMENTS
A	08/2019	KR	ISSUED FOR REVIEW

DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
BLACK JACK NO.1 - ALTERNATIVE 2
PRELIMINARY

FIGURE
8
233001331

Wednesday, July 19, 2023 9:52:37 AM KKREED C:\USERS\KKREED\STANTEC\HOMESTAKE - CIVIL\FIGURES\REPOSITORY LAYOUTS\HOMESTAKE_PRELIM REPOSITORY LAYOUTS 2&5.DWG

NORTH VENT SHAFT

POWDER MAGAZINE

ALLOTEE PARCEL 1180

ALLOTEE PARCEL 1179

ALLOTEE PARCEL 1182

ALLOTEE PARCEL 1181

SOUTH VENT SHAFT

HOIST HOUSE

BURIED MINE SHAFT

BJ2-1 BJ2-2 BJ2-3 BJ2-4 BJ2-4B BJ2-4D BJ2-4E BJ2-4F BJ2-5 BJ2-6 BJ2-7 BJ2-8 BJ2-9 BJ2-10 BJ2-10B BJ2-11 BJ2-11A BJ2-11B BJ2-11C BJ2-12 BJ2-13 BJ2-14 BJ2-15 BJ2-16 BJ2-17 BJ2-18 BJ2-19 BJ2-20 BJ2-21 BJ2-22

7400 7425 7450 7475 7500

G 20 0+00 5+00 7500

H 20 0+00 5+00 10+00 15+00 19+00 20+00 23+00

0 160 320
SCALE IN FEET

LEGEND:

- 7475 — EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET
- 7500 — PROPOSED SURFACE CONTOUR & ELEVATION, FEET
- CULTURAL RESOURCE INVENTORY BOUNDARY
- BIOLOGICAL RESOURCE SURVEY BOUNDARY
- ALLOTEE PARCEL
- LIMIT OF PROPOSED REPOSITORY (SEE NOTE 5)
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- COPC BORING LOCATION (NOTE 7)
- B / 12 — SECTION NAME AND VIEW DIRECTION; SHEET NUMBER OF SECTION VIEW

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MICKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
2. LIMITS OF IMPACTED AREA INDICATE AREA OF SITE WHERE GAMMA RADIATION CONSISTENTLY EXCEEDS BACKGROUND GAMMA RADIATION LEVELS. SURFACE SOILS WITHIN THIS AREA ARE ASSUMED TO BE IMPACTED BY HISTORICAL MINING ACTIVITIES.
3. MRM - MINING RELATED MATERIALS
4. COPC - CONSTITUENT OF POTENTIAL CONCERN
5. REPOSITORY VOLUME: 188,000 CY
6. EXISTING WELLS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE ABANDONED. EXISTING BUILDINGS, STRUCTURES, AND OTHER DEBRIS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE REMOVED, DEMOLISHED AND DISPOSED OF IN THE REPOSITORY.
7. ALL COPC BORING LOCATIONS CONTAIN COPC CONCENTRATIONS THAT EXCEED ONE OR MORE HUMAN HEALTH OR ECO RISK-BASED SCREENING LEVEL AND BACKGROUND THRESHOLD VALUE.

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	02/2022	KR	REVISED PER USEPA COMMENTS
A	08/2019	KR	ISSUEDD FOR REVIEW

DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
BLACK JACK NO.2 - ALTERNATIVE 2
PRELIMINARY

FIGURE
9
233001331

Wednesday, July 19, 2023 9:52:52 AM KWREED C:\USERS\KWREED\DST\ANTECH\HOMESTAKE - CIVIL\FIGURES\REPOSITORY LAYOUTS\HOMESTAKE_PRELIM REPOSITORY LAYOUTS 2-5.DWG Layout:BLACK JACK NO.2 - ALTERNATIVE 2

ALLOTEE PARCEL 1191

ALLOTEE PARCEL 1873

ALLOTEE PARCEL 1183

SERVICE BUILDING
WATER WELL
HOIST HOUSE

VENT RAISE

BURIED MINE SHAFT

TRAILER

LEGEND:

- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET
- PROPOSED SURFACE CONTOUR & ELEVATION, FEET
- CULTURAL RESOURCE INVENTORY BOUNDARY
- BIOLOGICAL RESOURCE SURVEY BOUNDARY
- ALLOTEE PARCEL
- ARROYO (AVOIDED)
- LIMIT OF PROPOSED REPOSITORY (SEE NOTE 5)
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- MINE WASTE PILES
- ORE PILES
- PROPOSED BORROW AREA (SEE NOTE 6)
- ROCK OUTCROP (NOT INCLUDED IN AVAILABLE BORROW CALCULATIONS)
- STRUCTURES (TO BE REMOVED) (SEE NOTE 7)
- POTENTIAL STOCKPILE AREA
- SECTION NAME AND VIEW DIRECTION
- SHEET NUMBER OF SECTION VIEW

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MICKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
2. LIMITS OF IMPACTED AREA INDICATE AREA OF SITE WHERE GAMMA RADIATION CONSISTENTLY EXCEEDS BACKGROUND GAMMA RADIATION LEVELS. SURFACE SOILS WITHIN THIS AREA ARE ASSUMED TO BE IMPACTED BY HISTORICAL MINING ACTIVITIES.
3. MRM - MINING RELATED MATERIALS
4. COPC - CONSTITUENT OF POTENTIAL CONCERN
5. REPOSITORY VOLUME: 710,000 CY
6. PROPOSED BORROW AREA IS A SOIL BORROW SOURCE. ANY ROCK MATERIAL WILL BE IMPORTED FROM AN OFF-SITE SOURCE.
7. EXISTING WELLS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE ABANDONED. EXISTING BUILDINGS, STRUCTURES, AND OTHER DEBRIS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE REMOVED, DEMOLISHED AND DISPOSED OF IN THE REPOSITORY.

SCALE IN FEET: 0, 160, 320

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	02/2022	KR	REVISED PER USEPA COMMENTS
A	08/2019	KR	ISSUED FOR REVIEW

DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
MAC NO.1 - ALTERNATIVE 3A
PRELIMINARY

FIGURE
10
233001331

Wednesday, July 19, 2023 9:53:36 AM KWREED C:\USERS\KWREED\STANTEC\HOMESTAKE - CIVIL\FIGURES\REPOSITORY LAYOUTS\HOMESTAKE_PRELIM REPOSITORY LAYOUTS 6-15.DWG Layout:MAC NO.1 - ALTERNATIVE 3A

ALLOTEE PARCEL 1044

ALLOTEE PARCEL 1043

ALLOTEE PARCEL 1046

ALLOTEE PARCEL 1045

MINE SITE FACILITIES AREA

BURIED MINE SHAFT

GATE

NORTH VENT SHAFT

DEBRIS DAM

SOUTH VENT SHAFT

North Branch

Main Arroyo

North Arroyo

South Arroyo

Main Arroyo

E 19

F 19

B 12

LEGEND:

- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET
- PROPOSED SURFACE CONTOUR & ELEVATION, FEET
- CULTURAL RESOURCE INVENTORY BOUNDARY
- BIOLOGICAL RESOURCE SURVEY BOUNDARY
- ALLOTEE PARCEL
- EXISTING OVERHEAD ELECTRIC
- ARROYO (AVOIDED)
- LIMIT OF PROPOSED REPOSITORY (SEE NOTE 5)
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- MINE WASTE PILES
- ORE PILES
- PROPOSED BORROW AREA (SEE NOTE 6)
- TREES (AVOIDED)
- POTENTIAL STOCKPILE AREA
- SECTION NAME AND VIEW DIRECTION
- SHEET NUMBER OF SECTION VIEW

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MICKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
2. LIMITS OF IMPACTED AREA INDICATE AREA OF SITE WHERE GAMMA RADIATION CONSISTENTLY EXCEEDS BACKGROUND GAMMA RADIATION LEVELS. SURFACE SOILS WITHIN THIS AREA ARE ASSUMED TO BE IMPACTED BY HISTORICAL MINING ACTIVITIES
3. MRM - MINING RELATED MATERIALS
4. COPC - CONSTITUENT OF POTENTIAL CONCERN
5. REPOSITORY VOLUME: 710,000 CY
6. PROPOSED BORROW AREA IS A SOIL BORROW SOURCE. ANY ROCK MATERIAL WILL BE IMPORTED FROM AN OFF-SITE SOURCE.
7. EXISTING WELLS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE ABANDONED. EXISTING BUILDINGS, STRUCTURES, AND OTHER DEBRIS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE REMOVED, DEMOLISHED AND DISPOSED OF IN THE REPOSITORY.

SCALE IN FEET 0 200 400

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DESIGNED K REED

CHECKED S DOWNEY

APPROVED J CUMBERS

Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
BLACK JACK NO.1 - ALTERNATIVE 3B
PRELIMINARY

FIGURE 11

233001331

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ALLOTEE PARCEL 1191

ALLOTEE PARCEL 1183

ALLOTEE PARCEL 1673

SERVICE BUILDING
WATER WELL
HOIST HOUSE

VENT RAISE

BURIED MINE SHAFT

TRAILER

A 17 — 0+00

B 17 — 0+00

7425 7430 7435 7440 7445 7450 7455 7460 7465 7470 7475 7500

0+00 2+00 4+00 6+00 8+00 10+00 12+00 14+00 16+00 18+00 20+00 22+00 23+50

5+00 10+00 15+00 20+00 25+00

0 160 320
SCALE IN FEET

LEGEND:

- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET (7475)
- PROPOSED SURFACE CONTOUR & ELEVATION, FEET (7500)
- CULTURAL RESOURCE INVENTORY BOUNDARY
- BIOLOGICAL RESOURCE SURVEY BOUNDARY
- ALLOTEE PARCEL
- ARROYO (AVOIDED)
- LIMIT OF PROPOSED REPOSITORY (SEE NOTE 5)
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- MINE WASTE PILES
- ORE PILES
- PROPOSED BORROW AREA (SEE NOTE 6)
- ROCK OUTCROP (NOT INCLUDED IN AVAILABLE BORROW CALCULATIONS)
- STRUCTURES (TO BE REMOVED) (SEE NOTE 7)
- POTENTIAL STOCKPILE AREA
- B / 12 — SECTION NAME AND VIEW DIRECTION; SHEET NUMBER OF SECTION VIEW

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MICKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
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3. MRM - MINING RELATED MATERIALS
4. COPC - CONSTITUENT OF POTENTIAL CONCERN
5. REPOSITORY VOLUME: 1,049,000 CY
6. PROPOSED BORROW AREA IS A SOIL BORROW SOURCE. ANY ROCK MATERIAL WILL BE IMPORTED FROM AN OFF-SITE SOURCE.
7. EXISTING WELLS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE ABANDONED. EXISTING BUILDINGS, STRUCTURES, AND OTHER DEBRIS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE REMOVED, DEMOLISHED AND DISPOSED OF IN THE REPOSITORY.

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DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
MAC NO.1 - ALTERNATIVE 4A
PRELIMINARY

FIGURE
12
233001331

Wednesday, July 19, 2023 9:55:55 AM KWREED C:\USERS\KWREED\STANTEC\HOMESTAKE - CIVIL\FIGURES\REPOSITORY LAYOUTS\HOMESTAKE_PRELIM REPOSITORY LAYOUTS 6-15.DWG Layout:MAC NO.1 - ALTERNATIVE 4A

ALLOTEE PARCEL 1044

ALLOTEE PARCEL 1043

ALLOTEE PARCEL 1046

ALLOTEE PARCEL 1045

MINE SITE FACILITIES AREA

BURIED MINE SHAFT

GATE

NORTH VENT SHAFT

DEBRIS DAM

SOUTH VENT SHAFT

North Branch

Main Arroyo

North Arroyo

South Arroyo

Main Arroyo

E 19 0+00

5+00

10+00

15+00

20+00

25+00

30+00

35+00

38+00

24+00

30+00

F 19 0+00

LEGEND:

- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET
- PROPOSED SURFACE CONTOUR & ELEVATION, FEET
- CULTURAL RESOURCE INVENTORY BOUNDARY
- BIOLOGICAL RESOURCE SURVEY BOUNDARY
- ALLOTEE PARCEL
- EXISTING OVERHEAD ELECTRIC
- ARROYO (AVOIDED)
- LIMIT OF PROPOSED REPOSITORY (SEE NOTE 5)
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- MINE WASTE PILES
- ORE PILES
- PROPOSED BORROW AREA (SEE NOTE 6)
- TREES (AVOIDED)
- POTENTIAL STOCKPILE AREA
- B 12 SECTION NAME AND VIEW DIRECTION / SHEET NUMBER OF SECTION VIEW

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MICKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
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3. MRM - MINING RELATED MATERIALS
4. COPC - CONSTITUENT OF POTENTIAL CONCERN
5. REPOSITORY VOLUME: 1,049,000 CY
6. PROPOSED BORROW AREA IS A SOIL BORROW SOURCE. ANY ROCK MATERIAL WILL BE IMPORTED FROM AN OFF-SITE SOURCE.
7. EXISTING WELLS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE ABANDONED. EXISTING BUILDINGS, STRUCTURES, AND OTHER DEBRIS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE REMOVED, DEMOLISHED AND DISPOSED OF IN THE REPOSITORY.

0 200 400
SCALE IN FEET

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DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

HOMESTAKE

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO

MAC AND BLACK JACK EE/CA REPORT
BLACK JACK NO.1 - ALTERNATIVE 4B
PRELIMINARY

FIGURE
13
233001331

Wednesday, July 19, 2023 9:54:06 AM KKREED C:\USERS\KKREED\STANTEC\HOMESTAKE - CIVIL\FIGURES\REPOSITORY LAYOUTS\HOMESTAKE_PRELIM REPOSITORY LAYOUTS 6-15.DWG Layout:BLACK JACK NO.1 - ALTERNATIVE 4B

ALLOTEE PARCEL 1191

ALLOTEE PARCEL 1183

ALLOTEE PARCEL 1873

SERVICE BUILDING
WATER WELL
HOIST HOUSE

VENT RAISE

BURIED MINE SHAFT

TRAILER

A 17

B 17

0+00

2+00

4+00

6+00

8+00

10+00

12+00

14+00

15+00

16+00

18+00

20+00

22+00

23+50

5+00

25+00

7425 7430 7435 7440 7445 7450 7455 7460 7465 7475 7500

0 160 320
SCALE IN FEET

LEGEND:

- 7475 — EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET
- 7500 — PROPOSED SURFACE CONTOUR & ELEVATION, FEET
- CULTURAL RESOURCE INVENTORY BOUNDARY
- BIOLOGICAL RESOURCE SURVEY BOUNDARY
- ALLOTEE PARCEL
- ARROYO (AVOIDED)
- LIMIT OF PROPOSED REPOSITORY (SEE NOTE 5)
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- MINE WASTE PILES
- ORE PILES
- PROPOSED BORROW AREA (SEE NOTE 6)
- ROCK OUTCROP (NOT INCLUDED IN AVAILABLE BORROW CALCULATIONS)
- STRUCTURES (TO BE REMOVED) (SEE NOTE 7)
- POTENTIAL STOCKPILE AREA
- B 12 — SECTION NAME AND VIEW DIRECTION; SHEET NUMBER OF SECTION VIEW

NOTES:

1. SITE FEATURES FROM APPENDIX 1 OF WORK PLAN FOR SITE HAZARDS ASSESSMENT ON ABANDONED URANIUM MINE LANDS, FORMER BLACK JACK NO.1 & 2, AND MAC NO.1 & 2, SMITH LAKE, MICKINLEY COUNTY, NEW MEXICO (IINA BA, INC., 2017)
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3. MRM - MINING RELATED MATERIALS
4. COPC - CONSTITUENT OF POTENTIAL CONCERN
5. REPOSITORY VOLUME: 510,000 CY
6. PROPOSED BORROW AREA IS A SOIL BORROW SOURCE. ANY ROCK MATERIAL WILL BE IMPORTED FROM AN OFF-SITE SOURCE.
7. EXISTING WELLS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE ABANDONED. EXISTING BUILDINGS, STRUCTURES, AND OTHER DEBRIS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE REMOVED, DEMOLISHED AND DISPOSED OF IN THE REPOSITORY.

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DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO
MAC AND BLACK JACK EE/CA REPORT
MAC NO.1 - ALTERNATIVE 4C
PRELIMINARY

FIGURE
14
233001331

Wednesday, July 19, 2023 9:54:15 AM KWREED C:\USERS\KWREED\STANTEC\HOMESTAKE - CIVIL\FIGURES\REPOSITORY LAYOUTS\HOMESTAKE_PRELIM REPOSITORY LAYOUTS 8x15.DWG Layout:MAC NO.1 - ALTERNATIVE 4C

ALLOTEE PARCEL 1044

ALLOTEE PARCEL 1043

MINE SITE FACILITIES AREA

BURIED MINE SHAFT

GATE

NORTH VENT SHAFT

DEBRIS DAM

SOUTH VENT SHAFT

ALLOTEE PARCEL 1046

ALLOTEE PARCEL 1045

North Branch

Main Arroyo

North Arroyo

South Arroyo

Main Arroyo

E 19

F 19

0+00

5+00

10+00

15+00

20+00

24+00

25+00

30+00

35+00

38+00

7575 7550 7525 7500 7475 7450 7425 7400 7375 7350 7480 7470 7465 7460 7455 7445 7440 7435 7430

0 200 400

SCALE IN FEET

LEGEND:

- EXISTING GROUND SURFACE CONTOUR & ELEVATION, FEET (7475)
- PROPOSED SURFACE CONTOUR & ELEVATION, FEET (7500)
- CULTURAL RESOURCE INVENTORY BOUNDARY
- BIOLOGICAL RESOURCE SURVEY BOUNDARY
- ALLOTEE PARCEL
- E — EXISTING OVERHEAD ELECTRIC
- ARROYO (AVOIDED)
- LIMIT OF PROPOSED REPOSITORY (SEE NOTE 5)
- ESTIMATED LIMITS OF IMPACTED AREA (SEE NOTE 2)
- MRM DEPTH ≥ APPROXIMATELY 2 FEET BELOW GROUND SURFACE
- MINE WASTE PILES
- ORE PILES
- PROPOSED BORROW AREA (SEE NOTE 6)
- TREES (AVOIDED)
- POTENTIAL STOCKPILE AREA
- B / 12 — SECTION NAME AND VIEW DIRECTION; SHEET NUMBER OF SECTION VIEW

NOTES:

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3. MRM - MINING RELATED MATERIALS
4. COPC - CONSTITUENT OF POTENTIAL CONCERN.
5. REPOSITORY VOLUME: 539,000 CY
6. PROPOSED BORROW AREA IS A SOIL BORROW SOURCE. ANY ROCK MATERIAL WILL BE IMPORTED FROM AN OFF-SITE SOURCE.
7. EXISTING WELLS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE ABANDONED. EXISTING BUILDINGS, STRUCTURES, AND OTHER DEBRIS WITHIN THE LIMITS OF IMPACTED AREA AND/OR WITHIN THE REPOSITORY AREA WILL BE REMOVED, DEMOLISHED AND DISPOSED OF IN THE REPOSITORY.

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DESIGNED K REED

CHECKED S DOWNEY

APPROVED J CUMBERS

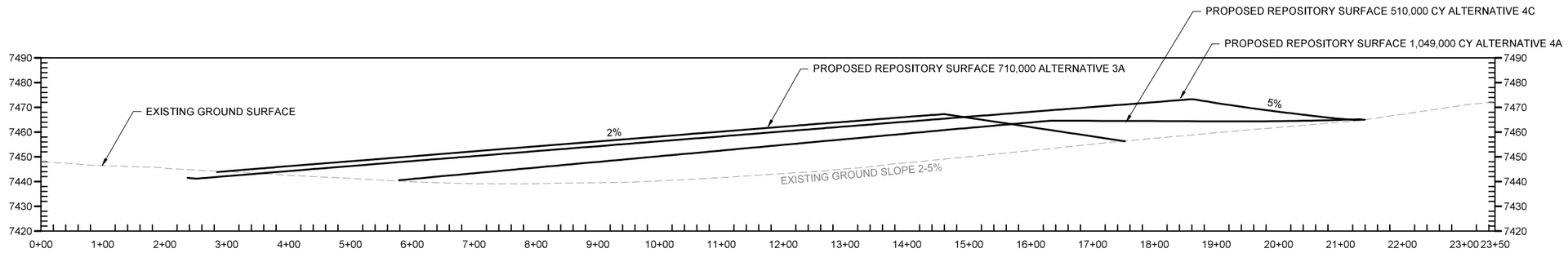
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MIKINLEY COUNTY, NEW MEXICO

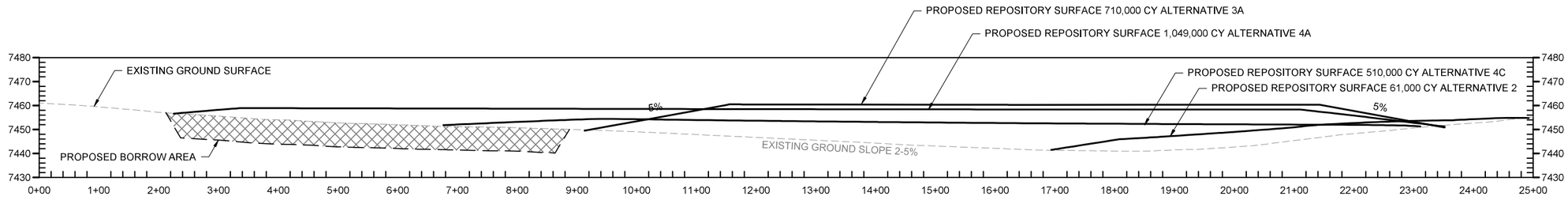
MAC AND BLACK JACK EE/CA REPORT
BLACK JACK NO.1 - ALTERNATIVE 4C
PRELIMINARY

FIGURE
15
233001331

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A/17 PROFILE A - MAC NO. 1
ALTERNATIVE 3A, 4A, AND 4C



B/17 PROFILE B - MAC NO. 1
ALTERNATIVE 2, 3A, 4A, AND 4C

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
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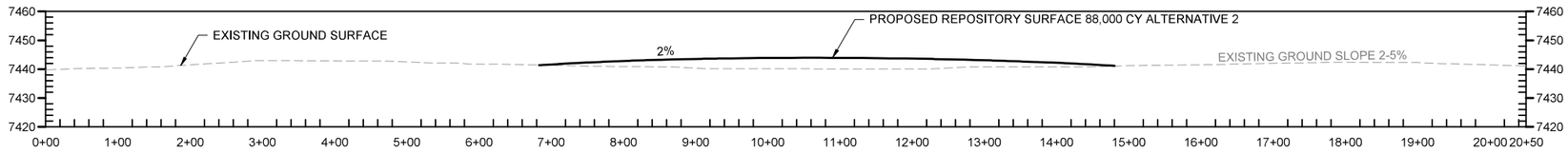
DESIGNED K REED
CHECKED S DOWNEY
APPROVED J CUMBERS

Stantec

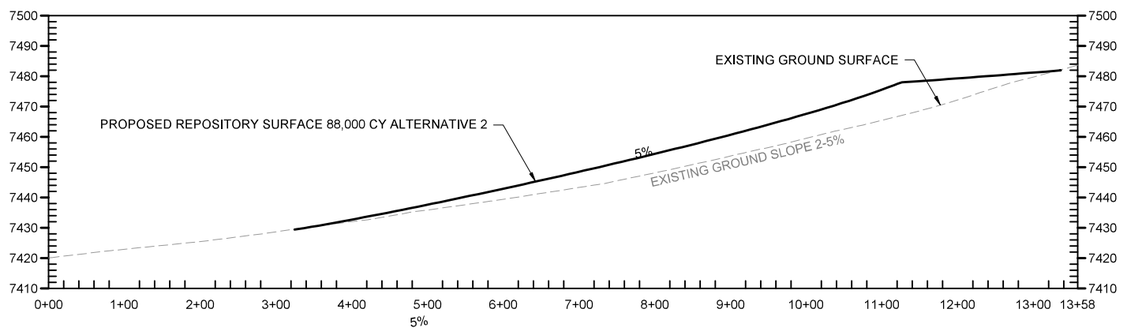
BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO
MAC AND BLACK JACK EE/CA REPORT
MAC NO.1 - ALTERNATIVES 2, 3A, 4A, AND 4C
PRELIMINARY PROFILES A AND B

FIGURE
16
233001331

Wednesday, July 19, 2023 9:55:04 AM KWREED C:\USERS\KWREED\STANTECHOMESTAKE - CIVIL\FIGURES\REPOSITORY LAYOUTS\HOMESTAKE_PRELIM REPOSITORY LAYOUTS 6-15.DWG Layout:MAC NO.1 - ALTERNATIVES 3A 4A AND 4C



C 18 PROFILE C - MAC NO. 2
ALTERNATIVE 2



D 18 PROFILE D - MAC NO. 2
ALTERNATIVE 2

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
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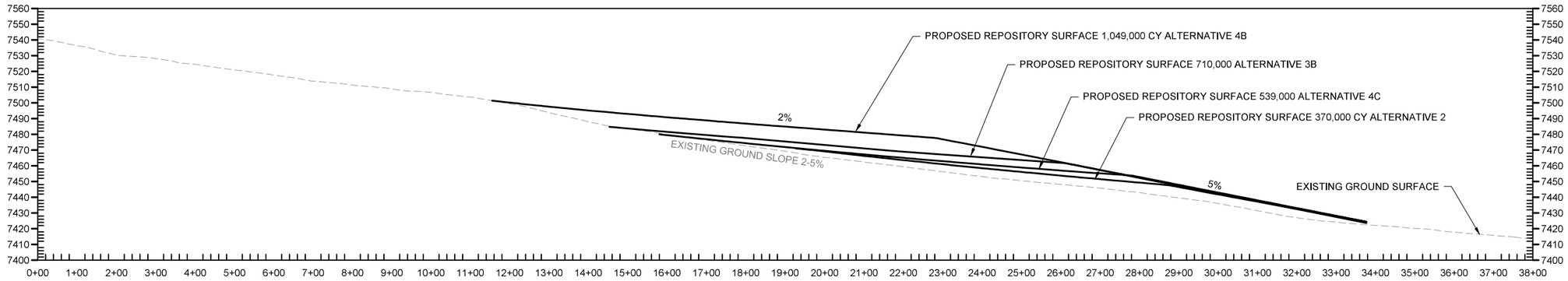
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CHECKED S DOWNEY
APPROVED ISSUED FOR REVIEW

Stantec

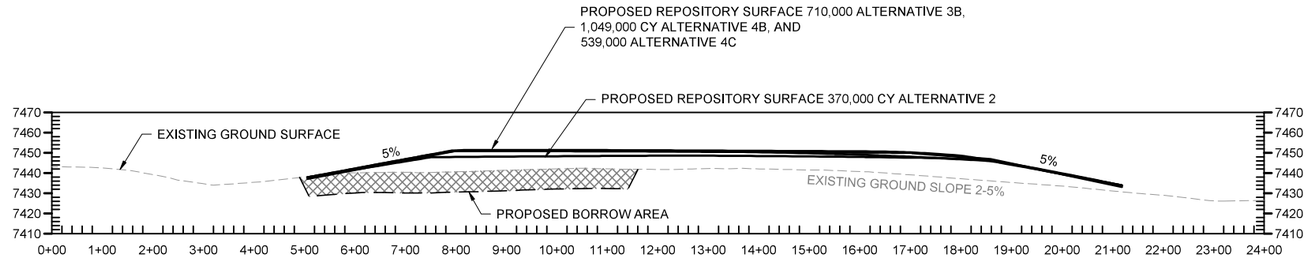
BARRICK, HOMESTAKE MINING CO.
MIKINLEY COUNTY, NEW MEXICO
MAC AND BLACK JACK EE/CA REPORT
MAC NO.2 - ALTERNATIVE 2
PRELIMINARY PROFILES C AND D

FIGURE
17
233001331

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E 19 PROFILE E - BLACK JACK NO. 1
ALTERNATIVES 2, 3B, 4B, AND 4C



F 19 PROFILE F - BLACK JACK NO. 1
ALTERNATIVES 2, 3B, 4B, AND 4C

REV	DATE	BY	DESCRIPTION
0	7-18-23	KR	ISSUED FOR FINAL EE/CA
B	02/2022	KR	REVISED PER USEPA COMMENTS
A	08/2022	KR	ISSUED FOR REVIEW

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CHECKED S DOWNEY
APPROVED J CUMBERS

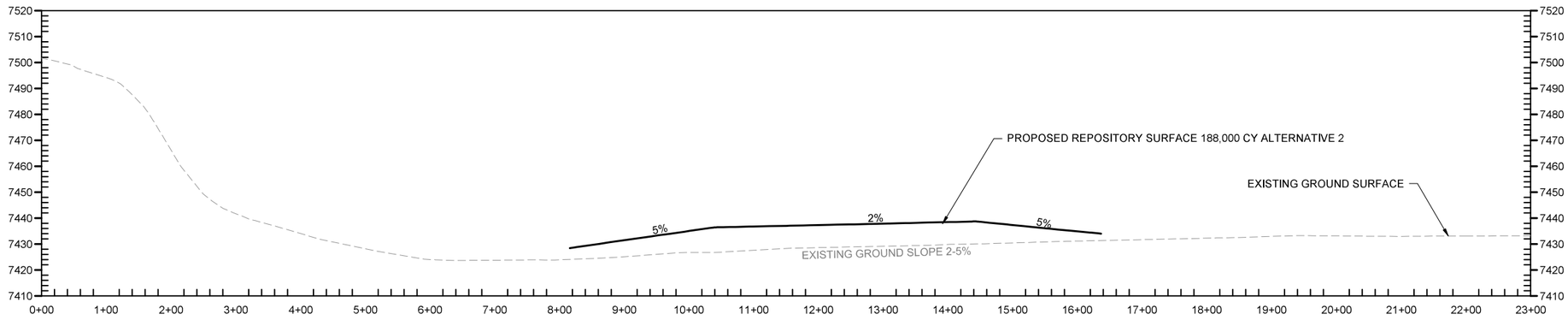
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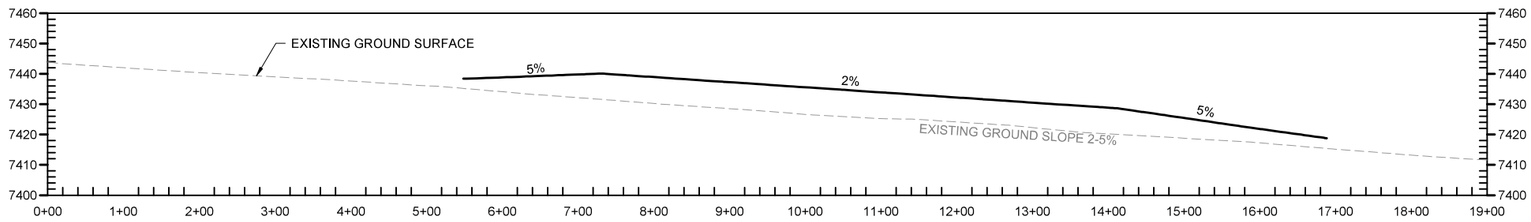
MAC AND BLACK JACK EE/CA REPORT
BLACK JACK NO.1 - ALTERNATIVES 2, 3B, 4B, AND 4C
PRELIMINARY PROFILES E AND F

FIGURE
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G/20 PROFILE G - BLCK JACK NO. 2
ALTERNATIVE 2



H/20 PROFILE H - BLCK JACK NO. 2
ALTERNATIVE 2

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PRELIMINARY PROFILES G AND H

FIGURE
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MARIANO LAKE

CROWNPOINT

LITTLE WATER

CASAMERO LAKE

BACA PREWITT

Black Jack No. 1

MAC No. 1

Black Jack No. 2

MAC No. 2

SECTION 13

Marano Lake

Smith Lake

Hosta Butte

Continental Divide

Thoreau

North Chaves

Navajo

Ambrosia L

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LEGEND:

NAVAJO NATION BOUNDARIES

HOMESTAKE MINING CO.

SCALE IN MILES

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SECTION 13 LOCATION

FIGURE
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APPENDICES

APPENDIX A
STATISTICAL ANALYSIS OF BACKGROUND AREA DATA

Appendix A: Statistical Analysis of Background Area Data

Mac and Black Jack Mines EE/CA

September 29, 2023

Prepared for:

Homestake Mining Company of California

Prepared by:
Stantec Consulting Services Inc.

APPENDIX A: STATISTICAL ANALYSIS OF BACKGROUND AREA DATA

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Abbreviations

AUM	abandoned uranium mine
bgs	below ground surface
BTV	background threshold value
COPC	constituent of potential concern
EE/CA	Engineering Evaluation / Cost Analysis
IQR	interquartile range
pCi/g	picocuries per gram
PQL	practical quantitation limit
RSE	Removal Site Evaluation
95-95 UTL	95 percent upper tolerance limit with 95 percent coverage



1 Introduction

This statistical evaluation presents the methods used in, and the results of, statistical analyses performed on soil sample results collected from two background reference areas (i.e., Background Area 1 and Background Area 2) located in the vicinity of the Mac and Black Jack abandoned uranium mine (AUM) sites (the sites) located in the Smith Lake and Mariano Lake Chapters of the Navajo Nation, in support of the evaluation of alternatives in the Engineering Evaluation/Cost Analysis (EE/CA). The statistical evaluation presented herein includes a summary of the analytical data for constituents of potential concern (COPCs) in surface and subsurface soil from each background area, a statistical comparison of data from each depth range and each background area, an analysis of potential outliers for each dataset, and finally calculation of a background threshold value (BTV) for each COPC for use in determination of action levels for the sites.

2 Statistical Evaluation

2.1 Data Summary

Environmental Restoration Group (ERG) collected samples in background areas during the Phase 1 RSE (ERG, 2017). Data from those sample locations were included in the statistical analyses described in this appendix. It is important to note that corrections to the background area data results in the Phase 1 RSE Report (ERG, 2017) were provided in the Phase 3 RSE Report (ERG, 2018), and those corrections were included in this statistical analysis. Summary statistics for COPCs in each background reference area and at each depth are presented in Table 2-1. As described in the *Phase 1 Summary Report* (Part 1: Radiological Characterization Surveys; ERG, 2017), background concentrations in soil within each reference area and at each depth appear to follow approximately normal data distributions. Two sample T-testing indicated that there are no statistically significant differences between the surface (i.e., 0 to 0.5 foot below ground surface [bgs]) and subsurface (i.e., 0.5 to 2 feet bgs) datasets for any analyte at either background area (ERG; 2017). As a result, the surface and subsurface datasets were combined for the remainder of the statistical evaluation presented in this appendix. Two sample T-testing between the two background areas indicated that COPC concentrations at Background Area 1 are statistically higher than COPC concentrations at Background Area 2, except for molybdenum (ERG, 2017). Background reference area datasets were not combined for any COPC.



APPENDIX A: STATISTICAL ANALYSIS OF BACKGROUND AREA DATA

Statistical Evaluation

Table 2-1 Summary Statistics for Background Reference Area Samples

Constituent of Potential Concern	Number of Samples	Number of Detects	Detection Frequency	Minimum	Median	Mean	Maximum	Standard Deviation
Background Area 1, Surface Soil (0 to 0.5 feet bgs)								
Arsenic (mg/kg)	11	10	91%	1.00	6.40	5.99	7.70	1.78
Molybdenum (mg/kg)	11	11	100%	0.400	0.400	0.427	0.500	0.0467
Radium-226 (pCi/g)	11	11	100%	0.900	1.10	1.23	1.50	0.190
Selenium (mg/kg)	11	11	100%	0.600	0.600	0.655	0.700	0.0522
Uranium (mg/kg)	11	11	100%	1.20	1.30	1.41	1.80	0.176
Vanadium (mg/kg)	11	11	100%	3.80	21.1	19.8	26.4	5.78
Background Area 1, Subsurface Soil (0.5 to 2 feet bgs)								
Arsenic (mg/kg)	10	10	100%	6.00	6.55	6.60	7.10	0.374
Molybdenum (mg/kg)	10	10	100%	0.400	0.400	0.420	0.500	0.042
Radium-226 (pCi/g)	10	10	100%	0.800	1.10	1.21	1.80	0.285
Selenium (mg/kg)	10	10	100%	0.600	0.700	0.730	0.800	0.0675
Uranium (mg/kg)	10	10	100%	1.20	1.40	1.43	1.70	0.177
Vanadium (mg/kg)	10	10	100%	18.4	22.7	21.7	24.2	2.11
Background Area 2, Surface Soil (0 to 0.5 feet bgs)								
Arsenic (mg/kg)	11	11	100%	2.20	3.30	3.09	4.00	0.517
Molybdenum (mg/kg)	11	11	100%	0.200	0.300	0.309	0.400	0.070
Radium-226 (pCi/g)	11	11	100%	0.700	0.900	0.936	1.20	0.175
Selenium (mg/kg)	11	11	100%	0.300	0.300	0.345	0.400	0.0522
Uranium (mg/kg)	11	11	100%	0.500	1.00	0.927	1.10	0.205
Vanadium (mg/kg)	11	11	100%	9.70	14.6	14.0	16.8	2.20
Background Area 2, Subsurface Soil (0.5 to 2 feet bgs)								
Arsenic (mg/kg)	10	10	100%	2.20	3.65	3.58	4.80	0.739
Molybdenum (mg/kg)	10	10	100%	0.200	0.300	0.350	0.700	0.143
Radium-226 (pCi/g)	10	8	80%	0.0700	0.850	0.757	1.10	0.313
Selenium (mg/kg)	10	10	100%	0.300	0.400	0.410	0.800	0.145
Uranium (mg/kg)	10	10	100%	0.500	0.900	0.940	1.20	0.201
Vanadium (mg/kg)	10	10	100%	10.7	15.4	15.3	17.9	2.31

Notes:
bgs - below ground surface
mg/kg - milligrams per kilogram
pCi/g - picocuries per gram



2.2 Outlier Analysis

The presence of outliers in a background reference dataset can distort statistics derived from that dataset; therefore, this statistical evaluation includes an analysis to identify potential outliers. The combined surface and subsurface soil datasets for each COPC and background area were evaluated for potential outliers using the following methodology:

- Evaluation of box plots using the 1.5 interquartile range (IQR) rule
- Evaluation of normal probability plots
- Dixon's outlier test

Each test for outliers is described in the following subsections.

2.2.1 BOX PLOTS

Box plots visually represent the quartile-based descriptive statistics. The IQR (i.e., the first and third quartiles) is represented by the bounds of the box, and the median (i.e., the second quartile) is represented by a solid line. The minimum and maximum values, not including outlier values, are depicted by the whiskers (vertical lines), and any potential outliers are represented as singular dots. Outliers are defined as values that are either less than the first quartile minus 1.5 times the IQR, or the third quartile plus 1.5 times the IQR. Potential outliers identified in box plots of the background data for Background Area 1 include one potential low outlier each for arsenic and vanadium (Figure 2-1). The box plot depicting results from molybdenum samples collected from Background Area 1 appears to indicate one high outlier; however, because there are only two distinct results for molybdenum samples from Background Area 1, the IQR is equal to zero and the box plot method cannot be used to identify potential outliers (Figure 2-1). Potential outliers identified in box plots of the background data for Background Area 2 include one potential high outlier each for arsenic, molybdenum, and selenium, two potential low outliers each for radium-226 (Ra-226) and uranium, and three potential low outliers for vanadium (Figure 2-1). Each of these potential outliers are further evaluated in the following sections.



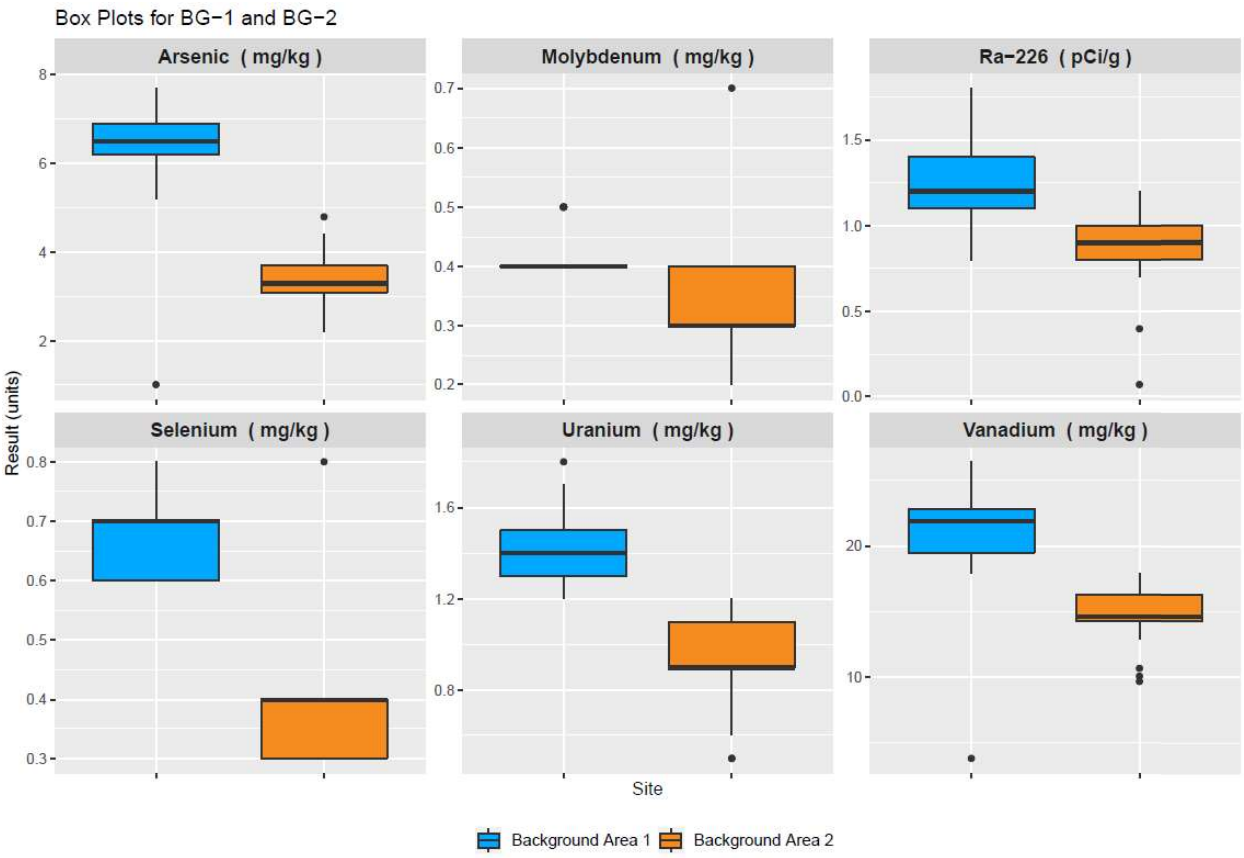


Figure 2-1 Box Plots of Analytical Data for COPCs at Background Area 1 and Background Area 2

2.2.2 PROBABILITY PLOTS

The normal probability plot is a graphical technique for assessing whether a data set is approximately normally distributed, and where there may be outlier values. The sample data are plotted on the y-axis against a theoretical normal distribution on the x-axis in such a way that the points, if normally distributed, should form an approximate straight line.

One potential low outlier each was identified in the box plots of the arsenic and vanadium datasets for Background Area 1. When viewed in probability plots in Figure 2-2, these low values do appear to be outliers and do not conform with the shape of the datasets for arsenic and vanadium. The low value for arsenic is a non-detect reported at the practical quantitation limit (PQL). These low values were both tested for statistical significance as outliers in Section 2.2.3. Figure 2-2 also highlights the lack of data variability for molybdenum sample results from Background Area 1 that was apparent in Figure 2-1. Due to this lack of variability, no further statistical analysis of molybdenum data from Background Area 1 is possible.

APPENDIX A: STATISTICAL ANALYSIS OF BACKGROUND AREA DATA

Statistical Evaluation

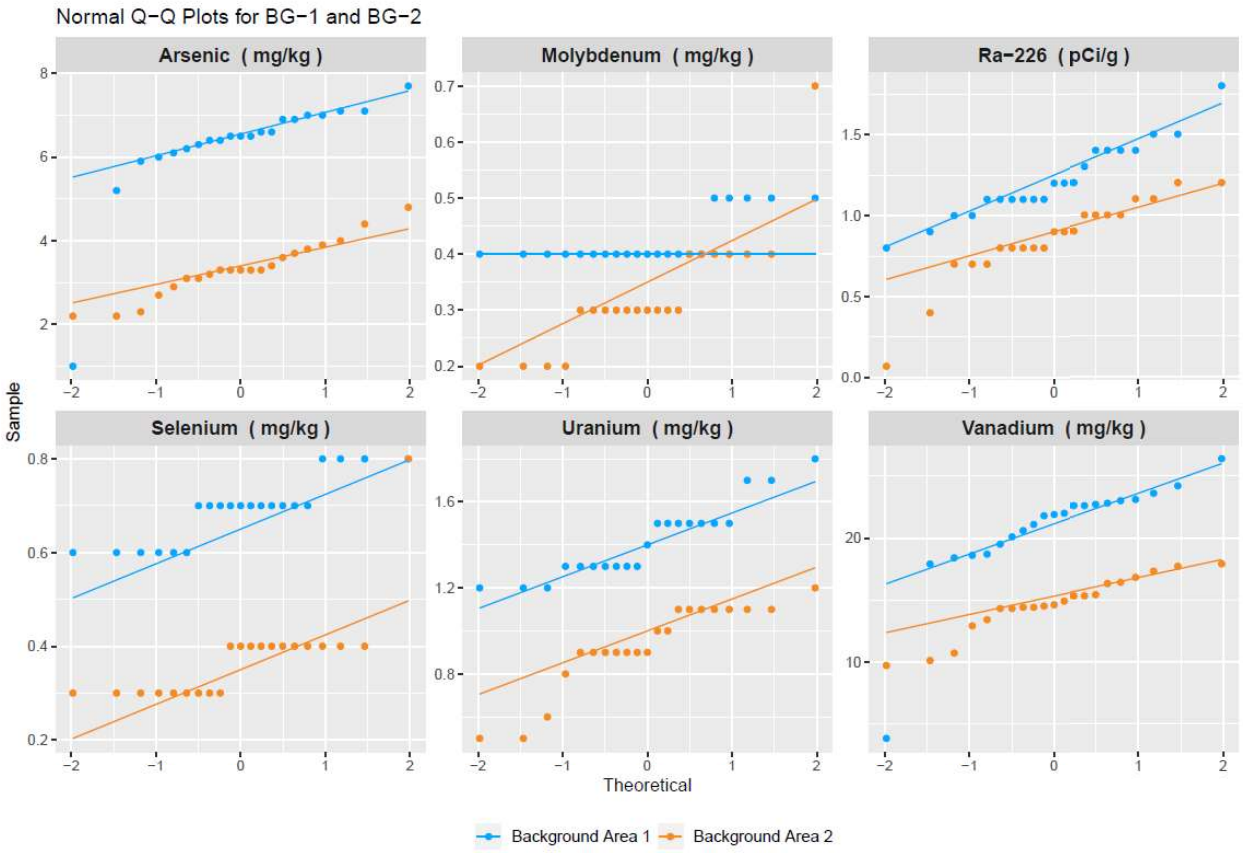


Figure 2-2 Probability Plots for Analytical Data for COPCs at Background Area 1 and Background Area 2

One potential high outlier each was identified in the box plots of the arsenic, molybdenum, and selenium datasets for Background Area 2. When viewed in a probability plot in Figure 2-2, the high value for arsenic does not appear to be elevated relative to the rest of the dataset and fits the general distribution. It is unlikely that this high value is a statistically significant outlier; however, this value was tested for statistical significance as an outlier, as presented in Section 2.2.3. The high values for molybdenum and selenium appear to be distinct from the rest of the datasets for these analytes, and both values were tested for statistical significance as outliers, as presented in Section 2.2.3.

Two potential low outliers each were identified in the box plots of the Ra-226 and uranium datasets for Background Area 2, and three potential low outliers were identified in the boxplots of the vanadium dataset for Background Area 2. Each of these potential outliers are further evaluated in the following sections. The two low potential outliers in the Ra-226 dataset for Background Area 2 are non-detects reported at levels below the PQL (i.e., 0.07 picocuries per gram [pCi/g] reported result compared with a PQL of 0.8 pCi/g in sample BA2-02-S-1560, and 0.4 pCi/g reported result compared with a PQL of 0.6 pCi/g in sample BA2-10-S-1560). The two non-detect values were tested for statistical significance as potential outliers at the reported result. The potential low outliers for uranium are not far from the rest of the dataset and fit the general shape of the distribution. The potential low outliers in the vanadium dataset

appear to be distinct from the rest of the distribution but fit the general shape. These values were tested for statistical significance as outliers, as presented in Section 2.2.3.

2.2.3 DIXON'S TEST

Dixon's test for outliers (Dixon, 1953) is a popular test used to check if datasets with 25 or fewer samples contains an outlier. The test works by comparing the distance between the potential outer and the next closest value with the overall range of the data. Dixon's outlier test is designed to be used for data sets containing only one or two outlier values and was performed to the 95% confidence level on each of the potential outlier values. Non-detects were evaluated at one-half of the reported value. Dixon's Test was run in the United States Environmental Protection Agency's (USEPA's) ProUCL Statistical Software, Version 5.1 (EPA, 2015). The results of the Dixon's test are presented in Table 2-2.



Table 2-2 Summary of Dixon's Test for Statistical Outliers Results

Constituent of Potential Concern	Hypothesis	Location ID	p-Value	Conclusion
Background Area 1				
Arsenic	Nondetect low value 1 mg/kg is an outlier	BA1-09-S-0015	0.01	The non-detect value is a statistically significant outlier
Vanadium	Low value 3.8 mg/kg is an outlier	BA1-09-S-0015	0.01	The low value 3.8 mg/kg is a statistically significant outlier
Background Area 2				
Arsenic	High value 4.8 mg/kg is an outlier	BA2-07-S-1560	> 0.1	The high value 4.8 mg/kg is not a statistically significant outlier
Molybdenum	High value 0.7 mg/kg is an outlier	BA2-06-S-1560	0.01	The high value 0.7 mg/kg is a statistically significant outlier
Selenium	High value 0.8 mg/kg is an outlier	BA2-08-S-1560	0.01	The high value 0.8 mg/kg is a statistically significant outlier
Radium-226	Nondetect low value 0.07 pCi/g is an outlier	BA2-02-S-1560	0.01	The non-detect value 0.07 pCi/g is a statistically significant outlier
	Nondetect low value 0.4 pCi/g is an outlier	BA2-10-S-1560	0.01	The non-detect value 0.4 pCi/g is a statistically significant outlier
Uranium	Low value 0.5 mg/kg is an outlier	BA2-10-S-0015	> 0.1	The low value 0.5 mg/kg is not a statistically significant outlier
	Low value 0.5 mg/kg is an outlier	BA2-10-S-1560	0.05	The low value 0.5 mg/kg is a statistically significant outlier
Vanadium	Low value 9.7 mg/kg is an outlier	BA2-10-S-0015	> 0.1	The low value 9.7 mg/kg is not a statistically significant outlier
	Low value 10.1 mg/kg is an outlier	BA2-11-S-0015	> 0.1	The low value 10.1 mg/kg is not a statistically significant outlier
	Low value 10.7 mg/kg is an outlier	BA2-10-S-1560	> 0.1	The low value 10.7 mg/kg is not a statistically significant outlier

Notes:

mg/kg – milligrams per kilogram

pCi/g – picocuries per gram

p-Value - probability that the tested value is not an outlier; the p-value listed is the lowest significance level reported in ProUCL output.

2.2.4 CONCLUSIONS

The results of the Dixon's test indicated that one potential low outlier each in the datasets for arsenic and vanadium at Background Area 1 are statistically significant outliers. These low values both occur in Sample BA1-09-S-0015. This arsenic result is within the range of range of concentrations typically observed in western United States soils (United States Geological Survey [USGS], 1984) of <0.10 to 97 mg/kg for arsenic, but below the average (mean = 5.5 mg/kg). The vanadium result is below the range of range 7 to 500 mg/kg (mean = 70 mg/kg) reported in USGS (1984). Because these low values occurred in the same sample, appear to be outliers in Figure 2-1 and Figure 2-2, were identified as statistically significant by the Dixon's test, and the vanadium result is outside the range of normal concentrations for western United States (U.S.) soils, these values were removed from their respective Background Area 1 datasets.

The results of the Dixon's test indicated that one potential high outlier each in the datasets for molybdenum and selenium at Background Area 2 are statistically significant. These statistically significant outliers occur in soil samples BA2-06-S-1560 and BA2-08-S-1560. It is possible that these two values are identified as statistically significant outliers due to the homogeneity of the data (i.e., only four distinct values were reported for molybdenum, and only three distinct values were reported for selenium). Both of these results are within the range of concentrations typically observed in western U.S. soils (USGS, 1984) of < 3 to 7 mg/kg for molybdenum (mean = 0.85 mg/kg) and <0.1 to 4.3 mg/kg for selenium (mean = 0.23 mg/kg). Therefore, these values were not removed from the dataset prior to calculation of BTVs for Background Area 2.

For COPCs in soil samples from Background Area 2 with more than one potential low outlier, Dixon's test was run sequentially on each potential outlier starting with the lowest value. Then, the lowest potential outlier was removed, regardless of whether it was statistically significant, and the second lowest potential outlier was tested. Using this method, both non-detect values for Ra-226 in Background Area 2 soil were identified as statistically significant outliers; only one potential low outlier for uranium at Background Area 2 was identified as statistically significant; and no potential low outliers for vanadium were identified as statistically significant. The statistically significant low outliers for Ra-226 are non-detect results reported at less than the PQL. When Dixon's test is run sequentially on the Ra-226 dataset with non-detects reported at the PQL, the first low outlier is statistically significant at the 5% level, while the second one is only significant at the 10% level. When BTVs are calculated with the non-detect results removed from the dataset, the result is the same to one decimal place as when BTVs are calculated with the non-detect results equal to the PQL. Because the non-detect values less than the PQL are statistically significant outliers, and because there is limited uncertainty in the BTV associated with removing them rather than calculating the BTV with PQL replacement, these results were removed from the Ra-226 dataset for Background Area 2. For uranium, the two potential outlier sample results identified in the box plot are both 0.5 mg/kg. When applied to the full uranium dataset for Background Area 2, the Dixon's test indicates that there are no statistically significant outliers; when applied to the dataset with one of the potential low outliers removed, the second potential low outlier is statistically significant at the 5% confidence level. Review of the plots showed that these potential low outliers are not distant from the rest of the dataset, including the next lowest value of 0.6 mg/kg; therefore, these values are not recommended for removal from the Background Area 2 dataset for uranium.



APPENDIX A: STATISTICAL ANALYSIS OF BACKGROUND AREA DATA

Statistical Evaluation

In summary, one low outlier each were removed from the Background Area 1 datasets for arsenic and vanadium, and two low outliers were removed from the Background Area 2 dataset for Ra-226 prior to BTV calculation.



3 BTV Calculation

The 95% upper tolerance limit with 95% coverage (95-95 UTL) was selected as the BTV to represent the upper end of COPC concentrations in Background Area 1 and Background Area 2 soils. The 95-95 UTL was selected because it is simpler to implement than other potential statistics (e.g., an upper simultaneous limit) and lends itself to single point comparisons with on-site data during potential future remedial actions. The 95-95 UTLs were calculated in the USEPA's ProUCL software (EPA, 2015). BTVs for Background Area 1 and Background Area 2 are presented in Table 3-1.

Table 3-1 Recommended BTVs for Background Area 1 and Background Area 2

Constituent of Potential Concern	95-95 UTL	Assumed Distribution
Background Area 1		
Arsenic (mg/kg)	7.84	Normal
Molybdenum (mg/kg)	0.500	Nonparametric
Radium-226 (pCi/g)	1.77	Normal
Selenium (mg/kg)	0.800	Nonparametric
Uranium (mg/kg)	1.80	Nonparametric
Vanadium (mg/kg)	26.9	Normal
Background Area 2		
Arsenic (mg/kg)	4.90	Normal
Molybdenum (mg/kg)	0.700	Nonparametric
Radium-226 (pCi/g)	1.31	Normal
Selenium (mg/kg)	0.800	Nonparametric
Uranium (mg/kg)	1.40	Nonparametric
Vanadium (mg/kg)	20.0	Normal

Notes:
mg/kg - milligrams per kilogram
pCi/g - picocuries per gram
95-59 UTL - 95 percent upper tolerance limit with 95 percent coverage

4 References

Environmental Restoration Group, Inc (ERG), 2017. *Phase 1 Summary Report*, Removal Site Evaluation and Interim Removal Action, Black Jack and Mac Mines, McKinley County, New Mexico. August.

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United States Environmental Protection Agency (EPA), 2015. *ProUCL Version 5.1 Technical Guide Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations*.

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APPENDIX B
RADIOLOGICAL DEPTH PROFILES

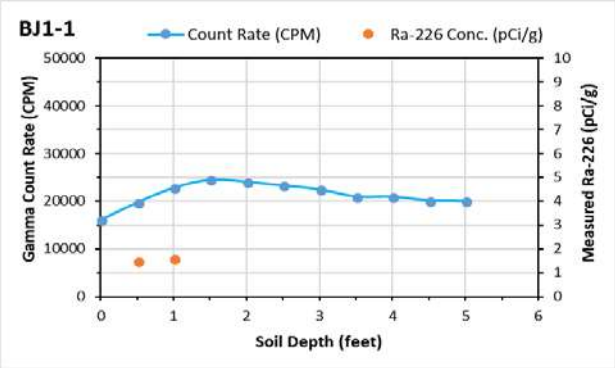
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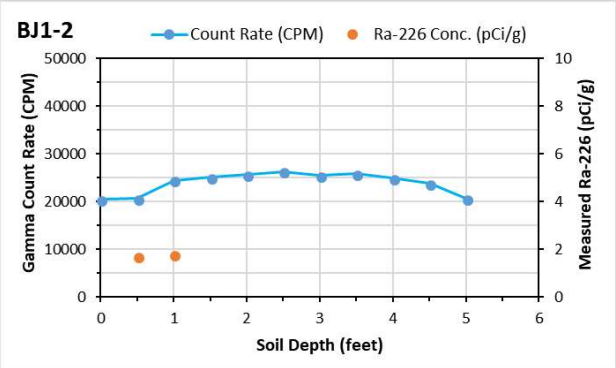
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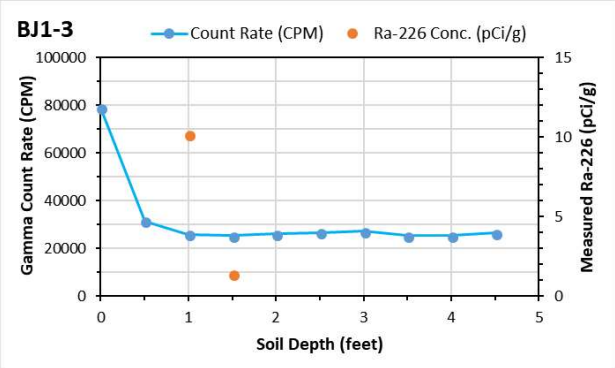
ERG, 2018. Removal Site Evaluation and Interim Removal Action, Black Jack and Mac Mines, McKinley County, New Mexico. Phase 3 Report: Removal Site Evaluation. Revision 1, September.

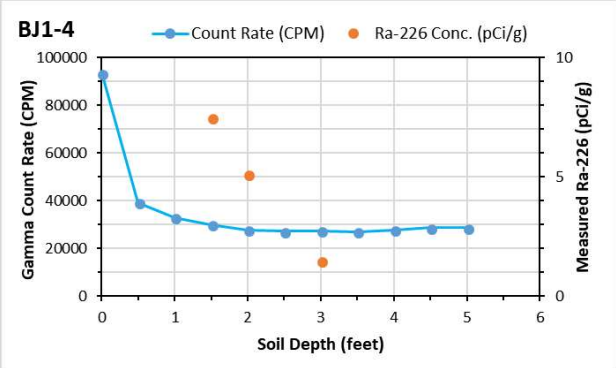
Stantec Supplemental Site Characterization Report: Appendix A, pdf p. 32-36

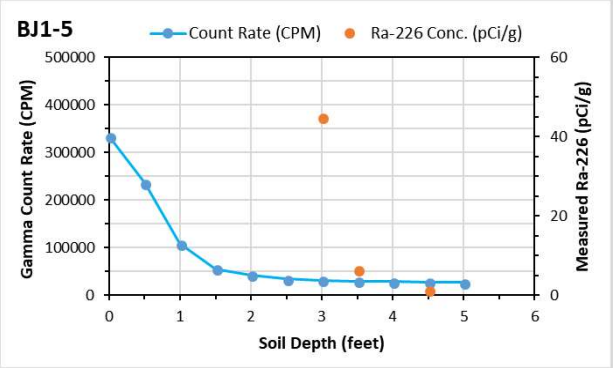
Stantec, 2019. Supplemental Site Characterization Report – Draft, Mack and Black Jack Mines. June.

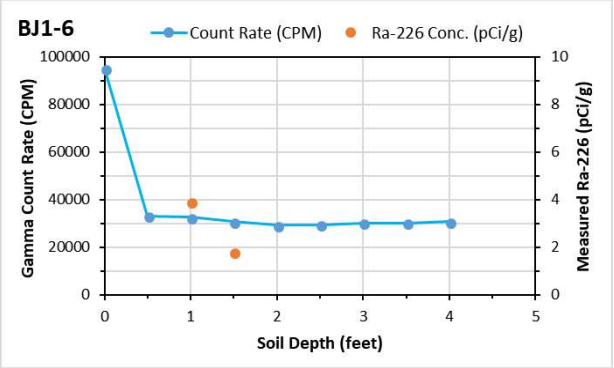

BJ1-1
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

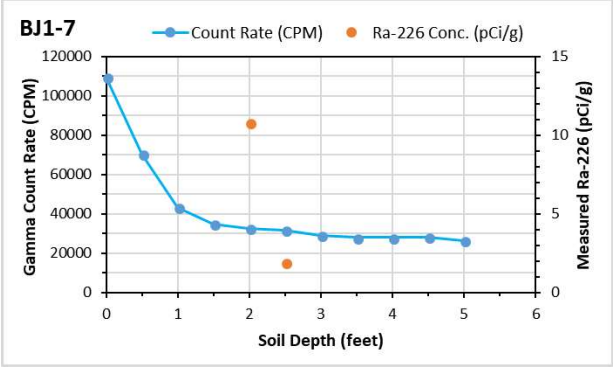

BJ1-2
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

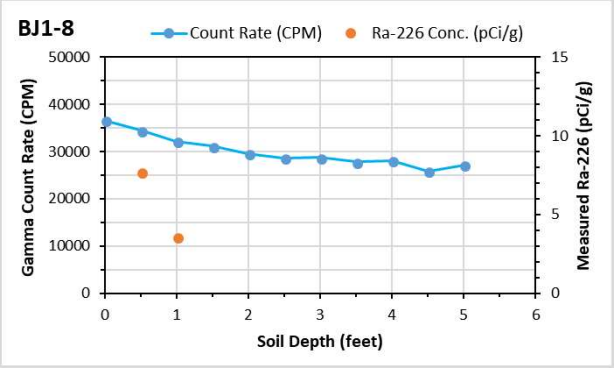

BJ1-3
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

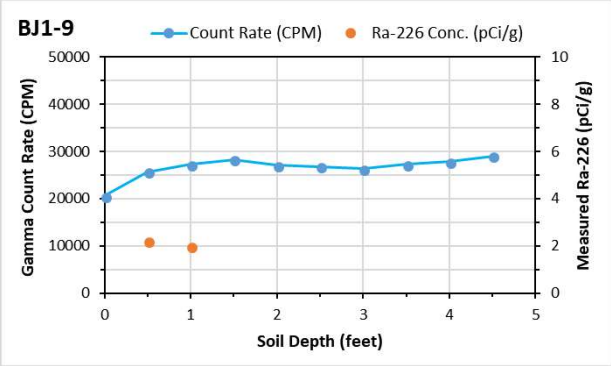

BJ1-4
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

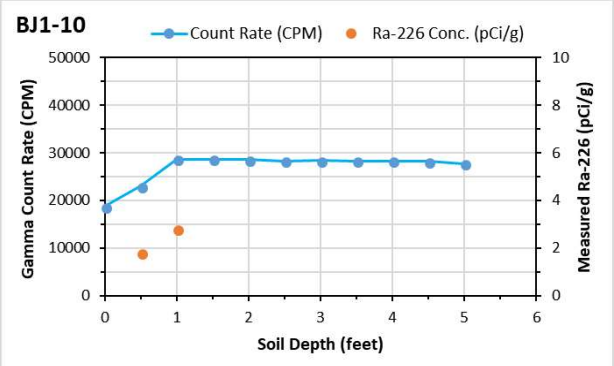

BJ1-5
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

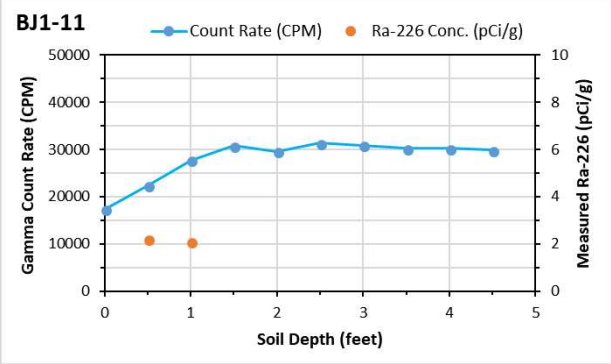

BJ1-6
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

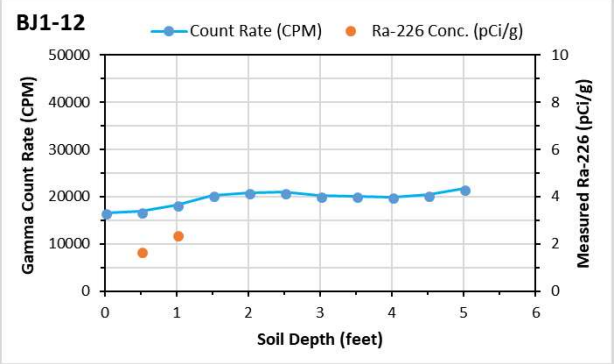

BJ1-7
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

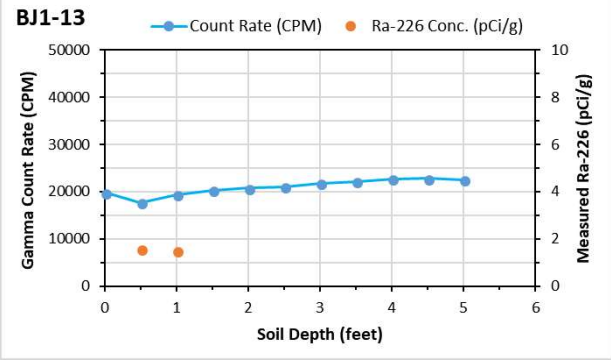

BJ1-8
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

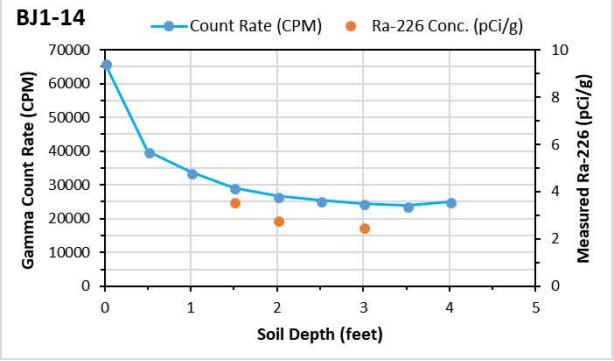

BJ1-9
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

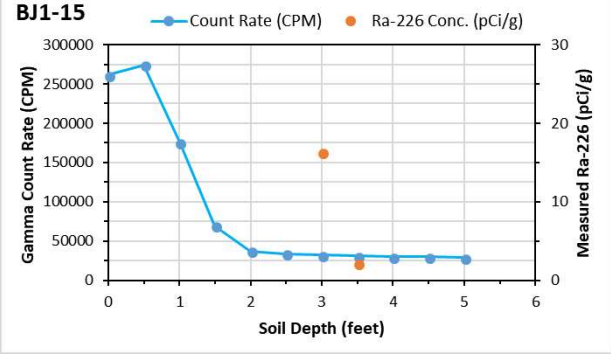

BJ1-10
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

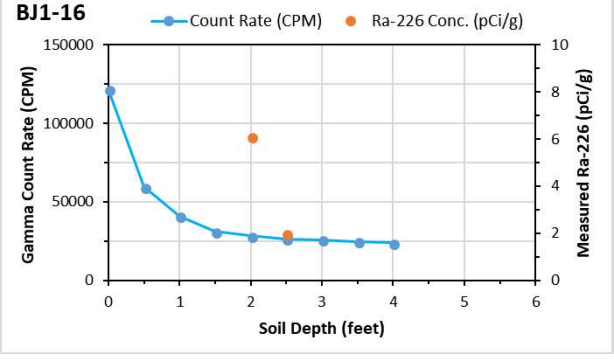

BJ1-11
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

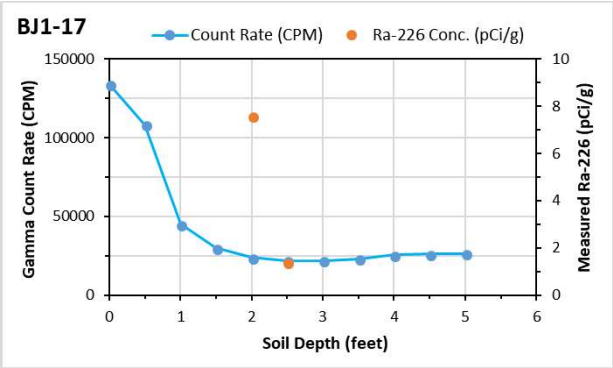

BJ1-12
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

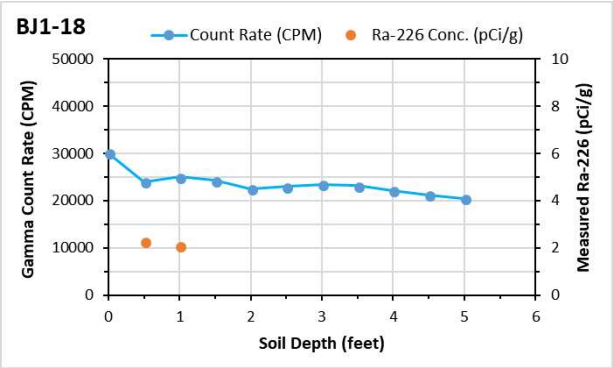

BJ1-13
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

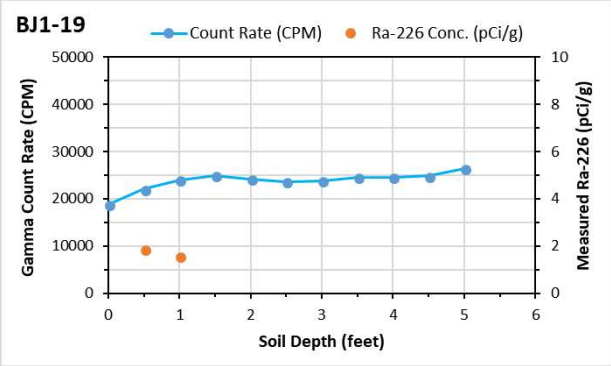

BJ1-14
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

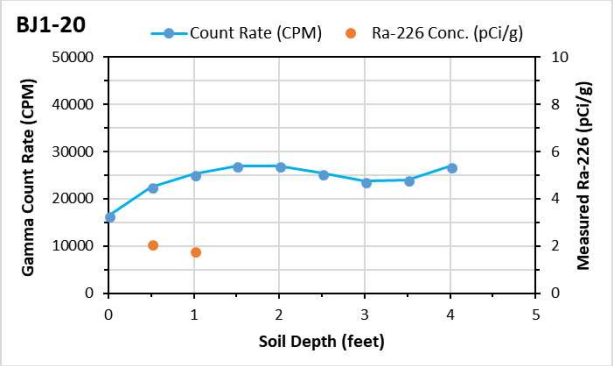

BJ1-15
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

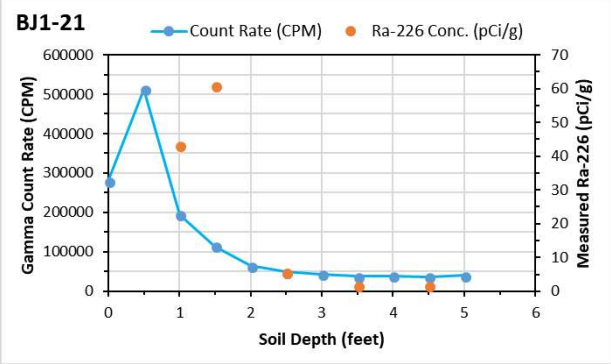

BJ1-16
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

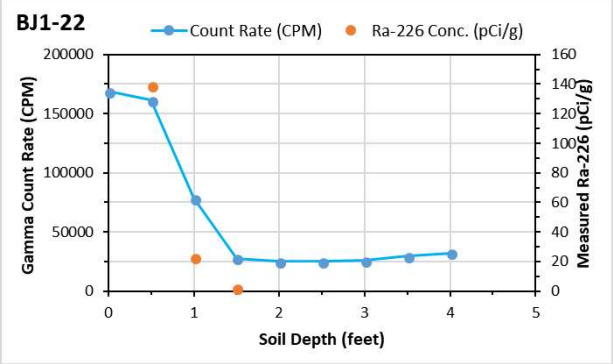

BJ1-17
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

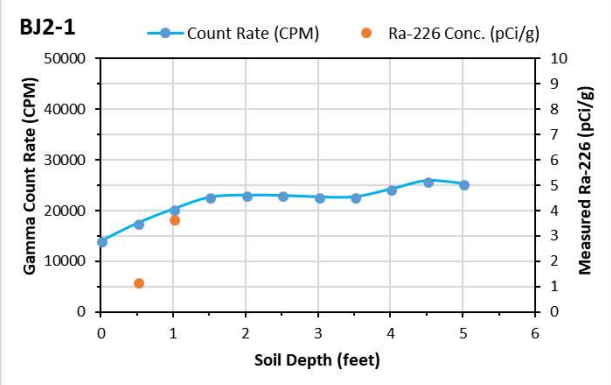

BJ1-18
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

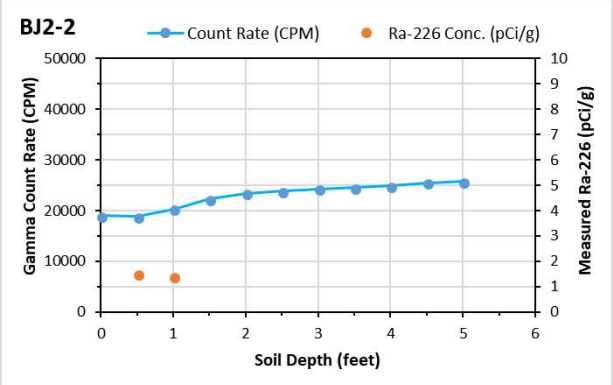

BJ1-19
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

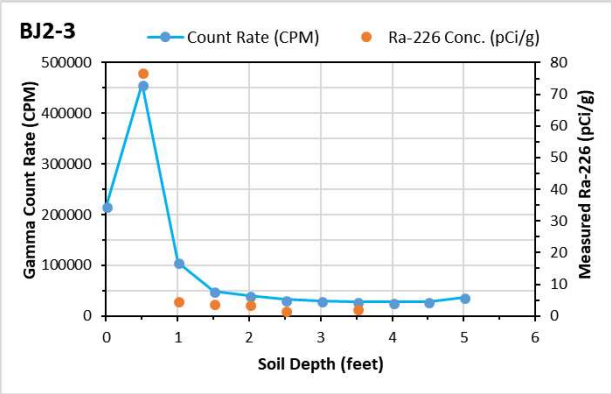

BJ1-20
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

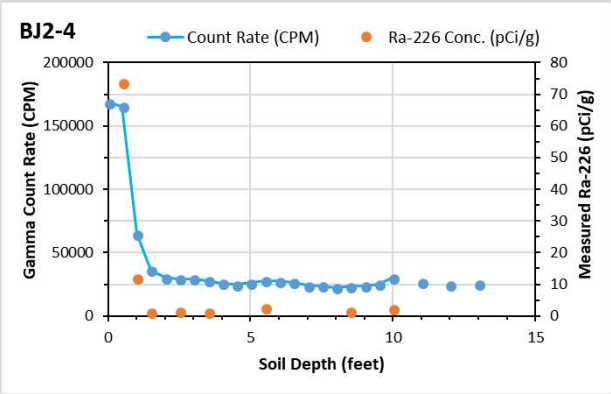

BJ1-21
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

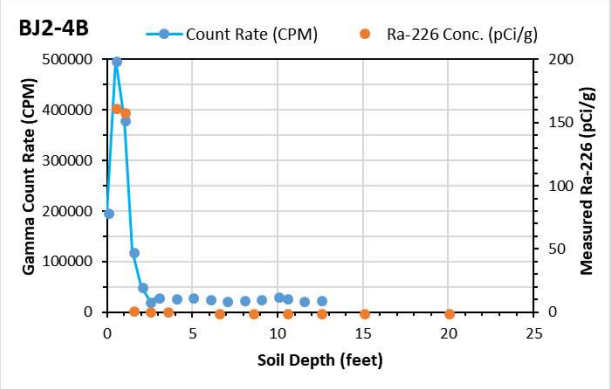

BJ1-22
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

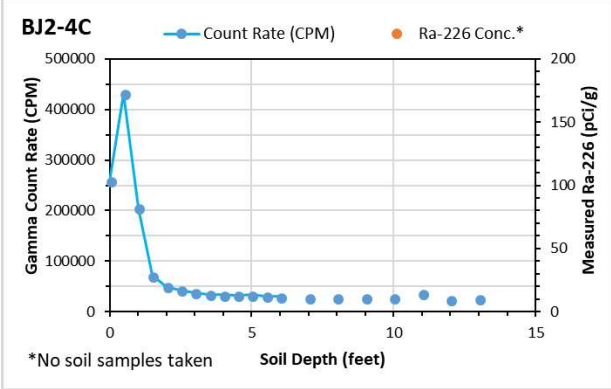

BJ2-1
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

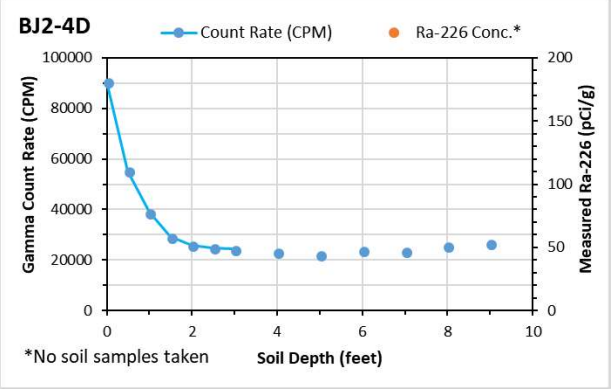

BJ2-2
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

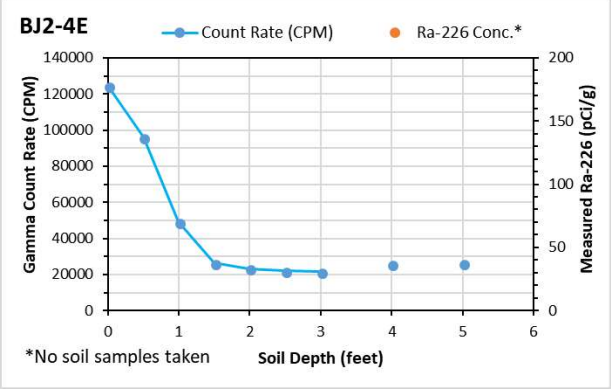

BJ2-3
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

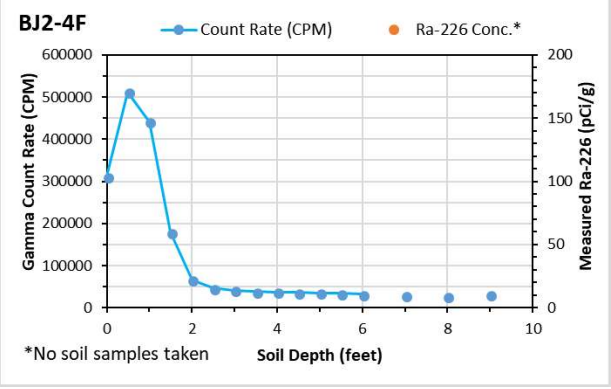

BJ2-4
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

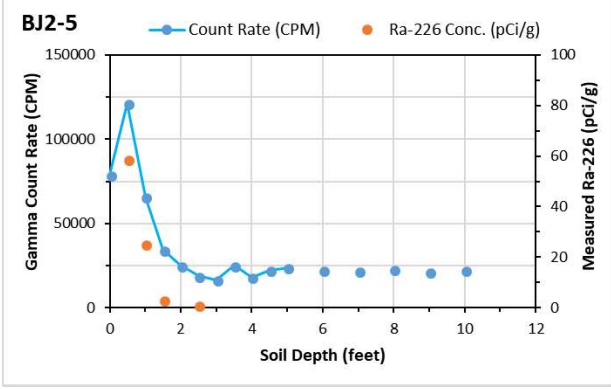

BJ2-4B
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

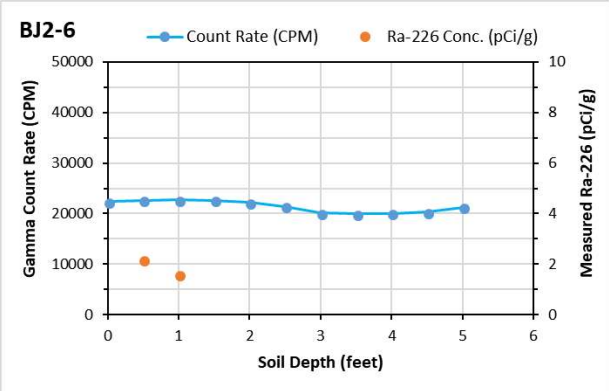

BJ2-4C
Count Rate (CPM)
Ra-226 Conc.*
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
*No soil samples taken
Soil Depth (feet)

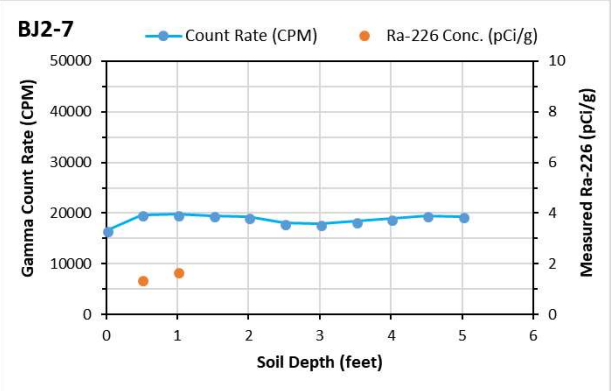

BJ2-4D
Count Rate (CPM)
Ra-226 Conc.*
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
*No soil samples taken
Soil Depth (feet)

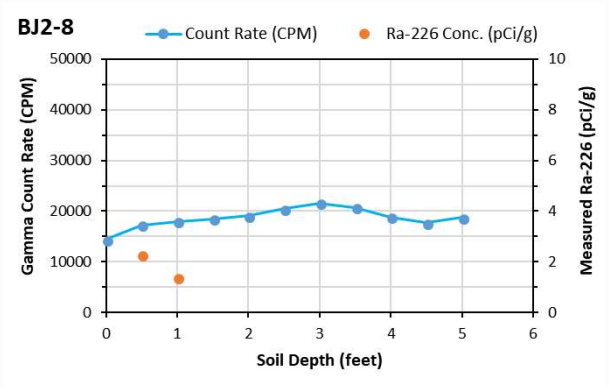

BJ2-4E
Count Rate (CPM)
Ra-226 Conc.*
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
*No soil samples taken
Soil Depth (feet)

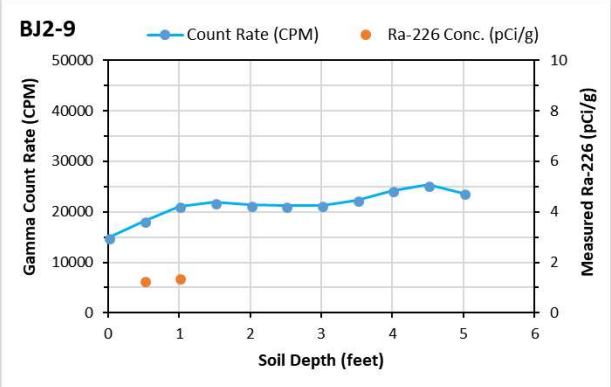

BJ2-4F
Count Rate (CPM)
Ra-226 Conc.*
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
*No soil samples taken
Soil Depth (feet)

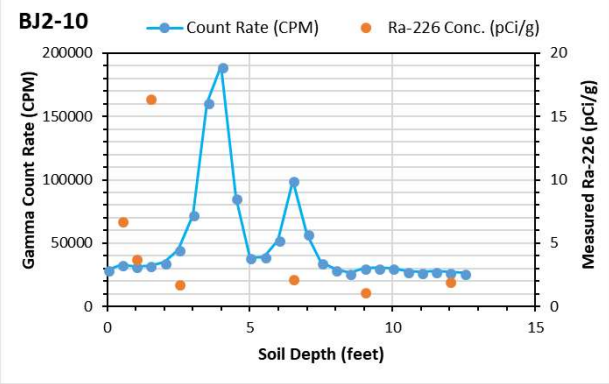

BJ2-5
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

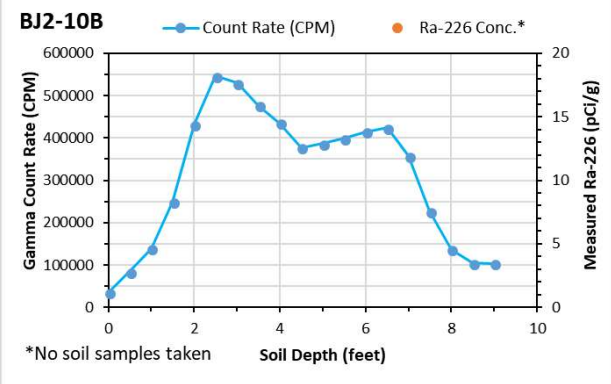

BJ2-6
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

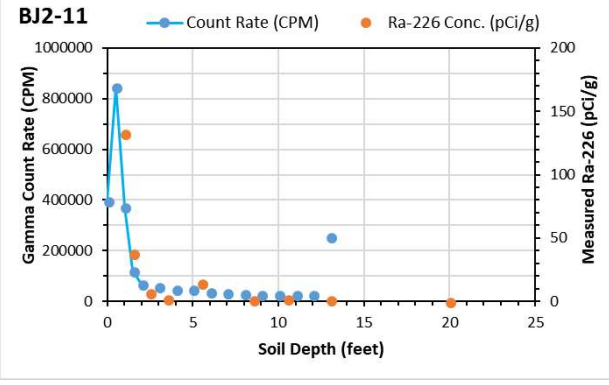

BJ2-7
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

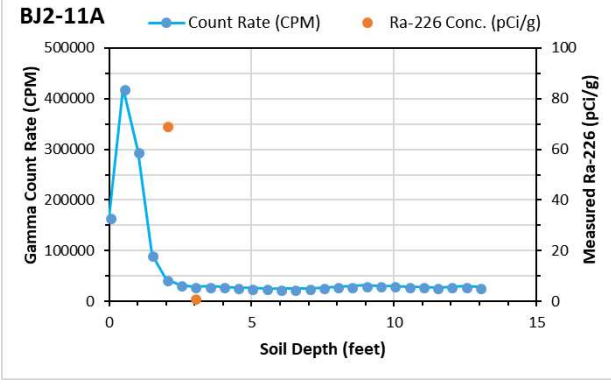

BJ2-8
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

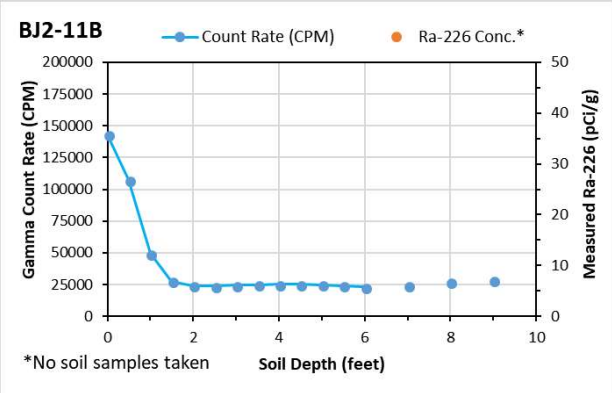

BJ2-9
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

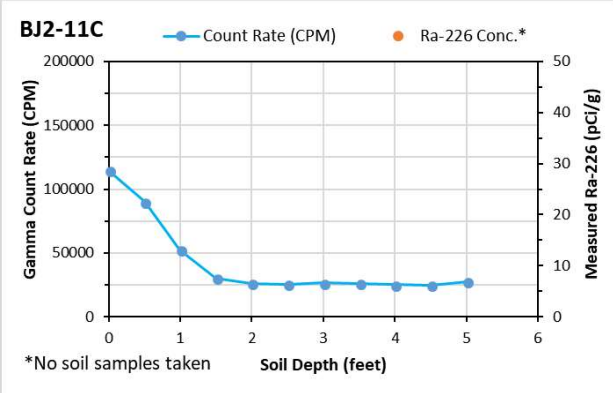

BJ2-10
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

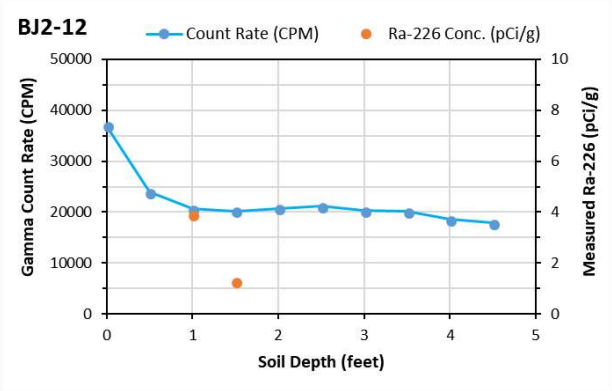

BJ2-10B
Count Rate (CPM)
Ra-226 Conc.*
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
*No soil samples taken
Soil Depth (feet)

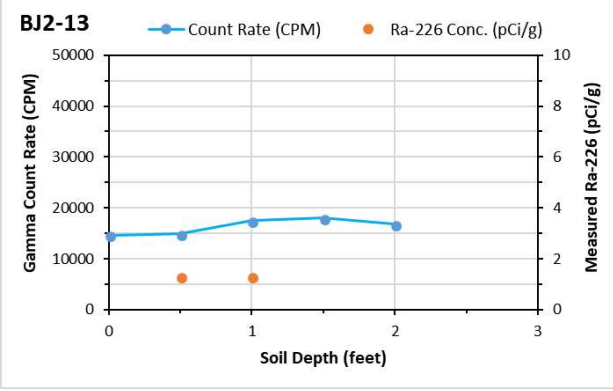

BJ2-11
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

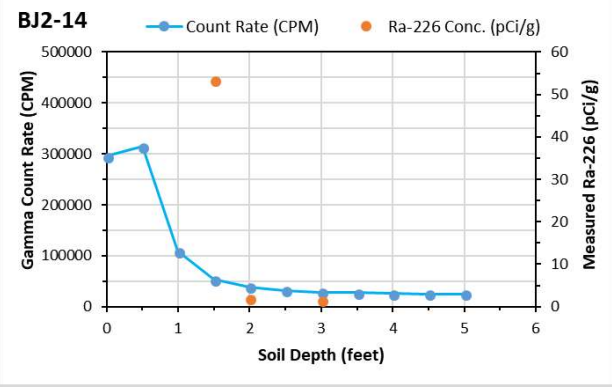

BJ2-11A
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

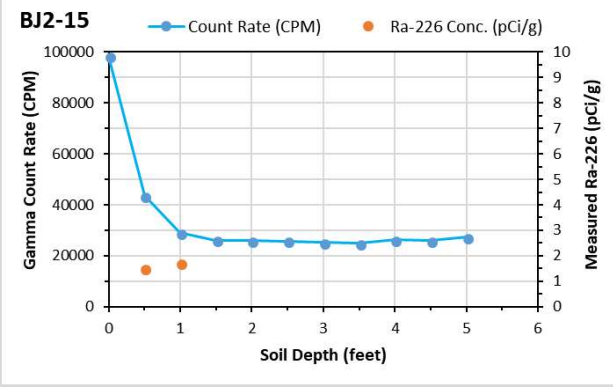

BJ2-11B
Count Rate (CPM)
Ra-226 Conc.*
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
*No soil samples taken
Soil Depth (feet)

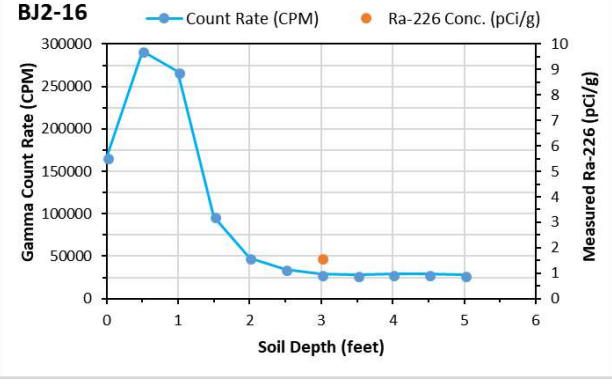

BJ2-11C
Count Rate (CPM)
Ra-226 Conc.*
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
*No soil samples taken
Soil Depth (feet)

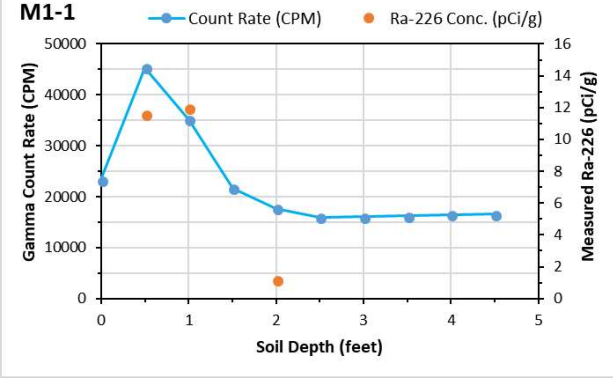

BJ2-12
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

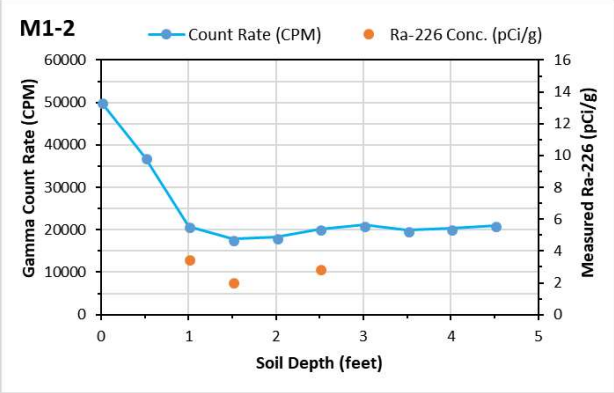

BJ2-13
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

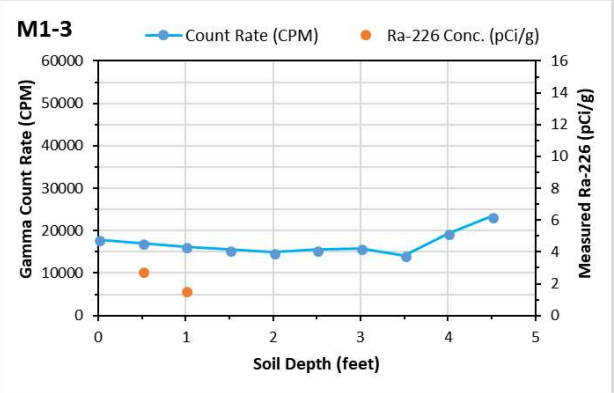

BJ2-14
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

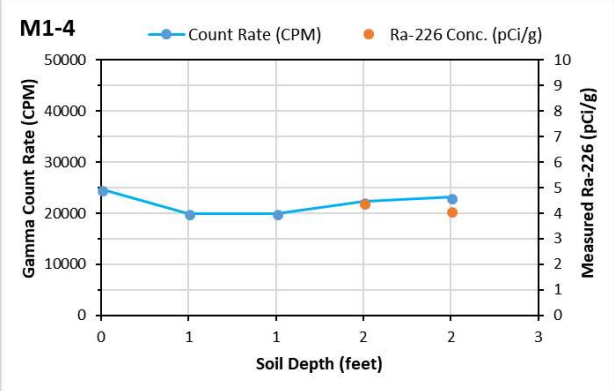

BJ2-15
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

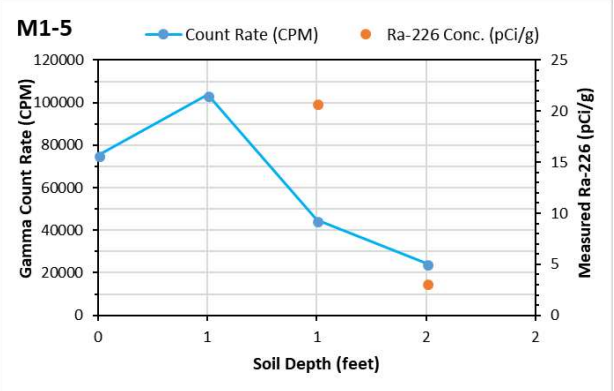

BJ2-16
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

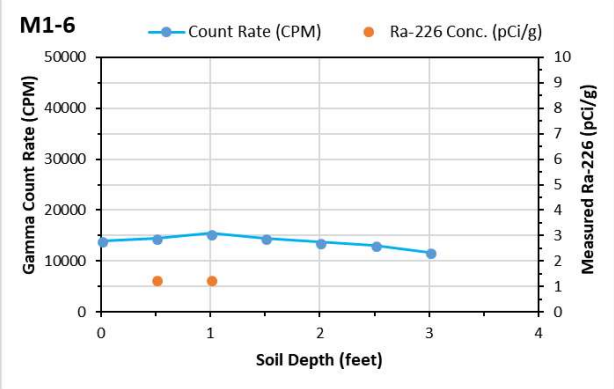

M1-1
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

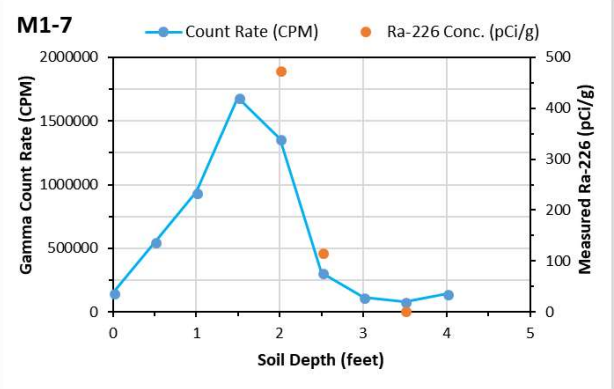

M1-2
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

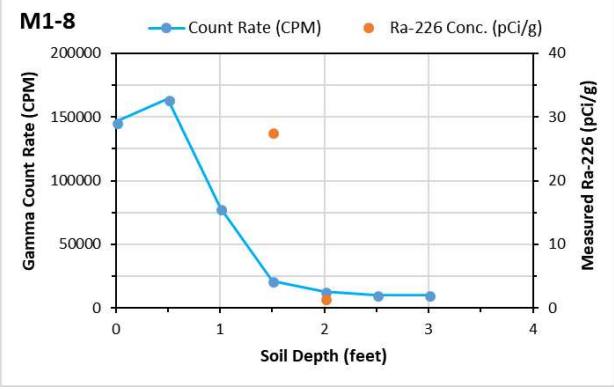

M1-3
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

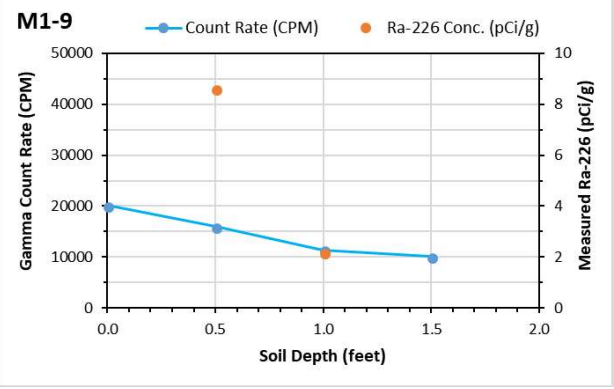

M1-4
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

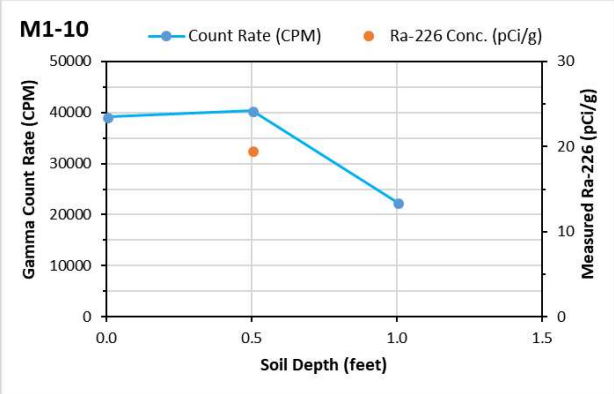

M1-5
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

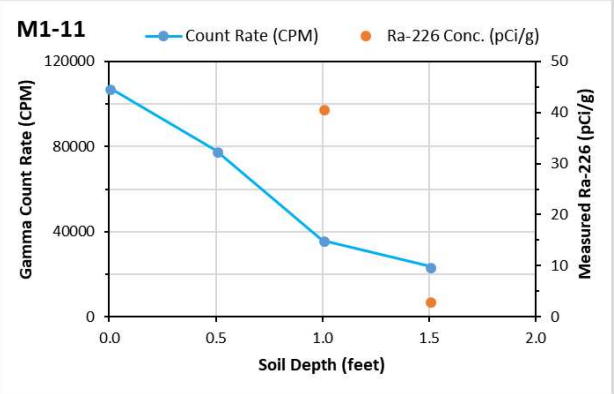

M1-6
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

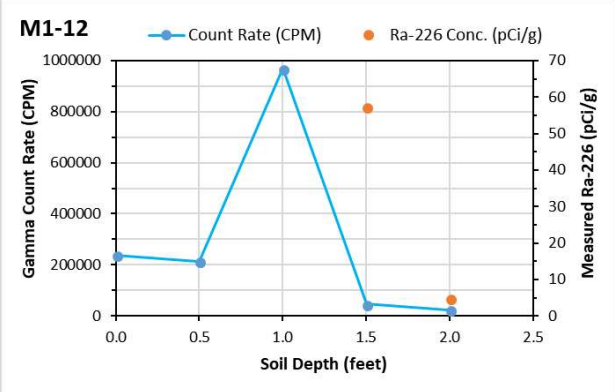

M1-7
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

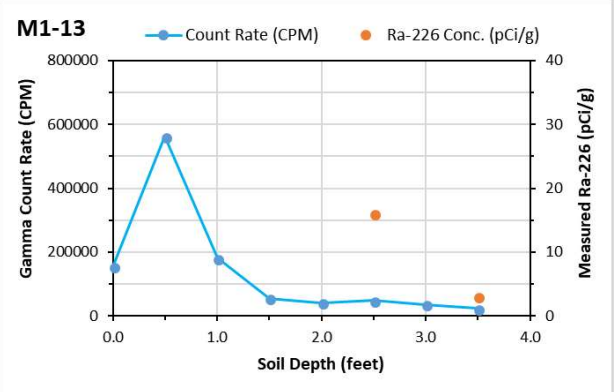

M1-8
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

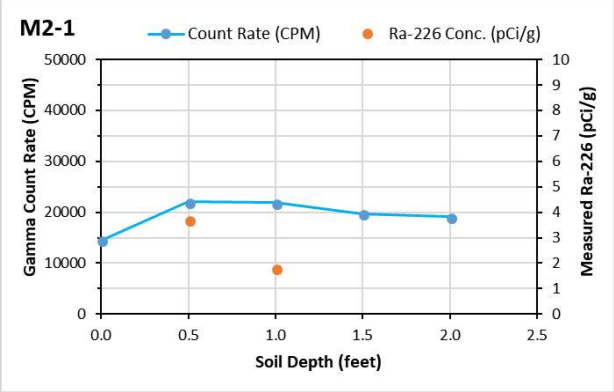

M1-9
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

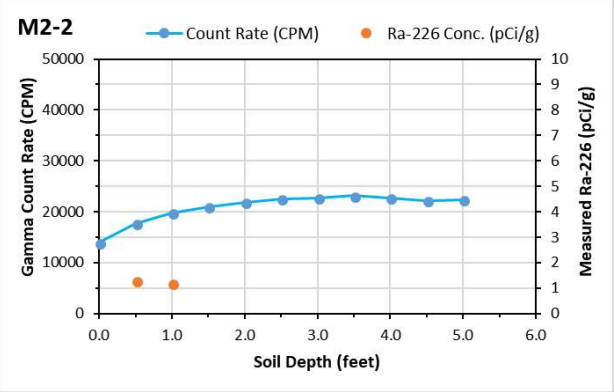

M1-10
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

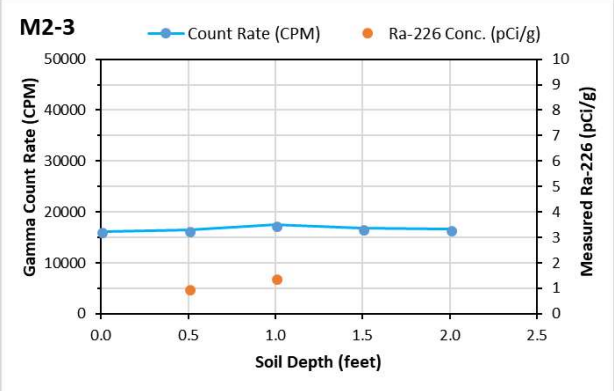

M1-11
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

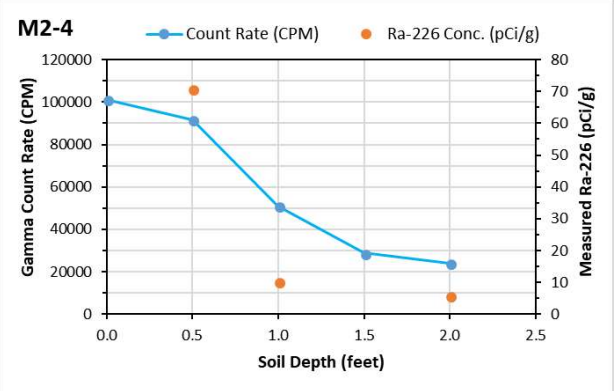

M1-12
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

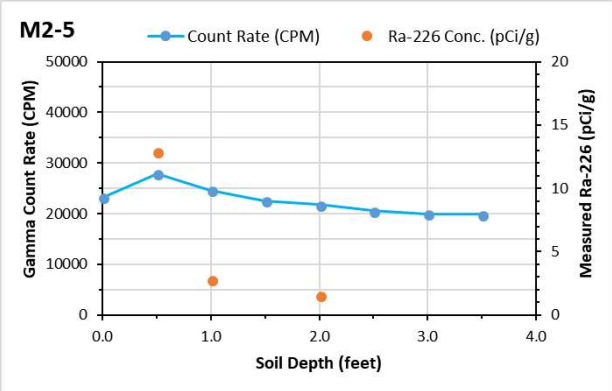

M1-13
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

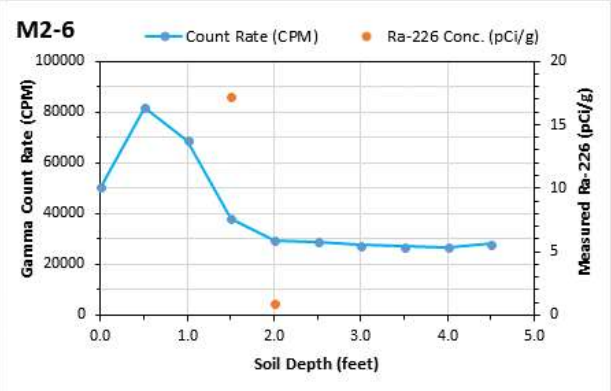

M2-1
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

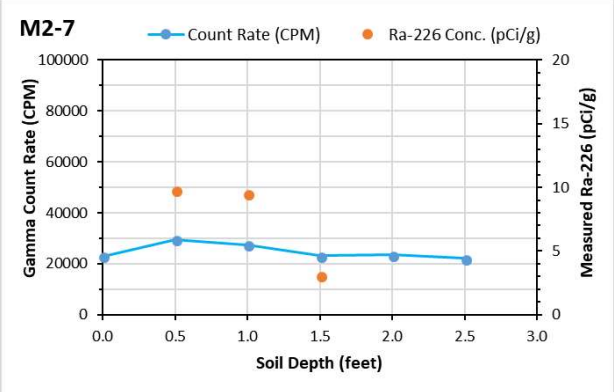

M2-2
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

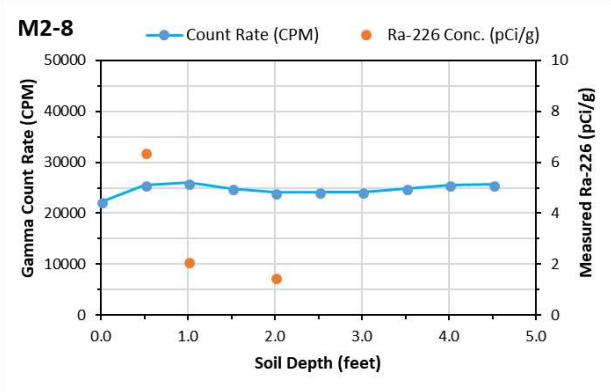

M2-3
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

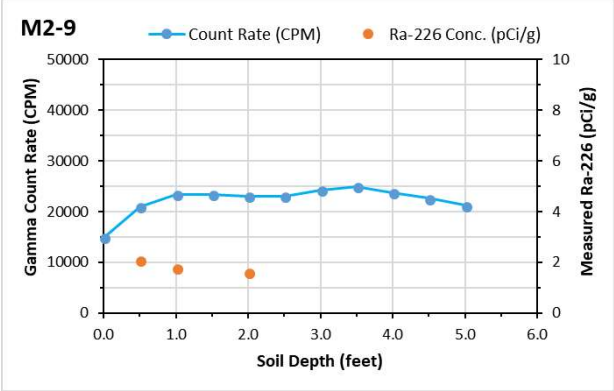

M2-4
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

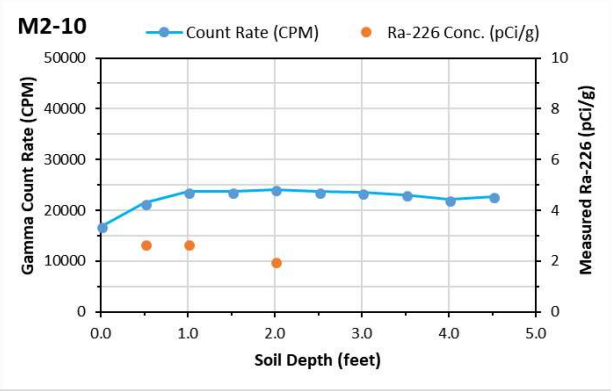

M2-5
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

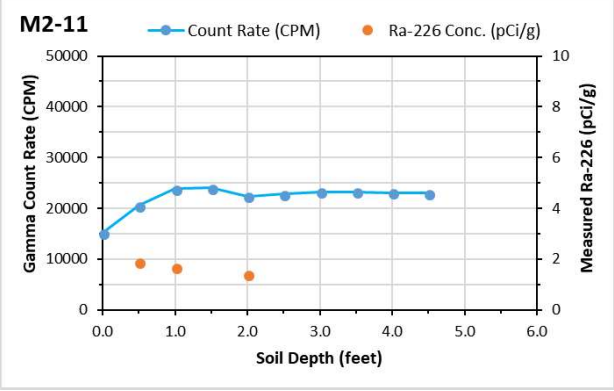

M2-6
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

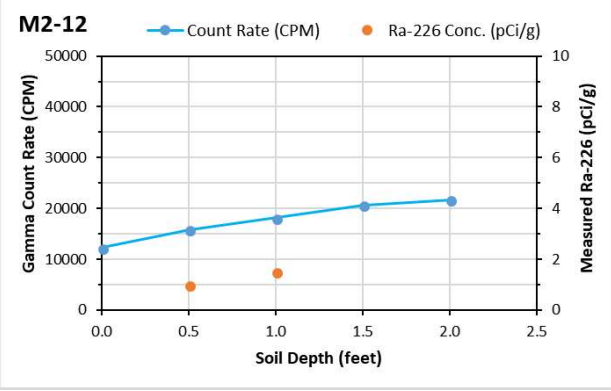

M2-7
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

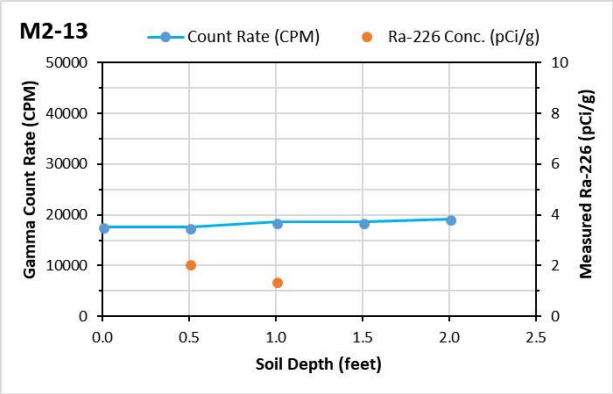

M2-8
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

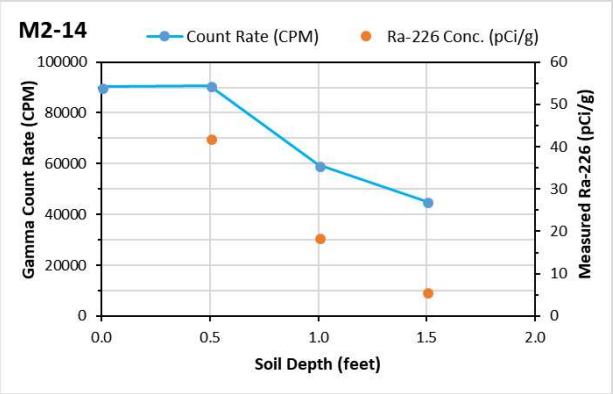

M2-9
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

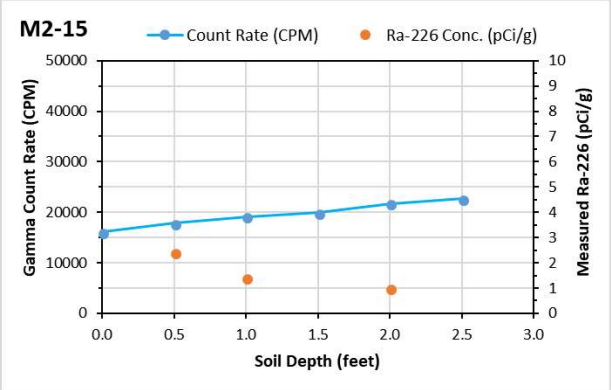

M2-10
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

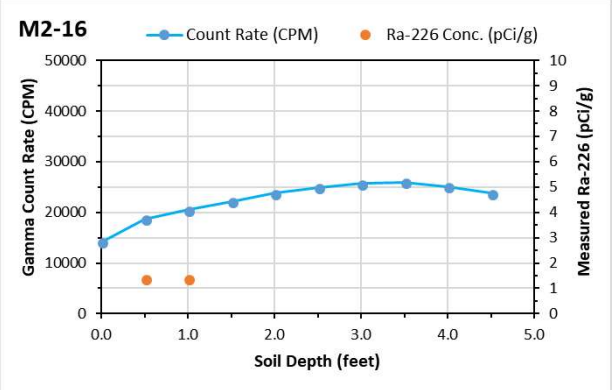

M2-11
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

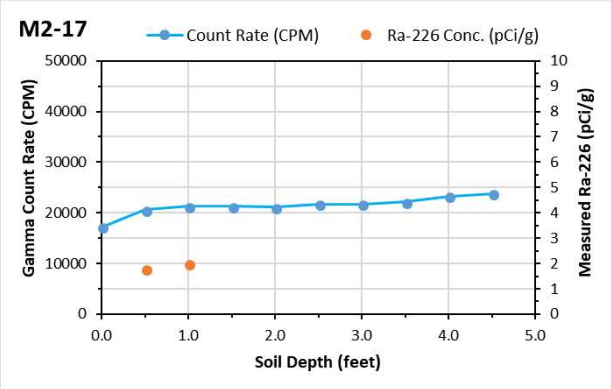

M2-12
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

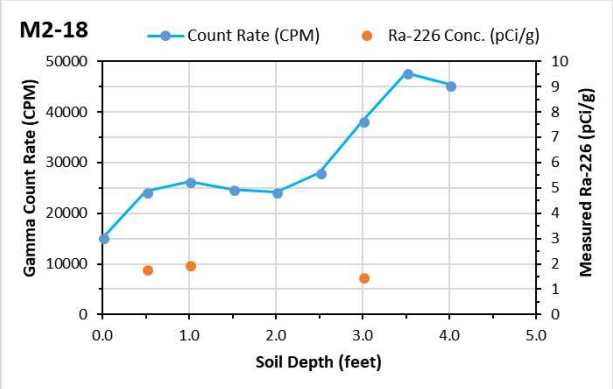

M2-13
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

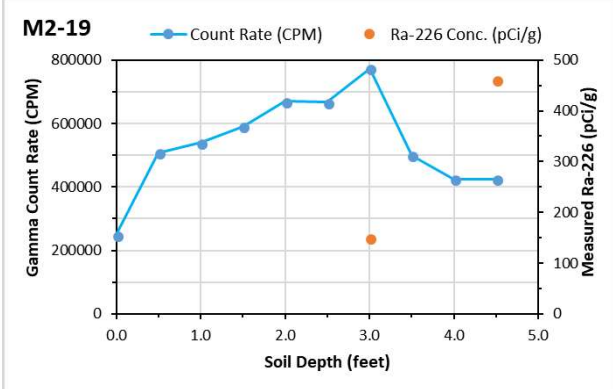

M2-14
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

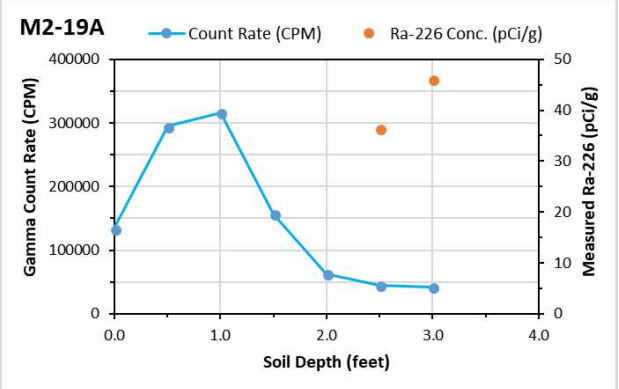

M2-15
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

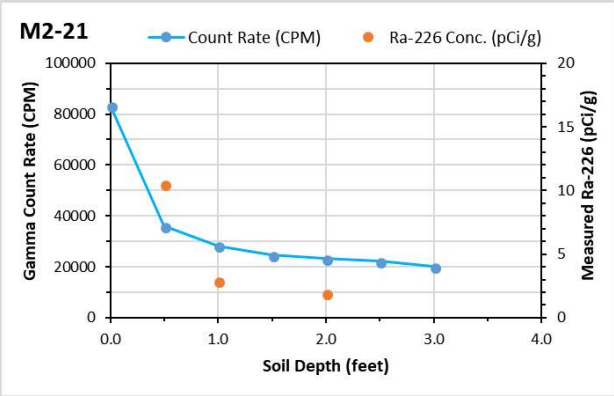

M2-16
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

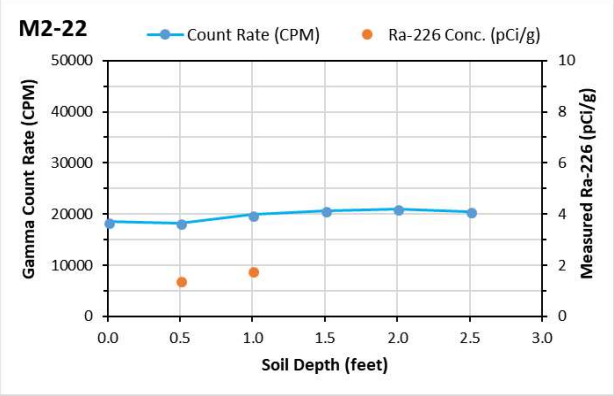

M2-17
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

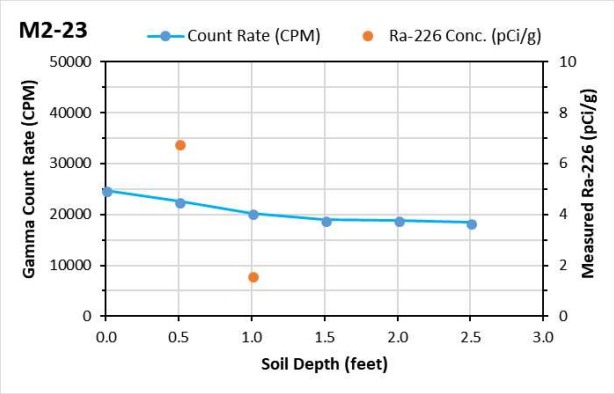

M2-18
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)


M2-19
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

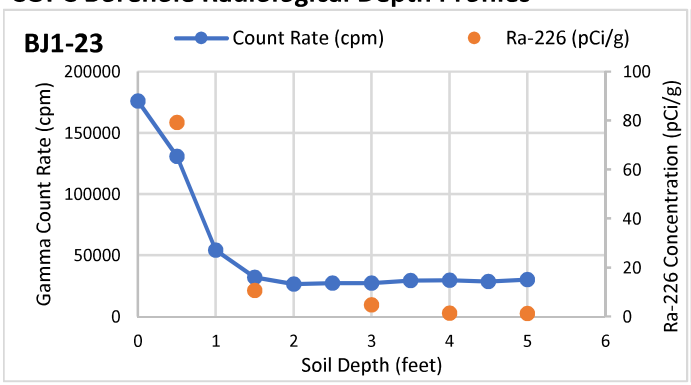

M2-19A
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)

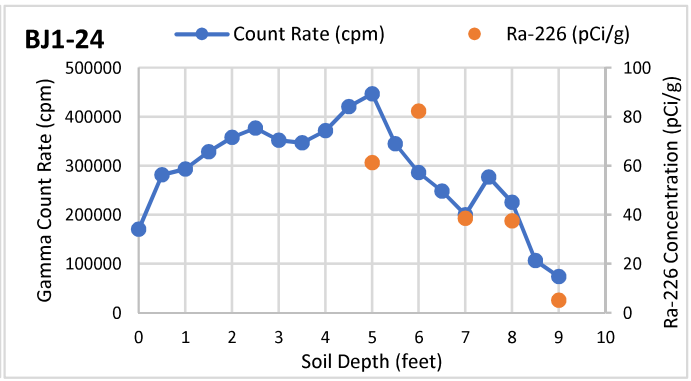

M2-21
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)
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40000
20000
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15
10
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2.0
3.0
4.0

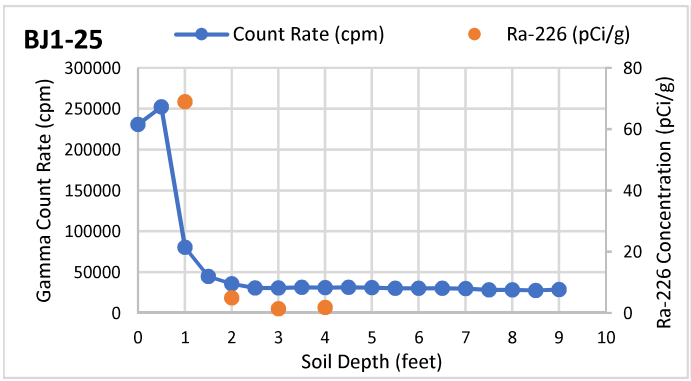

M2-22
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)
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30000
20000
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6
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0.5
1.0
1.5
2.0
2.5
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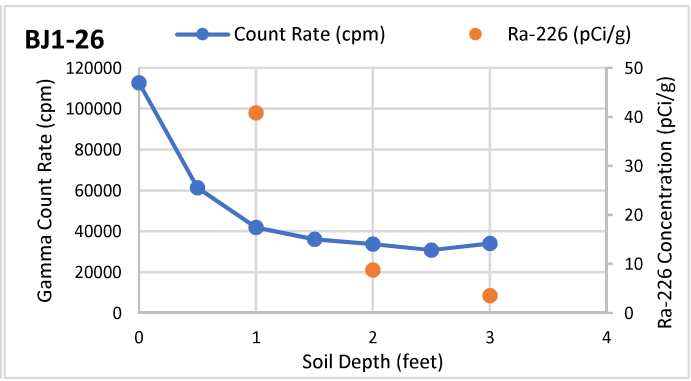

M2-23
Count Rate (CPM)
Ra-226 Conc. (pCi/g)
Gamma Count Rate (CPM)
Measured Ra-226 (pCi/g)
Soil Depth (feet)
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40000
30000
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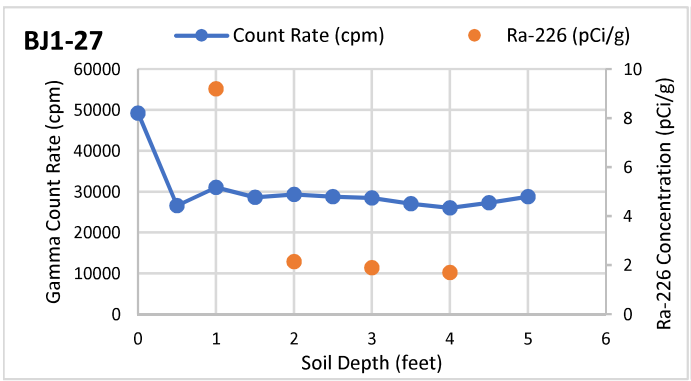
COPC Borehole Radiological Depth Profiles

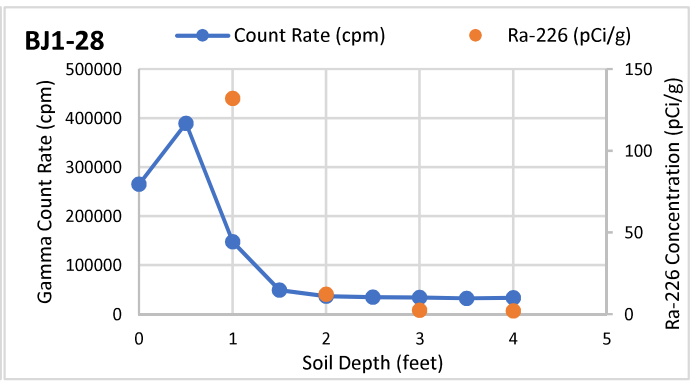


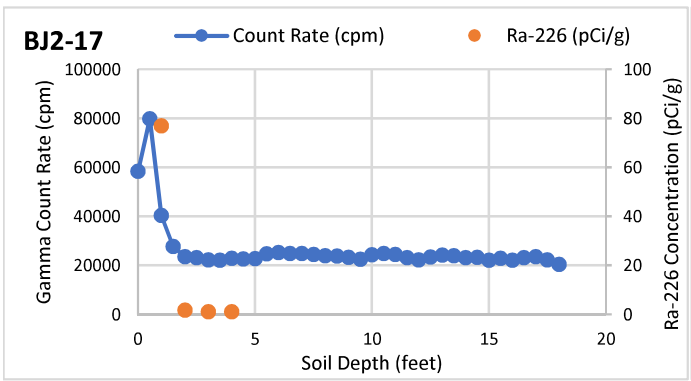


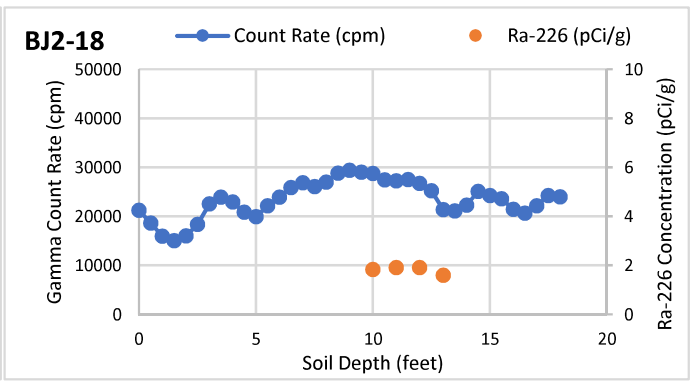


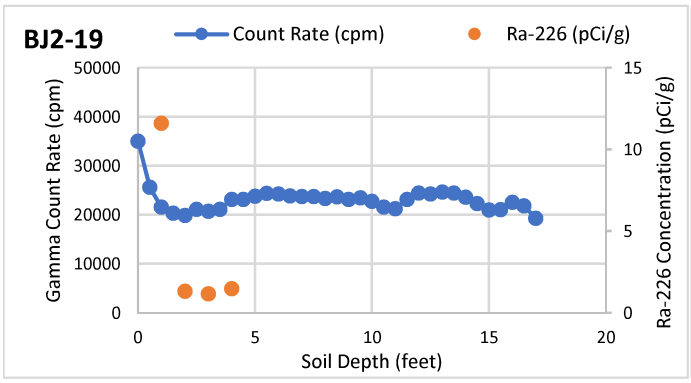


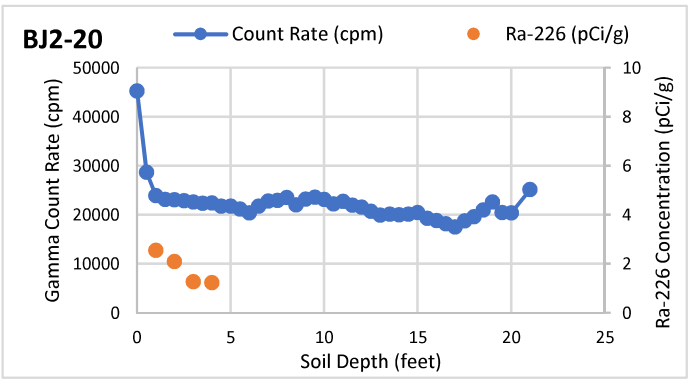


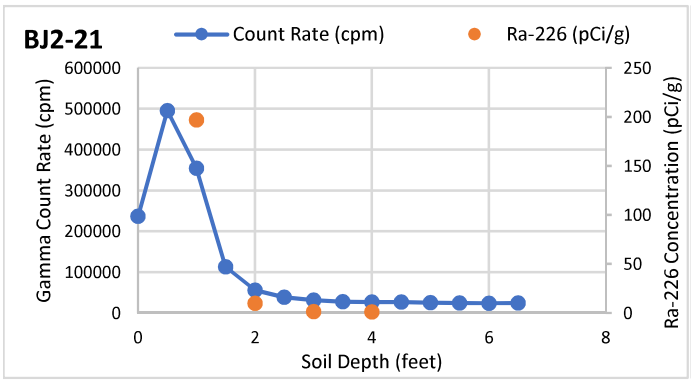


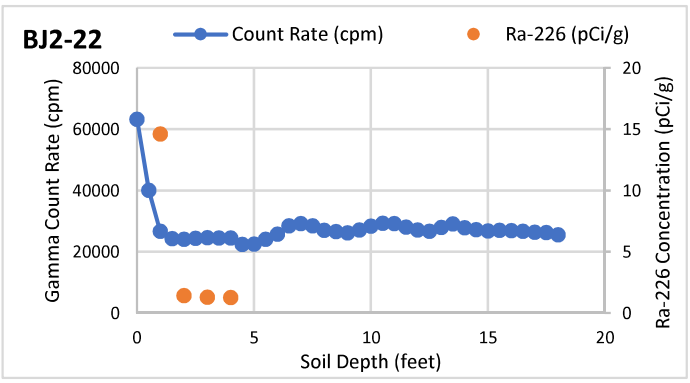


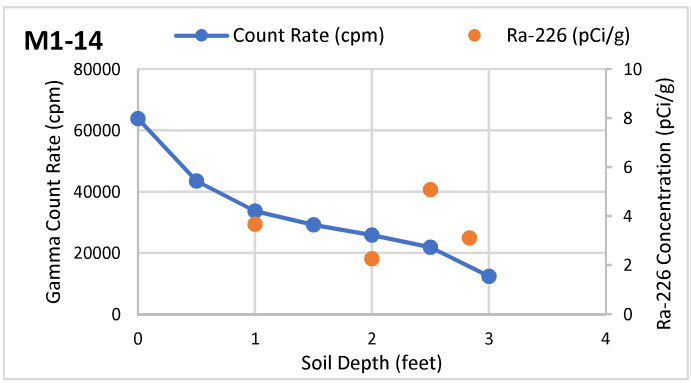


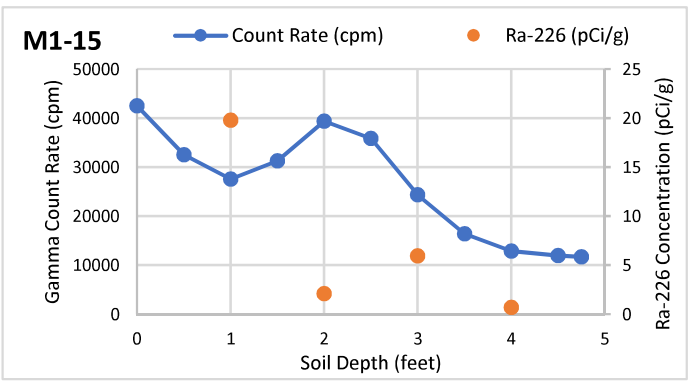

BJ2-19
Count Rate (cpm)
Ra-226 (pCi/g)
Gamma Count Rate (cpm)
Ra-226 Concentration (pCi/g)
Soil Depth (feet)

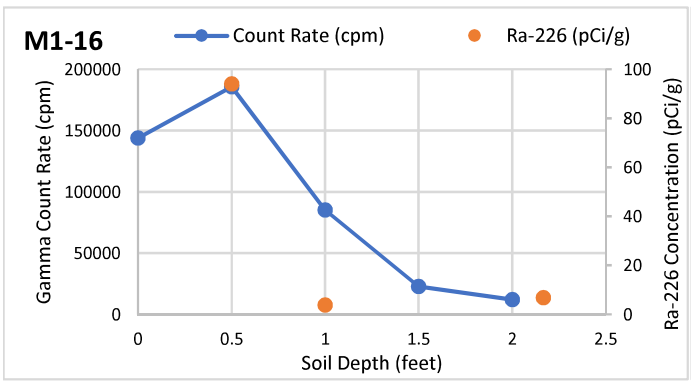

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Ra-226 (pCi/g)
Gamma Count Rate (cpm)
Ra-226 Concentration (pCi/g)
Soil Depth (feet)

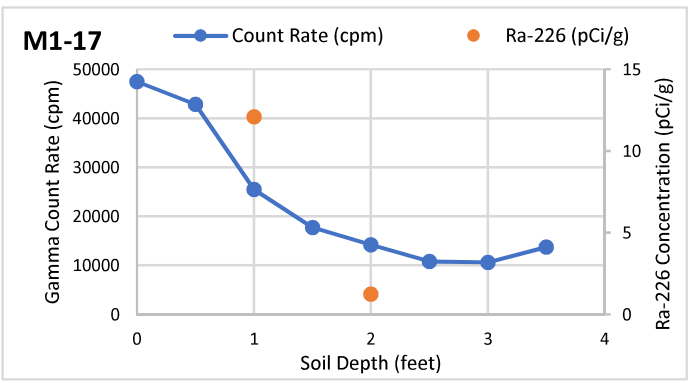

BJ2-21
Count Rate (cpm)
Ra-226 (pCi/g)
Gamma Count Rate (cpm)
Ra-226 Concentration (pCi/g)
Soil Depth (feet)


BJ2-22
Count Rate (cpm)
Ra-226 (pCi/g)
Gamma Count Rate (cpm)
Ra-226 Concentration (pCi/g)
Soil Depth (feet)

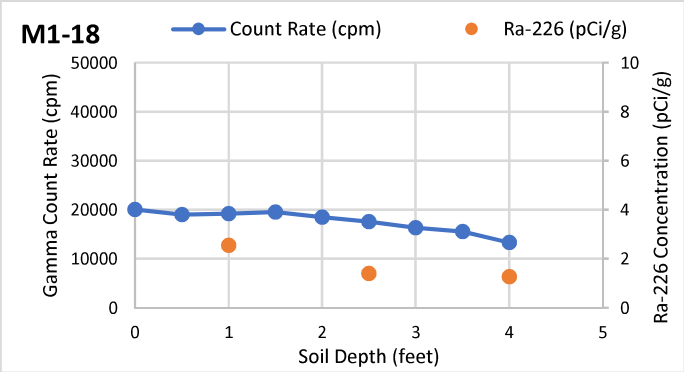

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Ra-226 Concentration (pCi/g)
Soil Depth (feet)

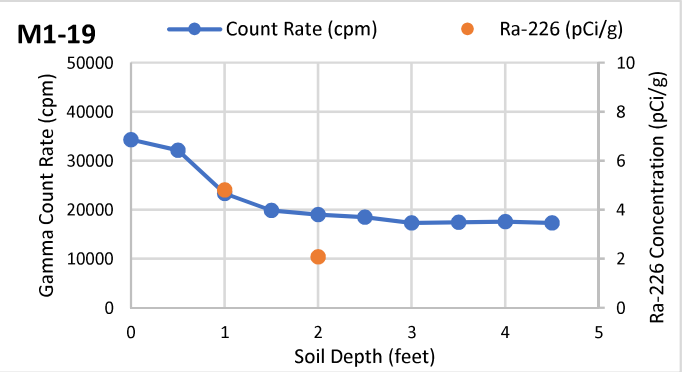

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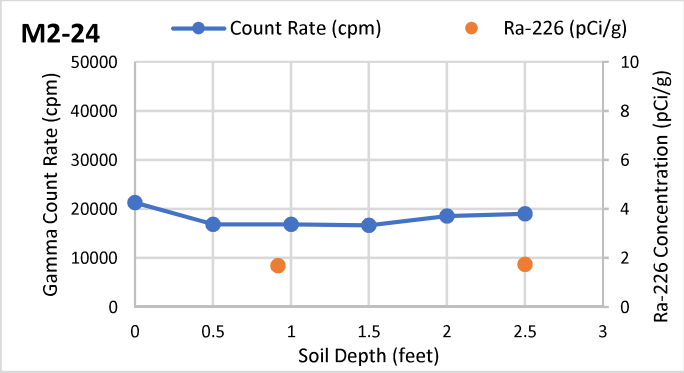

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Soil Depth (feet)

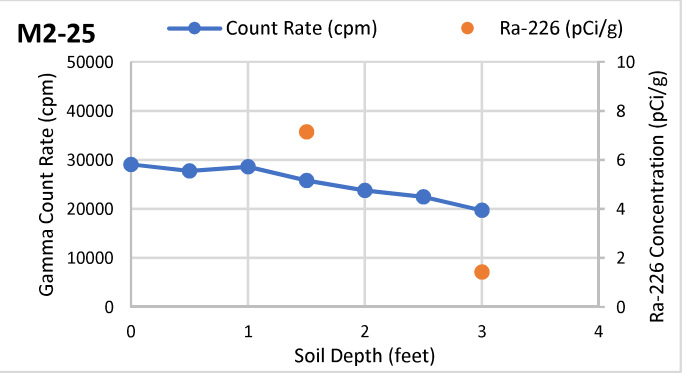

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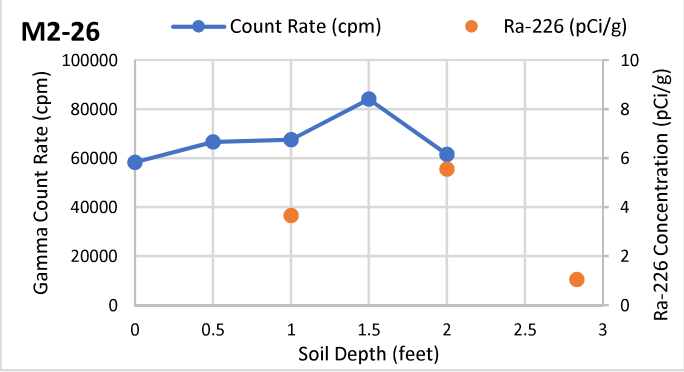
Appendix A - Radiological Depth Profile Data
Supplemental Site Characterization Report

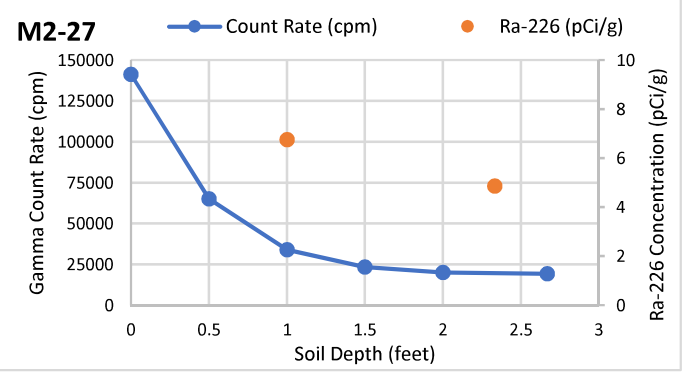


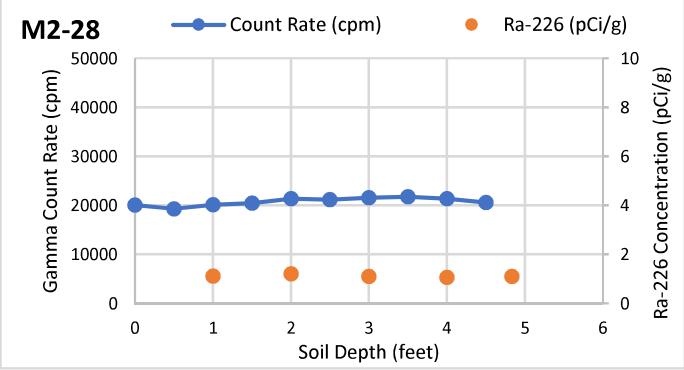


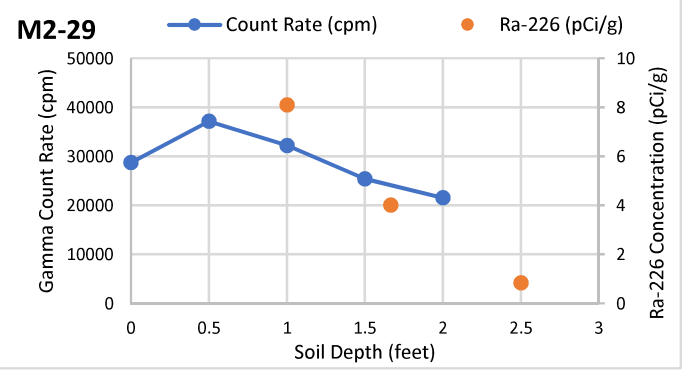


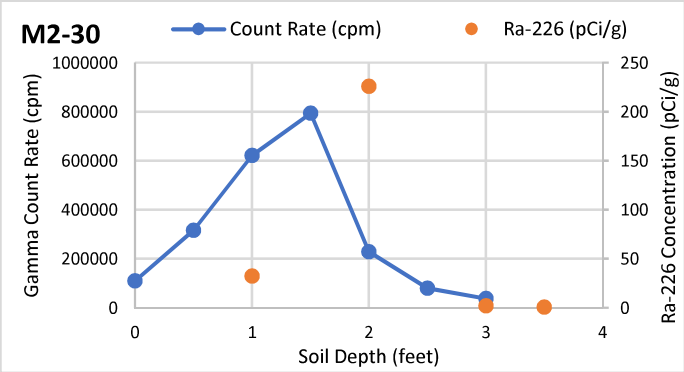




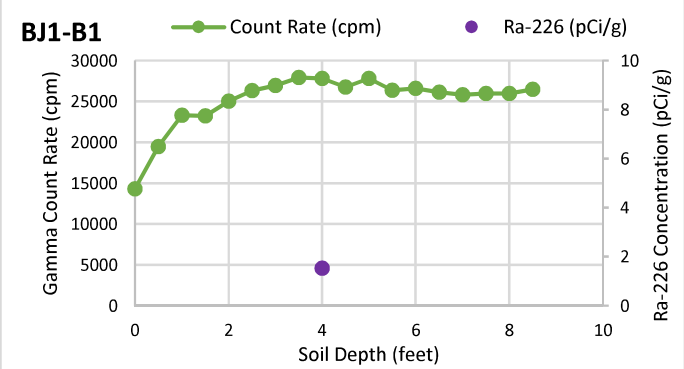


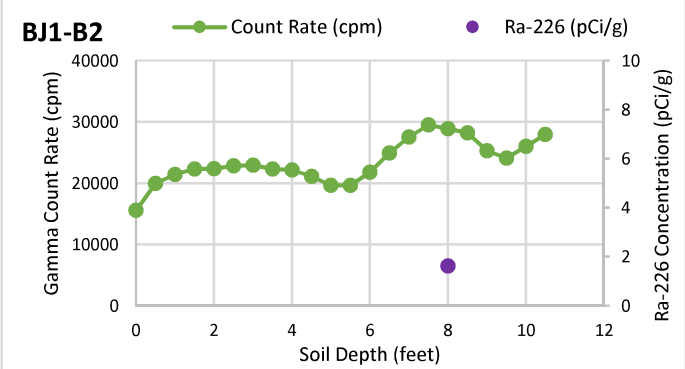


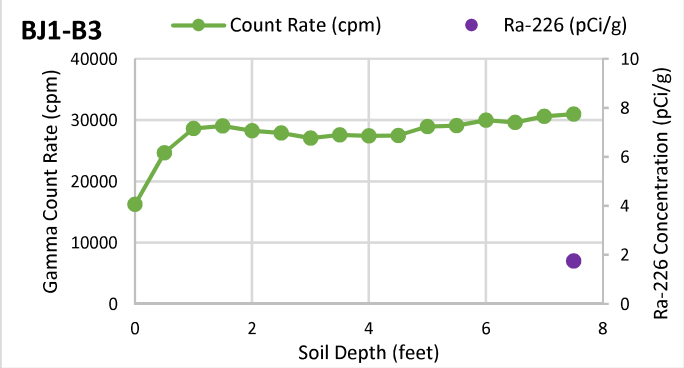


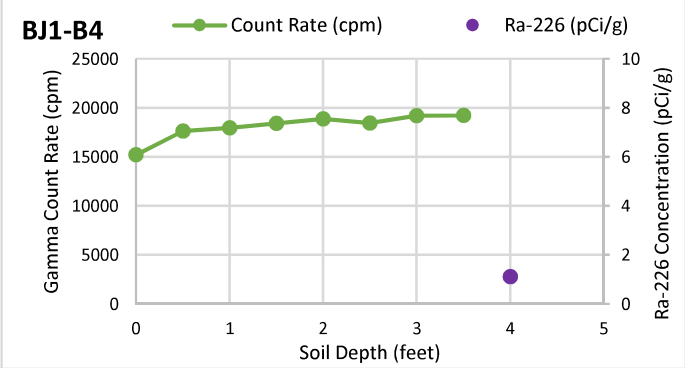


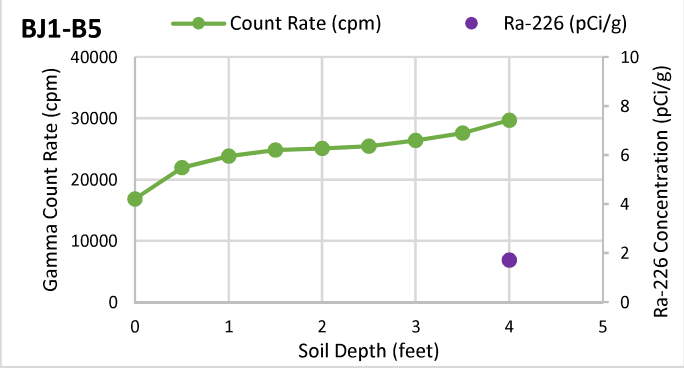
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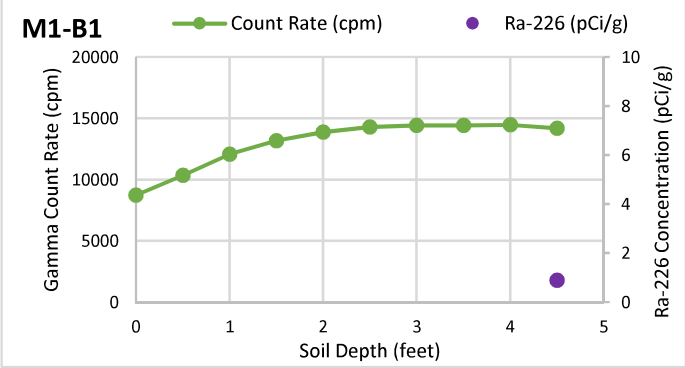




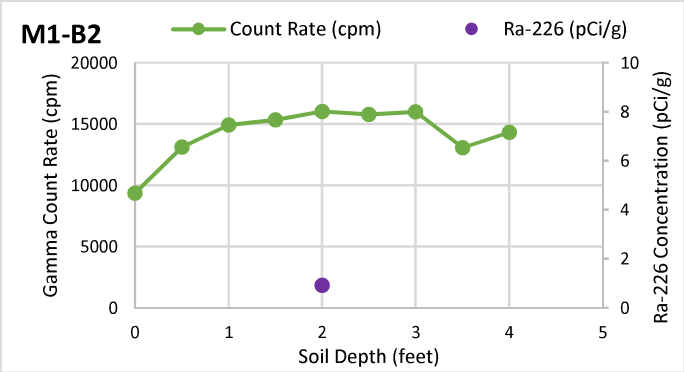


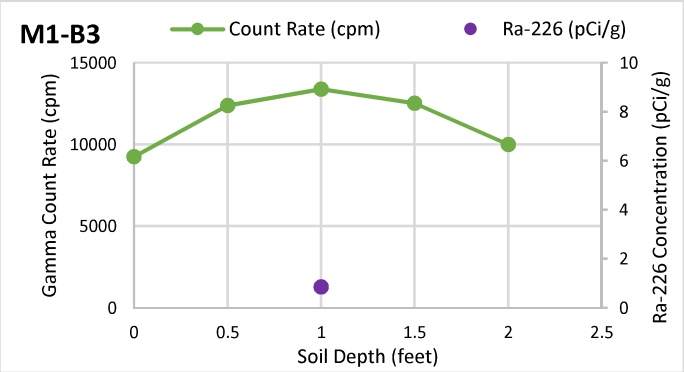


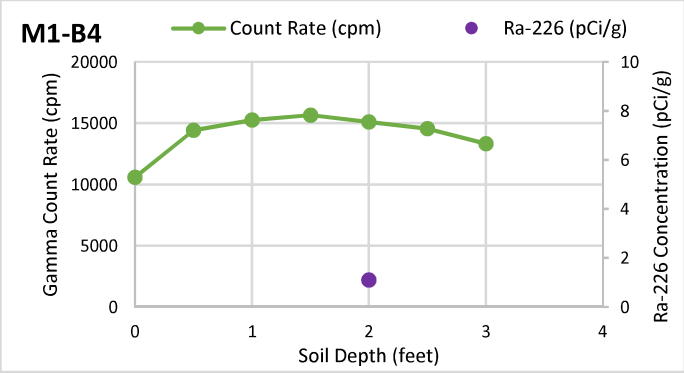




Appendix A - Radiological Depth Profile Data
Supplemental Site Characterization Report







APPENDIX C
BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Appendix C: Baseline Human Health and Ecological Risk Assessment

Mac and Black Jack Mines EE/CA

September 29, 2023

Prepared for:

Homestake Mining Company of California

Prepared by:
Stantec Consulting Services Inc.

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Abbreviations

AUM	abandoned uranium mine
BERA	baseline ecological risk assessment
Bgs	below ground surface
COC	contaminant of concern
COEC	contaminant of ecological concern
COPC	contaminant of potential concern
COPEC	contaminant of potential ecological concern
CSM	conceptual site model
CTE	central tendency exposure
EE/CA	engineering evaluation / cost analysis
EPC	exposure point concentration
ERA	ecological risk assessment
ERBSL	ecological risk-based screening level
HHRA	human health risk assessment
HQ	hazard quotient
ILCR	incremental lifetime cancer risk
iPaC	Information for Planning and Consultation
LOAEL	lowest observed adverse effects level
MLF	mass loading factor
MRM	mining-related material
NAUM	Navajo Abandoned Uranium Mines
NESL	Navajo Endangered Species List
NNDFW	Navajo Nation Department of Fish and Wildlife
NNEPA	Navajo Nation Environmental Protection Agency
NNHP	Navajo Nation Heritage Program
NOAEL	no observed adverse effects level
ODL	Diné Bee'ooliil or Navajo Fundamental Law-based exposure pathways
PRG	preliminary remediation goal
RME	reasonable maximum exposure
RSE	Removal Site Evaluation
Sites	Mac and Black Jack AUM sites
SLERA	screening level ecological risk assessment
TRV	toxicity reference value
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

1 Introduction

This baseline human health and ecological risk assessment was conducted to evaluate potential impacts to human health and the environment associated with the Mac and Black Jack sites (the Sites) located on allotments within the Smith Lake Chapter and Mariano Lake Chapter of the Navajo Nation, in support of the evaluation of alternatives in the Final Engineering Evaluation / Cost Analysis (EE/CA). The four sites, Mac No. 1, Mac No. 2, Black Jack No. 1, and Black Jack No. 2 were identified by the United States Environmental Protection Agency (USEPA) as part of the *Health and Environmental Impacts of Uranium Contamination in the Navajo Nation Five-Year Plan* (Five-Year Plan; USEPA, 2008), indicating that mining-related materials (MRM) at these Sites may have elevated levels of radium-226 that may need to be addressed to protect public health and the environment. MRM is defined as soil, rock, and mine structures and debris with levels of uranium decay series radionuclides and metals associated with uranium ore that are elevated relative to naturally occurring levels in local background surface soils and/or rocks (ERG, 2018).

1.1 Site Setting

The Sites are located within a 3.5-mile radius of one another and include Mac No. 1 in the Mariano Lake Chapter and the following sites in the Smith Lake Chapter: Mac No. 2, Black Jack No. 1, and Black Jack No. 2. The Sites are located at the juncture of several major fold structures on the Colorado Plateau; native overburden soils generally consist of sands. The climate is arid to semi-arid and subject to erosion due to high-intensity precipitation events and significant wind. The Sites are located mainly on topographic low areas, and the dominant soil transport mechanisms are erosion and deposition as windblown dust and transport with surface water runoff. Water is present only ephemerally, flowing from adjacent high ground across the Sites as sheet flow or stream flow after large storms. Average annual temperatures range from 31 degrees Fahrenheit (°F) to 66°F, the average annual daily wind speed is 7.0 miles per hour, and the average precipitation at the Gallup airport is approximately 11 inches per year. Soil depth at the Sites varies from thin to none at Mac No. 1 and Mac No. 2 to at least 10 feet at Black Jack No. 1 (ERG, 2018). Impacts from historical mining operations are generally limited to the top six inches of soil, with deeper soil impacted at locations such as former ore stockpiles, remnant waste rock piles, mine structures or portals, or downgradient accumulation areas (ERG, 2018).

The Sites are in arid open grassland and shrubland, with some piñon-juniper habitat. Land at the Sites is currently vacant. The mines are abandoned, with various physical features of past mining operations remaining, including mine shafts and vents, miscellaneous open holes, concrete slabs, former utility infrastructure, and former mining buildings. Physical hazards mitigation was completed in 2018 (ii bá, Inc. 2018). Some rural residences, including residences where farming and/or livestock grazing occurs, are present in the area. The closest residences to any site are approximately one-half mile away.

1.2 Site Characterization Data

Validated site characterization data are summarized in the USEPA-approved Removal Site Evaluation (RSE) report (ERG, 2018) and the Supplemental Site Characterization Report (Stantec, 2019b). The Supplemental Site Characterization followed the RSE and included drilling 25 additional boreholes at the Sites to further evaluate uranium and radium-226 concentrations to address comments from the Navajo Nation Environmental Protection Agency (NNEPA) on the RSE Report (ERG, 2018). The data were validated to confirm that the results of data collection activities support the objectives of the RSE and Supplemental Site Characterization, as documented in the Phase 3 Removal Site Evaluation Work Plan (ERG, 2017) and the Supplemental Characterization Field Sampling Plan (Stantec, 2019a).

The constituents analyzed for in soil samples collected at the Sites are naturally occurring and commonly found in geologic formations in the area. Those naturally occurring constituents detected at concentrations that are potentially elevated due to the presence of MRM warrant further evaluation in a risk assessment, while those constituents that are detected at concentrations within the range of naturally occurring background levels do not require evaluation in a risk assessment. Site and background sample data were statistically evaluated in the Phase 3 RSE report (ERG, 2018) to determine if they represent the same data population, or if Site concentrations are significantly elevated above background concentrations. ERG (2018) presents the results of both parametric and non-parametric comparisons between site and background soil datasets for each site at the time of the Phase 3 RSE (i.e., including surface and subsurface soil, but not including supplemental data for uranium and radium-226). The right-skewed data distributions in these evaluations suggest that the non-parametric results are more applicable to the site datasets. The non-parametric statistical evaluation of site and background area samples indicate that concentrations of arsenic, molybdenum, selenium, uranium, vanadium, and radium-226 at the Sites are elevated relative to background concentrations for all analytes with the potential exceptions of arsenic at Mac No. 1 and selenium at Mac No. 2. Although this statistical comparison did not include supplemental sample results for radium-226 and uranium, the non-parametric statistical evaluation indicates that these constituents are significantly higher in site soils relative to background soil and omission of additional data from the statistical comparison is a minor source of uncertainty. Although ERG (2018) indicates that two constituents, arsenic and selenium at Mac No. 1 and Mac No. 2, may not be elevated above background, all constituents are conservatively evaluated as contaminants of potential concern for human health / contaminants of potential ecological concern (COPCs / COPECs) in this risk assessment.



2 Human Health Risk Assessment

The human health risk assessment (HHRA) for the Sites included the development of risk-based preliminary remediation goals (PRGs) and the calculation of human health risk estimates under current and hypothetical future exposure scenarios.

The HHRA is comprised of the following key steps:

- Exposure assessment
- Toxicity assessment
- Risk characterization
- Risk discussion

Each step is described in the following subsections.

2.1 Exposure Assessment

The human health exposure assessment consists of development of a site-specific conceptual site model (CSM) that identifies current and potential future land uses and exposure pathways, parameterization of models for quantifying exposure doses, and calculation of exposure point concentrations (EPCs).

2.1.1 EXPOSURE PATHWAYS

This HHRA considers hypothetical traditional land uses in the area, including consumption of home grown produce and locally grazed livestock, and collection and use of native plants for cooking and medicine. Human health risks were quantified for four of the receptors provided in the Navajo Abandoned Uranium Mines (NAUM) Calculation Tool; the fifth receptor / exposure scenario, Kǫǫ eí doo nahaazáh dah (site visitor to difficult access open space use), is not applicable to the Sites because the Sites are physically accessible. USEPA, in collaboration with NNEPA, developed the NAUM Calculation Tool and required its use at the Sites. This risk assessment used Version 1.00 of the NAUM Calculation Tool, dated August 17, 2022 (USEPA, 2022a), and modified as discussed in Section 2.1.2. The receptors that were evaluated in the HHRA are described below and shown graphically on the human health CSM for the Sites (**Figure 2-1**).

- **Kee'da'whíí téél** – **Full-Time Navajo Residential Use**: This receptor lives full-time at the Site. Exposure pathways include external exposure to radiation, incidental ingestion of soil, dermal exposure to soil (metals only), inhalation of soil (or dust), ingestion of homegrown produce and gathered wild plants, and consumption of animal products from raised animals (meat, milk, eggs) and hunted animals (meat), as well as plant exposures from Diné Lifeways practices including medicinal and ceremonial exposures. This resident engages in intensive subsistence lifestyle activities, including an assumed outdoor exposure time of 12 hours per day, for a 75-year exposure duration (NNEPA, undated).

- **Kǫǫh bí łíí nakaí** – **Sheep Camp Use**: This receptor lives on-site seasonally to graze their livestock. Exposure pathways include external exposure to radiation, incidental ingestion of soil, dermal exposure to soil (metals only), inhalation of soil (or dust), ingestion of a limited number of homegrown produce and gathered wild plants, and ingestion of raised animal products and hunted animals, as well as plant exposures from Diné Lifeways practices including medicinal and ceremonial exposures. The sheep Camp user works outside 12 hours per day, 150 days per year, for a 75-year exposure duration (USEPA, 2022a).

- **Kǫǫ eí nahaazáh** – **Easy Access Open Space Use**: This receptor frequently utilizes easily accessible areas. Assumed to be on-site 60 days per year for 2 hours per visit (NNEPA, undated). Exposure pathways include external exposure to radiation, incidental ingestion of soil, dermal exposure to soil (metals only), inhalation of soil (or dust), ingestion of gathered wild plants, meat from raised and hunted animals, as well as plant exposures from Diné Lifeways practices including medicinal and ceremonial exposures.

- **Chíí dah wiih łeezh** – **Washes and Drainages**: People that frequently utilize accessible washes and drainages. Assumed to be on-site 150 days per year for 12 hours per day (NNEPA, undated). Includes external exposure to radiation, incidental ingestion of soil, dermal exposure to soil (metals only), inhalation of soil (or dust), ingestion of a limited number of homegrown produce and gathered wild plants, and raised animal products and hunted animals, as well as plant exposures from Diné Lifeways practices including medicinal and ceremonial exposures.

Complete exposure pathways evaluated for the Sites do not include surface water or groundwater routes of exposure. Groundwater is not present at the Sites (ERG, 2018) and surface water is present only as ephemeral runoff. A source of water for potable uses and crop irrigation / livestock watering is not currently present at the Sites.

2.1.2 EXPOSURE MODELS

The NAUM Calculation Tool was used to model exposure doses in this HHRA. The version of the NAUM Calculation Tool dated August 17, 2022, as provided by USEPA on August 19, 2022, was used except for the following modifications:

- A custom residential scenario was added. Select exposure parameters for the custom scenario were modified from the default Kee'da'whíí téél (Full-Time Navajo Residential Use) parameters provided in the model.

- A custom Navajo site visitor scenario was also added; select exposure parameters for the Kǫǫ eí nahaazáh (Easy Access Open Space) were modified to reflect site-specific exposure assumptions.

The NAUM Calculation Tool calculates both cancer risk and noncancer hazard estimates for a given site concentration, as well as cancer risk- and noncancer hazard-based PRGs that can be used to calculate risk and noncancer hazard estimates at multiple sites. For this risk assessment, PRGs calculated within the model were used to derive cancer risk estimates for a combined child and adult receptor, and noncancer hazard estimates for the more conservative of a child or an adult receptor, at the Sites. Exposure parameter values used in the NAUM Calculation Tool are presented in Table 2-1 for the two custom scenarios and the corresponding default scenarios [i.e., custom and default Kee'da'whíí téél (full-time Navajo resident) and Kǫǫ eí nahaazáh (easy access open space use)], with the exception of other Diné Bee'ooliil or Navajo Fundamental Law-based (ODL) plant ingestion, dermal exposure, and inhalation pathways. ODL plant ingestion, dermal exposure, and inhalation exposure assumptions, along with exposure assumptions for the other two default receptors were not modified in this HHRA, and are as presented in the NAUM Calculation Tool Attachment A.

The custom exposure scenarios presented in Table 2-1 remain as highly conservative, as the default exposure parameters presented in the NAUM Calculation Tool were retained in most cases, and limited modifications were made to other exposure parameters. The outdoor exposure time was only slightly reduced from 12 to 10 hours per day, consistent with the 90th percentile for all respondents spending time outdoors on a farm (USEPA, 2011); the value of 10 hours per day is still very conservative when applied to every day the resident is on-site (i.e., an assumed 350 days per year), as it suggests either 12-hour days outside all summer or work outside after dark all winter.

Assumptions regarding produce and native culturally significant plant ingestion, and raised and hunted animal products, were also mostly retained. Animal product ingestion was modified, from just over two pounds of animal product per day to a pound and a quarter of animal product per day for an adult; the NAUM Calculation Tool default animal product ingestion rate for a child was retained for this HHRA (refer to Footnote g in Table 2-1).

2.1.3 EXPOSURE CONCENTRATIONS

The EPC used to quantify human health exposures was the 95% upper confidence limit (UCL) on the mean concentration measured in soil samples from 0 to 10 feet below ground surface (bgs). A maximum exposure depth of 10 feet bgs is conservatively used to evaluate a scenario where subsurface soil is brought to the surface in future excavation work. The UCL on the mean concentrations were calculated using USEPA's ProUCL statistical software version 5.2 (USEPA, 2022b). Recommendations for appropriate distributions and associated UCLs provided by the program were utilized. Summary statistics and derived UCLs for soil from 0 to 10 feet bgs are provided in Table 2-2, and ProUCL output sheets are provided in Attachment B.



To assess site-related human health risks relative to ambient risks, EPCs were also developed for background data for the calculation of background risk estimates. Two background areas were sampled: Background Area 1 and Background Area 2. Background Area 1 is located adjacent to Black Jack No. 1, and EPCs for Background Area 1 were used to calculate background risks for this site. Background Area 2 is located closer to the Black Jack No. 2 and Mac No. 1 and 2 sites; EPCs for Background Area 2 were used to calculate background risks for these sites. The data summary, calculated UCLs, and EPCs for Background Area 1 and Background Area 2 are presented in Table 2-3. ProUCL output sheets for these background areas are provided in Attachment B.

2.2 Toxicity Assessment

The toxicity assessment serves to characterize the relationship between the magnitude of exposure and the potential that an adverse effect will occur from exposure to a chemical or radiological constituent. Adverse effects include the potential increase in incidence of cancer following exposure, and noncarcinogenic systemic effects (e.g., liver toxicity). In this HHRA, two COPCs (arsenic and radium-226) were evaluated for potential increase in cancer risk, and five COPCs (arsenic, molybdenum, selenium, vanadium, and uranium) were evaluated for systemic effects. Toxicity values used in this HHRA are summarized in Table 2-4. Note that although Table 2-4 includes toxicity data for radium-226 for reference, the PRGs used in this HHRA are for radium in secular equilibrium and include contributions from decay products in addition to radium-226 toxicity.

2.3 Risk Characterization

Risk characterization integrates the exposure and toxicity assessments to quantify potential risks to human receptors. In this HHRA, risk based PRGs calculated in the NAUM Tool were used to calculate human health risks. PRGs were calculated to correspond to a 1×10^{-4} lifetime cancer risk for carcinogens and a non-cancer hazard quotient of 1 for noncarcinogenic COPCs. As noted above, one COPC at the Sites, arsenic, is associated with both carcinogenic risk and noncancer hazard; the PRGs for arsenic presented in Table 2-5 are equal to the more conservative cancer risk-based PRG. The noncancer hazard-based PRG for arsenic used in the noncancer hazard calculation is presented in Attachment A.

Risk of developing cancer and the potential for noncancer effects are quantified separately by calculating an incremental lifetime cancer risk (ILCR) and hazard quotient (HQ), respectively, as described below:

$$ILCR = \frac{EPC}{PRG} \times TR$$

Where:

ILCR = incremental lifetime cancer risk (unitless)

EPC = exposure point concentration (pCi/g or mg/kg)

PRG = preliminary remediation goal for carcinogenic effects (pCi/g or mg/kg)

TR = target risk (unitless; 1×10^{-4})

$$HQ = \frac{EPC}{PRG} \times THQ$$

Where:

HQ = hazard quotient (unitless)

EPC = exposure point concentration (mg/kg)

PRG = preliminary remediation goal for carcinogenic effects (mg/kg)

THQ = target hazard quotient (unitless; 1)

As indicated above, risk estimates were calculated using an EPC equal to the UCL on the mean concentration of each COPC in surface soil at each site. Naturally occurring background levels of COPCs in soil may contribute a significant portion to the site risk; therefore, in addition to site risk estimates, incremental risk estimates (i.e., risks associated with exposure to site-related contamination above background levels) were calculated as the difference between site risk and hazard estimates and background risk and hazard estimates.

2.4 Results

Site, background, and incremental cancer risk and noncancer hazard estimates are presented in Table 2-6a, Table 2-6b, and Table 2-6c, respectively. Cancer risk estimates were evaluated against the cancer risk criterion of 1×10^{-4}, and noncancer hazard estimates were evaluated against an acceptable noncancer hazard criterion of 1.

For the Sites, both site and incremental cumulative cancer risk and noncancer hazard estimates exceed 1×10^{-4} and 1, respectively, for every exposure scenario. Radium-226 is the most significant cancer risk driver, and uranium is the most significant noncancer hazard driver.

For Background Area 1 and Background Area 2, cumulative cancer risk estimates exceed 1×10^{-4} for every exposure scenario at both background areas. Constituent-specific cancer risk estimates for radium-226 are approximately an order of magnitude larger than those for arsenic. Noncancer hazard estimates for Background Area 1 exceed 1 for both the custom and default Kee'da'whíí téél (full-time Navajo residential) exposure scenarios. Noncancer hazard estimates for Background Area 2 exceed 1 for the custom Kee'da'whíí téél (full-time Navajo residential) exposure scenario. Arsenic is the only COPC present in soil at Background Area 1 at concentrations associated with noncancer hazard estimates greater than 1; no individual COPCs are present in soil at Background Area 2 at concentrations with noncancer hazard estimates greater than 1.

Detailed cancer risk and noncancer hazard estimates for the Sites and background areas, along with incremental site risks above background, are presented in Table 2-6a through Table 2-6c and summarized in the following subsections.

2.4.1 BACKGROUND AREA 1

Cumulative background cancer risk estimates for a residential scenario were 3×10^{-3} for both the custom and default scenarios. The cumulative background cancer risk estimates for an easy access open space visitor scenario were 5×10^{-4} for both the custom and default scenarios. Radium-226 is the primary driver of a background cancer risk estimate greater than the criterion of 1×10^{-4}.

Cumulative background noncancer hazard estimates for a residential scenario were 3 for the custom scenario and 2 for the default scenario. The cumulative background noncancer hazard estimates for an easy access open space visitor scenario were 0.6 for both the custom and default scenarios. Arsenic was the only COPC present in soil at concentrations associated with a noncancer hazard estimate greater than the criterion of 1.

The custom scenario background cancer risk and noncancer hazard estimates listed above are based on a site area of 159 acres for Black Jack No. 1.

2.4.2 BACKGROUND AREA 2

Cumulative background cancer risk estimates for a residential scenario were 2×10^{-3} for both the custom and default scenarios. The cumulative background cancer risk estimates for an easy access open space visitor scenario were 4×10^{-4} for both the custom and default scenarios. Radium-226 is the driver of a background cancer risk estimate greater than the criterion of 1×10^{-4}.

Cumulative background noncancer hazard estimates for a residential scenario were 2 and 1 for the custom and default scenarios, respectively. The cumulative background noncancer hazard estimates for an easy access open space visitor scenario were 0.4 and 0.3 for the custom and default scenarios, respectively. No individual COPCs were present in soil at concentrations associated with a noncancer hazard estimate greater than the criterion of 1.

The custom scenario background cancer risk and noncancer hazard estimates listed above are based on a site area of 65 acres for Black Jack No. 2; custom scenario background risk estimates for the smaller Mac No. 1 and 2 sites are slightly lower.

2.4.3 BLACK JACK NO. 1

Cumulative site-related and incremental cancer risk estimates for a residential scenario were 4×10^{-2} for both the custom and default scenarios. The cumulative site-related cancer risk estimates for an easy access open space visitor scenario were 7×10^{-3} for both the custom and default scenarios; the cumulative incremental cancer risk estimates for an easy access open space visitor scenario were 7×10^{-3} and 6×10^{-3}, respectively for the custom and default scenarios. Radium-226 was the driver of cancer risk.

Cumulative site-related noncancer hazard estimates for a residential scenario were 26 for both the custom and default scenarios, respectively; the incremental noncancer hazards were 23 and 24, respectively, for these receptors. The cumulative site-related and incremental noncancer hazard

estimates for an easy access open space visitor scenario were 5 for both the custom and default scenarios. Uranium was the primary driver of noncancer hazard.

2.4.4 BLACK JACK NO. 2

Cumulative site-related and incremental cancer risk estimates for a residential scenario were 6×10^{-2} for both the custom and default scenarios. The cumulative site-related cancer risk estimates for an easy access open space visitor scenario were 1×10^{-2} for both the custom and default scenarios. The cumulative incremental cancer risk estimates for an easy access open space visitor scenario were 1×10^{-2} and 9×10^{-3}, respectively, for the custom and default scenarios. Radium-226 was the primary driver of cancer risk.

Cumulative site-related noncancer hazard estimates for a residential scenario were 37 and 38 for the custom and default scenarios, respectively; the incremental noncancer hazards were 35 and 37, respectively, for these receptors. The cumulative site-related noncancer hazard estimates for an easy access open space visitor scenario were 8 and 7 for the custom and default scenarios, respectively; the incremental noncancer hazard estimates were 7 for both receptors. Uranium was the primary driver of noncancer hazard.

2.4.5 MAC NO. 1

Cumulative site-related and incremental cancer risk estimates for a residential scenario were 1×10^{-1} for both the custom and default scenarios, respectively. The cumulative site-related and incremental cancer risk estimates for an easy access open space visitor scenario were 2×10^{-2} for both the custom and default scenarios. Radium-226 was the primary driver of cancer risk.

Cumulative site-related noncancer hazard estimates for a residential scenario were 87 and 92 for the custom and default scenarios, respectively; the incremental noncancer hazards were 86 and 91, respectively, for these receptors. The cumulative site-related noncancer hazard estimates for an easy access open space visitor scenario were 19 and 18 for the custom and default scenarios, respectively; the incremental noncancer hazard estimates were 18 for both of these receptors. Uranium was the primary driver of noncancer hazard.

2.4.6 MAC NO. 2

Cumulative site-related and incremental cancer risk estimates for a residential scenario were 5×10^{-2} for both the custom and default scenarios. The cumulative site-related and incremental cancer risk estimates for an easy access open space visitor scenario were 9×10^{-3} for both the custom and default scenarios. Radium-226 was the primary driver of cancer risk.

Cumulative site-related noncancer hazard estimates for a residential scenario were 17 and 18 for the custom and default scenarios, respectively; the incremental noncancer hazards were 16 and 17, respectively, for these receptors. The cumulative site-related noncancer hazard estimates for an easy access open space visitor scenario were 4 for both the custom and default scenarios; the incremental noncancer hazard estimates were 3 for both of these receptors. Uranium was the primary driver of noncancer hazard.

2.5 HHRA Discussion

Each of the four sites and two background areas has one or more COPC present at a concentration associated with an estimated cancer risk and/or noncancer hazard for a Kee'da'whíí téél (hypothetical subsistence lifestyle resident) higher than the cancer risk and noncancer hazard criteria of 1×10^{-4} and 1, respectively. Site risk and hazard estimates are greater than background risk and hazard estimates. Cumulative site, background, and incremental (i.e., site minus background) risk and/or hazard estimates for a Kǫǫ eí nahaazáh (easy access open space user) are also higher than the criteria.

Cancer risk and noncancer hazard estimates above the criteria of 1×10^{-4} and 1 are driven primarily by the plant consumption pathway for metals, and the animal consumption pathway for radium-226. The percent contribution of each pathway to the total cancer risk or noncancer hazard estimate can be calculated from the PRGs in Table 2-5 using the following formula:

$$\%\ \text{contribution by pathway} = \frac{\text{Total PRG}}{\text{Pathway-Specific PRG}} \times 100$$

This formula indicates that for a custom Kee'da'whíí téél (hypothetical subsistence lifestyle resident):

- Nearly half of the radium-226 cancer risk estimate is associated with consumption of animal products.
- Consumption of produce and other Dine lifeways plant consumption pathways comprise 68 percent of the total cancer risk estimate for arsenic, and 44 to 72 percent of the total noncancer hazard estimates for molybdenum, uranium, and vanadium, while animal consumption comprises 21 percent of the total cancer risk estimate for arsenic and between 4 and 30 percent of the total noncancer hazard estimates for molybdenum, uranium, and vanadium. For selenium, the contribution of animals is much greater, at 80% of the total noncancer hazard estimate.
- External exposure accounts for 21 percent of the total cancer risk estimate for radium-226.
- Direct exposure (ingestion, dermal contact, and inhalation) accounts for 9 percent of the cancer risk estimate for arsenic, and 4 to 29 percent of the noncancer hazard estimates for molybdenum, selenium, uranium, and vanadium.

Human Health Risk Assessment

The NAUM Calculation Tool provides for detailed exposure modeling to calculate unrestricted future land use at the Sites and provides pathway-specific risks or PRGs to allow users to evaluate human health risks associated with each pathway independently. Because of the conservative nature of the Kee'da'whíí tééh (hypothetical subsistence lifestyle resident) exposure scenario, ambient concentrations of COPCs result in cumulative cancer risk and noncancer hazard estimates for this receptor that are higher than the acceptable cancer risk and noncancer hazard criteria of 1×10^{-4} and 1, respectively. As a result, consideration of alternative risk estimates and PRGs based on more likely central tendency exposure (CTE) assumptions may be warranted during future risk management discussions.

To put the conservative risk estimates for the Kee'da'whíí tééh (hypothetical subsistence lifestyle resident) exposure scenario into context, this HHRA also presents cancer risk and noncancer hazard estimates derived from the NAUM Calculation tool using exposure assumptions for a reasonable maximum exposure (RME) USEPA default residential exposure scenario (Table 2-7). COPC-specific cancer risk estimates for the USEPA default resident are approximately 30-fold lower than the COPC-specific cancer risk estimates for a custom Kee'da'whíí tééh (hypothetical subsistence lifestyle resident). For example, the cancer risk estimate for arsenic at Black Jack No. 1 for the USEPA default resident is 1×10^{-5}, while for the custom Kee'da'whíí tééh (hypothetical subsistence lifestyle resident) this risk is 4×10^{-4}. COPC-specific noncancer hazard estimates for a USEPA default-based resident are approximately 5- to 40-fold lower than the COPC-specific noncancer hazard estimates for a custom Kee'da'whíí tééh (hypothetical subsistence lifestyle resident). Potential uncertainties associated with this HHRA are discussed in Section 4.1.



3 Ecological Risk Assessment

The ecological risk assessment (ERA) conducted for the Sites includes a screening-level ecological risk assessment (SLERA) and a refined ERA in the form of a Step 3A analysis. Together, the SLERA and the Step 3A analysis provide a basis for the development of ecological PRGs.

The USEPA's eight step ERA process includes the development of a screening-level problem formulation as part of Step 1 and a more refined problem formation, as necessary, in Step 3. The problem formulation compiles information about the site including the types of ecological habitats and receptors present, contaminant sources and potentially impacted media, and the potential for compete exposure pathways between contaminant sources and ecological receptors. In the absence of a contaminants source, ecological receptors, or potentially complete exposure pathways, the remaining steps of the ERA are unnecessary, and the ERA process is terminated. However, if all of these components of the problem formulation step are present, then the ERA proceeds to a quantitative assessment of the potential for ecological risk. The problem formulation step of the ERA for the Sites is presented in Section 3.1.

A SLERA consists of the first two steps of the USEPA's eight step ecological risk assessment process and is used to determine if there is potential for exposure of ecological receptors to site-related contamination, if characterization data are sufficient to evaluate potential ecological exposures, and whether further risk assessment is necessary. The potential for exposure is evaluated by identifying ecological receptors which may come in to contact with site-related contaminated media and describing potential pathways between contaminated media and ecological receptors. Then, maximum detected concentrations of COPECs are compared to conservative medium-specific screening benchmarks to determine if a more refined ERA is necessary. Because maximum detected concentrations do not represent likely exposure concentrations for most receptors, and because conservative benchmarks are selected, the SLERA does not provide an accurate representation of site impacts, but instead indicates the *potential* for impacts to ecological receptors (USEPA, 1997). The SLERA is designed to ensure that any potential risks to the environment and ecological receptors are identified; a refined ERA can then be used to develop a more realistic evaluation of site impacts, if warranted.

The third step in the USEPA's ERA process comprises a more refined ecological risk evaluation, generating a more accurate estimate of potential ecological risk. This third step can take the form of a baseline ERA or a more site-specific Step 3A analysis. A baseline ERA includes exposure dose modeling for upper trophic level receptors. A Step 3A analysis is a sequential evaluation that includes more in-depth research into the exposure modeling inputs and toxicity information used in the baseline ERA. The Step 3a analysis can include refinements to exposure concentrations in site media, soil-to-biota uptake factors and dose equations, a receptor's diet and foraging habits, and the toxicity reference values (TRVs) selected to calculate ecological risks. A Step 3A analysis need not address every potential source of default conservatism in a baseline ERA, and typically addresses the most applicable sources first. The results of a Step 3A analysis is a more scientifically accurate portrayal of ecological hazard(s) at a site.

The ERA for the Sites includes both a SLERA and a refined Step 3A analysis. The methods and results of the SLERA are presented in Section 3.2, and the methods and results of the Step 3A analysis are presented in Section 3.3.

3.1 Problem Formulation

The problem formulation establishes the context for the ERA results through the development of an ecological CSM. The ecological CSM for the Sites (Figure 3-1) incorporates the operational history of the Sites and/or exposure area, site and vicinity land use, and the ecological habitats and potential receptors to identify complete exposure pathways between site-related contamination and ecological receptors. Key elements of this problem formulation include identification of contamination sources and transport pathways, ecological habitats and potential receptors, and exposure pathways for ecological receptors, as described below.

3.1.1 SOURCES OF CONTAMINATION AND TRANSPORT PATHWAYS

Sources of contamination at the Sites include historical soil contamination resulting from mining activities, and ongoing soil contamination resulting from the presence of MRM. As described previously, MRM includes geologic materials (e.g., soil and rock) and remnant mining debris. The dominant transport mechanisms at the Sites are erosion and deposition as windblown dust and transport with surface water runoff during heavy precipitation events; both of these mechanisms act on and impact surface soil, transporting contaminants from sources to depositional areas. Biological transport (e.g., uptake from soil to plant tissue) may also occur.

3.1.2 ECOLOGICAL HABITATS AND POTENTIAL RECEPTORS

3.1.2.1 Ecological Habitats

Ecological habitat at the Sites consists of arid open grassland and shrubland, salt desert scrub, semi-desert shrub steppe and piñon-juniper woodland, with the most diverse vegetation occurring at Black Jack No. 1 (iiná bá, Inc. 2017a, b). The Sites have low topographic relief and relatively shallow bedrock, and the dominant vegetation includes big sagebrush (*Artemisia tridentata*), blue grama (*Bouteloua gracilis*), and James' galleta (*Pleuraphis jamesii*) (iiná bá, Inc. 2017a, b). Two ephemeral watercourses flow through the Black Jack No. 1 site toward Smith Lake. Runoff as sheet flow and stream flow from high ground crosses all four Sites after large storms, but surface water is typically absent from the Sites (ERG, 2018). The Navajo Nation Department of Fish and Wildlife (NNDFW) Biological Resource Land Use Clearance Policies and Procedures maps indicate that the Sites, and most land in the vicinity, are designated Area 3: Less Sensitive Area (RCP, 2008). Land with an Area 3 designation includes fragmented habitat for species of concern. Suitable habitat is present in relatively small, well-spaced patches, however, NNDFW recognizes that lands with an Area 3 designation may not be completely surveyed for potential occurrence of sensitive species or habitat. Black Jack No. 1 lies to the southeast of a ribbon of steep terraced cliffs rising to a mesa that is designated as Area 1: Highly Sensitive Area (RCP, 2008). Land with an Area 1 designation contains the highest quality habitat for endangered and rare species. Although the majority of the Black Jack No. 1 site is not expected to support sensitive species, it is possible that animals using Area 1 habitat adjacent to the site could forage within the project area.

3.1.2.2 Potentially Exposed Ecological Receptors

The Sites potentially provide habitat for a variety of terrestrial species. A desktop evaluation was conducted to identify species with ranges that overlap with the Sites, and for which habitat requirements can be met by the mixed arid grassland, scrub, shrub steppe and piñon-juniper woodland present at the Sites. The desktop evaluation included a search of the United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (iPaC) website (USFWS, 2022) for special status (e.g., federally endangered) species. The iPaC website compares known or expected ranges, as well as additional areas of influence (e.g., ephemeral headwaters would be an area of interest for downstream riverine species) to project boundaries to generate a list of threatened or endangered species and critical habitats present within the vicinity of the Sites (USFWS, 2022). In addition, a list of Navajo species of concern from the Navajo Endangered Species List (NESL) with potential to occur at the Sites developed by the Navajo Nation Heritage Program (NNHP) was reviewed.

3.1.2.2.1 Common Species

The desktop evaluation identified common bird and mammal species potentially found at the Sites. Bird species that have been observed in McKinley County, and for which habitat may be available at the Sties, are species that use shrublands, grasslands, and/or woodlands. Bird species that have been observed or may be present at the Sites include sagebrush sparrow (*Artemisiospiza nevadensis*), house finch (*Haemorhous mexicanus*), ash-throated flycatcher (*Myiarchus cinerascens*), rock wren (*Salpinctes obsoletus*), common raven (*Corvus corax*), red-tailed hawk (*Buteo jamaicensis*), and turkey vulture

(*Cathartes aura*) (iiná bá, Inc. 2017a,b; PEEC, 2022; iNaturalist, 2022). Mammal species that may be present at the Sites include desert cottontail (*Sylvilagus audubonii*), Gunnison's prairie dog (*Cynomys gunnisoni*), rock squirrel (*Otospermophilus variegatus*), coyote (*Canis latrans*), striped skunk (*Mephitis mephitis*), and mule deer (*Odocoileus hemionus*) (iiná bá, Inc. 2017a, b; PEEC, 2022, iNaturalist, 2022). Reptile species potentially found at the Sites include gopher snake (*Pituophis catenifer*), mountain short-horned lizard (*Phrynosoma hernandesi*) and plateau striped whiptail (*Aspidoscelis velox*) (PEEC 2022, iNaturalist, 2022). The Sites do not provide habitat for fish, amphibians, or other species requiring perennial waterbodies.

3.1.2.2.2 Special Status Species

Federally listed species with potential ranges that include or are adjacent to the mines are unlikely to find suitable habitat at the Sites. For the Mac and Black Jack sites, iPaC lists two endangered species (the southwestern willow flycatcher [*Empidonax traillii extimus*] and the Zuni bluehead sucker [*Catostomus discobolus yarrowi*], three threatened species (the Mexican spotted owl [*Strix occidentalis lucida*], the yellow-billed cuckoo [*Coccyzus americanus*], and Zuni fleabane [*Erigeron rhizomatus*[]), and one candidate species (the monarch butterfly [*Danaus plexippus*]). No critical habitats are listed. As described below, although these species may have potential ranges that overlap the Sites, the Sites do not meet habitat requirements for these species, and none are expected to be found at the Sites.

- The southwestern willow flycatcher is a neotropical migrant bird that breeds only in dense riparian vegetation near open water or saturated soil. The southwestern willow flycatcher can breed in patches of suitable habitat as small as 0.6 hectare, although they avoid patches that are less than 10 meters wide (NPS, 2022a). No such habitat exists at the Sites.

- The Zuni bluehead sucker, a slender bottom-feeding fish, currently occupies an estimated 5 percent of its likely historical range in west-central New Mexico (USFWS, 2014). Ephemeral drainages carrying rainwater away from the Sites during storm events are not hydrologically connected to the perennial headwaters of the Zuni Mountains used by the Zuni bluehead sucker.

- The Mexican spotted owl nests in areas with complex mixed conifer forest structure comprising mature multistoried stands with high canopy closure, or in rocky canyons. Foraging occurs in a broader array of habitats, but most commonly in unlogged Douglas fir forest. The Mexican spotted owl exhibits high site fidelity to home ranges that vary from a few hundred hectares to more than 1,000 hectares. Juveniles disperse in September, utilizing a wider variety of habitats including pinyon-juniper woodlands. Dispersing juveniles only remain in one area for several weeks before moving on. The Sites do not contain foraging or breeding habitat for adults; however, the Sites are located relatively close (i.e., within 15 miles) of the Cibola National Forest, which does contain critical habitat (NPS, 2022b).

- The yellow-billed cuckoo breeds primarily in the eastern United States, migrates through Mexico and Central America, and spends the nonbreeding season in South America. Yellow-billed cuckoos use habitats with nearby water; in the southwest, where they are rare, they use willow, cottonwood, and mesquite riparian corridors (Cornell, 2022a), habitat which is not found at the Sites.

- Zuni fleabane, a perennial flower in the aster family, exists in scattered populations in west-central New Mexico and northeastern Arizona. Suitable habitat with isolated populations occurs approximately 10 miles southwest of the Sites in the Zuni mountains (USFWS, 2019). Zuni fleabane is found on sparsely vegetated clay hillsides, most often on north or east-facing slopes, with soils derived from shales of the Chinle or Baca formations. It grows at 7,000 to 8,000 feet in elevation in open pinyon-juniper woodlands and ponderosa pine forests that receive 14 to 16 inches precipitation per year (NPS, 2022c, New Mexico Rare Plant Technical Council, 1999). Although uranium exploration and mine development were listed as a threat to Zuni fleabane in the 1988 recovery plan (USFWS, 1988), drought is now considered to be the primary concern for this herbaceous plant (USFWS, 2019). The geology at the Sites is not favored by the Zuni fleabane, and the sagebrush steppe-dominated habitat is likely too dry to support this species.

The list of NESL species with the potential to occur on one or more of the Sites includes golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene cunicularia*), peregrine falcon (*Falco peregrinus*), Mexican spotted owl, black-footed ferret (*Mustela nigripes*), Townsend's big-eared bat (*Corynorhinus townsendii*), northern leopard frog (*Lithobates pipiens*), Heil's milk-vetch (*Astragalus heilii*), Acoma fleabane (*Erigeron acomanus*), Zuni fleabane, Sivinski's fleabane (*Erigeron sivinskii*), and Navajo bladderpod (*Lesquerella navajoensis*) (iiná bá, Inc. 2017a,b). As discussed above, the Mexican spotted owl and Zuni fleabane are unlikely to be found on the Sites. The other NESL species with potential to be found on the Sites are discussed below.

- Golden eagles and peregrine falcons may utilize cliffs located in a small area in the north of one site, Black Jack 1, as nesting habitat. However, no evidence of nests was observed in the vicinity of Black Jack 1 during an ecological survey conducted on June 29 and July 3, 2017 (iiná bá, Inc. 2017a, b). Golden eagles and peregrine falcons may forage at any of the Sites, particularly on prairie dogs in Black Jack 1 and Black Jack 2 (iiná bá, Inc. 2017a).

- Burrowing owls may utilize any of the Sites, particularly the prairie dog towns at Black Jack 1 and Black Jack 2. However, no evidence] of burrowing owls was observed at any site during ecological surveys conducted on June 29 and July 3, 2017 (iiná bá, Inc. 2017a, b).

- Black-footed ferrets prey on prairie dogs and are found in association with prairie dog towns at least 200 acres in size with a density of at least 28 burrows per acre. The Sites do not provide sufficient habitat to support black-footed ferrets (iiná bá, Inc. 2017a, b).

- The Townsend's big-eared bat may forage and find marginal roost habitat in abandoned mine features; however, the Sites provide poor habitat for this species (iiná bá, Inc. 2017a, b). Additionally, unlike most bats, Townsend's big-eared bat requires water for drinking, which is not present at the Sites.

- Northern leopard frogs require perennial standing water for breeding; no such habitat is present at the Sites (iiná bá, Inc. 2017a, b).
- Heil's milk-vetch, Acoma fleabane, Sivinski's fleabane, and Navajo bladderpod are each associated with very specific geology and edaphic conditions that are not found at the Sites (iiná bá, Inc. 2017a, b). For example, Sivinski's fleabane and Navajo bladderpod have been found only on barren slopes of the Chinle formation. The general geologic setting of the Sites is in the lower part of the Mancos Formation and the upper part of the Dakota Formation.

Based on the above, golden eagles and peregrine falcons may utilize the Sites as foraging habitat, and, although unlikely, Townsend's big-eared bat could be found in abandoned mine features. Golden eagles typically forage in a 150 square kilometer area around their nest (USFS, 2022); foraging ranges for peregrine falcons can vary from 293 to 1,500 square kilometers (USFS, 2022). Although individuals of each of these species may forage on the Sites, at approximately 1 square kilometer in area even the largest site, Black Jack No. 1, would satisfy only a fraction of the birds' foraging area needs. Therefore, exposure of golden eagles and peregrine falcons to MRM-related chemicals in site media is considered to be insignificant. Townsend's big-eared bats are highly sensitive to disturbance of roosting sites (Zeiner et al, 1990). If former mine shafts and buildings are used as habitat, they are likely to be abandoned during remediation activities and, therefore, exposure of Townsend's big-eared bat to MRM-related chemicals in site media following remediation is not expected. Signs of Townsend's big-eared bats were not observed on-site during biological evaluations conducted on June 29 and July 3, 2017 (iiná bá, Inc. 2017a, b).

3.1.2.3 Assessment and Measurement Endpoints

Terrestrial wildlife species of various feeding guilds are adapted to the habitats present at the Sites; these guilds inform the selection of the ecological assessment endpoints to be protected. Assessment endpoints focus the ecological risk assessment on the ecological communities or feeding guilds that might be adversely affected by exposure to contaminated media. As defined in USEPA's Guidelines for Ecological Risk Assessment (USEPA, 1998), an assessment endpoint is an explicit expression of the environmental value that is to be protected (for example, growth, survival, and reproduction of a specific species population). Assessment endpoints are evaluated through the use of measurement endpoints (i.e., measurable responses to an exposure to MRM-related chemicals that are related to the growth, survival, and reproduction of the selected ecological receptors).

In a SLERA, assessment endpoints are generic classes of ecological receptors, and measurement endpoints are HQs calculated as the ratio of the soil concentration to published soil benchmarks derived from toxicity studies that identified impacts to growth, survival, and/or reproduction. The generic ecological receptors evaluated in this SLERA for the Sites are terrestrial plants, terrestrial invertebrates, terrestrial mammalian populations, and terrestrial avian populations.

In the third step of the ERA process, specific representative ecological indicator receptor species are selected for dose modeling based on the assessment endpoint. The measurement endpoints at this step are HQs calculated as the ratio of modeled exposure doses for upper trophic level receptors to TRVs for birds and mammals developed from laboratory toxicology tests. Exposure doses are modeled based on life history characteristics for specific indicator receptors; the specific indictor receptors evaluated in the refined ERA for the Sites are described in Section 3.3.1.2.1.

The assessment endpoints evaluated in both the SLERA and refined ERA for the Sites are focused on the protection of populations of mammals and birds because there is insufficient habitat at the Sites to support special status (e.g., federally endangered or NESL) species, which could warrant evaluation on an individual organism-specific basis.

3.1.3 EXPOSURE PATHWAYS FOR ECOLOGICAL RECEPTORS

Exposure pathways for ecological receptors are depicted on **Figure 3-1**. As shown on **Figure 3-1**, exposure pathways associated with on-site surface soil, including incidental ingestion, uptake of MRM-related chemicals from soil to prey items, and external exposure (for radionuclides only) are potentially complete and significant for on-site receptors. Inhalation exposures to MRM-related chemicals in soil derived dust are potentially complete but insignificant exposure pathways for upper trophic level ecological receptors. Direct contact dermal exposures for upper trophic level receptors are typically not evaluated in ecological risk assessments and are indicated as complete but insignificant exposure pathways on **Figure 3-1**, because fur, feathers, and scales provide adequate protection against dermal exposures.

3.2 Screening-Level Ecological Risk Assessment

3.2.1 SCREENING-LEVEL EXPOSURE AND EFFECTS ASSESSMENT

Exposure assessment integrates the problem formulation step described in Section 3.1 with the effects assessment step described below and risk characterization step described in Section 3.2.2.

In the SLERA, the ecological EPCs used to quantify exposure to site COPECs conservatively consist of the maximum detected concentration of each COPEC in surface soil (i.e., 0 to 2 feet bgs) at each site (Table 3-1) and background area (Table 2-3). In the screening-level effects assessment, EPCs are compared to ecological benchmarks derived from toxicity tests and are intended to represent COPEC concentrations that do not inhibit levels of survival, growth, and reproduction necessary to sustain populations of ecological receptors. Ecological benchmarks were derived from the sources listed below, in addition to peer review literature, as necessary:

- USEPA's Ecological Soil Screening Levels (USEPA, various dates)
- Los Alamos National Laboratory (LANL) ECORISK database, Release 3.3 (LANL, 2015)
- Peer review literature, as necessary

USEPA's EcoSSLs were used in preference to LANL because of the robust literature review used to derive EcoSSL.

Two levels of ecological benchmarks are presented in Table 3-2: no observed adverse effects level- (NOAEL-) and lowest observed adverse effects level- (LOAEL-) based benchmarks. Typically, a SLERA employs NOAEL-based benchmarks, which are protective of individual organisms within a landscape. LOAEL-based benchmarks are protective of populations of organisms in a landscape and may be applicable for where special status or sensitive species are not present. LOAEL-based benchmarks are shown in Table 3-2 for reference only.

3.2.2 SCREENING-LEVEL ECOLOGICAL RISK CHARACTERIZATION

COPEC-specific screening-level ecological HQs are calculated as the ratio of the screening-level EPC to the chemical or radionuclide ecological benchmark (i.e., ecological risk-based screening level [ERBSL]), as shown below:

$$HQ = \frac{EPC}{ERBSL}$$

Where:

HQ = ecological hazard quotient (unitless)
EPC = exposure point concentration of COPEC in soil (mg/kg or pCi/g)
ERBSL = ecological risk-based screening level (mg/kg or pCi/g)

As indicated above, the EPC used in screening-level ecological HQ estimates was the maximum detected concentration of each COPEC in surface soil at each site. In addition to site-specific screening-level HQ estimates, background ecological HQ estimates were calculated using the maximum detected concentration in background area soils because naturally occurring background levels of COPECs in soil may contribute a significant portion to the ecological hazard estimates. Finally, incremental HQ estimates (i.e., ecological hazard associated with exposure to site-related contamination above background levels) were calculated as the difference between site HQ estimates and background HQ estimates. Site, background, and incremental screening-level HQ estimates are presented in Table 3-3a, Table 3-3b, and Table 3-3c, respectively.

Screening-level HQ values exceeding 1 indicate the potential for biological or ecological effects on representative receptor groups. HQ values above 1 do not necessarily indicate that a biological or ecological effect will occur, only that a lower threshold has been exceeded (Menzie et al, 1992). In the event that all screening level HQs are less than or equal to 1, a site can be proposed for no further evaluation in regard to ecological concerns. In the event that one or more ecological HQs exceed 1, the site may be further evaluated in a more refined baseline or Step 3A ERA, or recommended for evaluation of removal alternatives in the EE/CA.

As shown in Table 3-3c, the incremental HQ estimates for every COPEC exceed 1 for one or more generic receptors, except for arsenic at Black Jack No. 1 and, therefore, every COPEC will be discussed further in Section 3.2.3. Of particular note are molybdenum, selenium, and vanadium, which stand out as

being present at concentrations associated with screening-level ecological HQ estimates at or above 1 for upper trophic level receptors even at ambient background concentrations (Table 3-3b). Elevated ecological hazard estimates based on ambient background concentrations provide one indication that a SLERA is too conservative. For this reason, molybdenum, selenium, and vanadium are further evaluated in a refined ERA, as described in Section 3.3.

3.2.3 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT RESULTS

Screening level ecological hazard estimates calculated for MRM-related COPEC concentrations range from less than one to 425 (Table 3-3a). In general, lower trophic level receptors have higher hazard estimates. Ecological hazard estimates for background areas exceeded an acceptable criterion of 1 for plants exposed to selenium and avian receptors exposed to vanadium (Table 3-3b). Incremental ecological hazard estimates for background shown in Table 3-3c are similar to site-related ecological hazard estimates.

3.2.3.1 Background Area 1

Lower trophic level receptor Background Area 1 ecological hazard estimates ranged from 0.0036, for invertebrates exposed to uranium, to 1.5, for plants exposed to selenium. Upper trophic level receptor Background Area 1 ecological hazard estimates range from 0.0016 for avian receptors exposed to uranium, to 3.4 for avian receptors exposed to vanadium. Upper trophic level ecological hazard estimates for mammals exposed to molybdenum and selenium are equal to 1 (to one significant figure).

3.2.3.2 Background Area 2

Lower trophic level receptor Background Area 2 ecological hazard estimates ranged from 0.0024, for invertebrates exposed to uranium, to 1.5, for plants exposed to selenium. Upper trophic level receptor Background Area 2 ecological hazard estimates range from 0.0011 for avian receptors exposed to uranium, to 2.3 for avian receptors exposed to vanadium. Upper trophic level ecological hazard estimates for mammals exposed to molybdenum and selenium are equal to 1 (to one significant figure).

3.2.3.3 Black Jack No. 1

Every COPEC was associated with ecological hazard estimates greater than 1 for one or more ecological receptors. Lower trophic level receptor site-related ecological hazard estimates ranged from 0.69, for invertebrates exposed to vanadium, to 285, for plants exposed to selenium. Upper trophic level receptor site-related ecological hazard estimates range from 0.31 and 0.33 for mammalian and avian receptors, respectively, exposed to arsenic, to 235 for mammalian receptors exposed to selenium. These ranges were similar for incremental ecological hazard estimates.

3.2.3.4 Black Jack No. 2

Every COPEC was associated with ecological hazard estimates greater than 1 for one or more ecological receptors. Lower trophic level receptor site-related ecological hazard estimates ranged from 0.86, for plants exposed to arsenic, to 251, for plants exposed to radium-226. Upper trophic level receptor site-related ecological hazard estimates range from 0.33 and 0.36 for mammalian and avian receptors, respectively, exposed to arsenic, to 197 for mammalian receptors exposed to selenium. These ranges were similar for incremental ecological hazard estimates.

3.2.3.5 Mac No. 1

Every COPEC was associated with ecological hazard estimates greater than 1 for one or more ecological receptors. Lower trophic level receptor site-related ecological hazard estimates ranged from 0.94 for plants exposed to arsenic, to 425 for invertebrates exposed to radium-226. Upper trophic level receptor site-related ecological hazard estimates range from 0.37 and 0.39 for mammalian and avian receptors, respectively, exposed to arsenic, to 200 for avian receptors exposed to vanadium. These ranges were similar for incremental ecological hazard estimates.

3.2.3.6 Mac No. 2

Every COPEC was associated with ecological hazard estimates greater than 1 for one or more ecological receptors. Lower trophic level receptor site-related ecological hazard estimates ranged from 0.58 for plants exposed to arsenic, to 151 for invertebrates exposed to radium-226. Upper trophic level receptor site-related ecological hazard estimates ranged from 0.23 and 0.24 for mammalian and avian receptors, respectively, exposed to arsenic, to 54 for avian receptors exposed to vanadium. These ranges were similar for incremental ecological hazard estimates.

3.3 Refined Ecological Risk Assessment

3.3.1 REFINED EXPOSURE AND EFFECTS ASSESSMENT

As described in Section 3.0, the Step 3A analysis is performed using refinements to the EPCs, exposure modeling assumptions and/or effects assessment information that were evaluated in the SLERA. The Step 3A analysis for the Sites incorporates refinements to the EPCs (Section 3.3.1.1), exposure modeling methods (Section 3.3.1.2) and toxicity values (Section 3.3.1.3), as described in the following subsections. The refined ERA HQ is equal to the ratio of the modeled exposure dose to COPEC-specific TRVs (Section 3.3.2).

3.3.1.1 Refined Ecological Exposure Point Concentrations

The ecological EPCs for site COPECs evaluated in the refined ERA are equal to the 95% UCL on the mean concentration measured in soil samples from 0 to 2 feet bgs, calculated in USEPA's ProUCL statistical software version 5.2 (USEPA, 2022b). Recommendations for appropriate distributions and associated UCLs provided by the program were utilized. Summary statistics and derived UCLs for soil from 0 to 2 feet bgs are provided in Table 3-1, and ProUCL output sheets are provided in Attachment B. As in the SLERA, exposure was evaluated at background EPCs (Table 2-3) in order to assess site-related ecological hazard to ambient hazard.

3.3.1.2 Ecological Exposure Modeling

The refined ERA used standard modeling practices and assumptions to quantify the exposures described in the ecological CSM. An oral dose approach, as described in USEPA (1997), was used to estimate exposures to indicator avian and mammalian receptors according to the general equation derived from the USEPA's Wildlife Exposure Factors Handbook (USEPA, 1993). Exposure dose modeling parameters used in the refined ERA (Table 3-2) are average body weights, food, and incidental soil ingestion rates derived from literature sources for those indicator receptors selected to represent the most at-risk ecological feeding guilds at the Sites. The process for selecting indicator receptors is described in Section 3.3.1.2.1, and the exposure dose models are presented in Section 3.3.1.2.2.

3.3.1.2.1 Indicator Receptors

It is neither possible nor practical to evaluate the ecological risk posed to every mammal and bird species potentially exposed to MRM-related chemicals; as a result, indicator receptors are selected to quantitatively model potential hazards to the assessment endpoints. Criteria used to select indicator receptors include species occurrence, foraging habits, and home range. Indicator species should be known to occur, or have the potential to occur, at the Sites, should have foraging habits that result in exposure to site COPECs, and small home ranges. The indicator receptors selected for this Step 3A Analysis are Merriam's shrew (*Sorex merriami*; invertivorous mammal) and sagebrush sparrow (insectivorous bird). These species could occur at the Sites and forage on or near the ground on invertebrates, thus representing the feeding guild with the highest potential exposure to the MRM-related chemicals evaluated in this refined ERA.

Merriam's shrew was selected as an indicator receptor for insectivorous mammal populations because its diet consists entirely of invertebrates, it is directly exposed to soil, and it has a small home range. Records of Merriam's shrew observations in McKinley County were not found, but the range for this specie includes the Sites (Hafner and Stahlecker, 2002). Additionally, the Merriam's shrew utilizes drier habitats than other shrew species and is generally associated with sagebrush steppe habitat (Shaughnessy and Woodman, 2015).

The sagebrush sparrow was selected as an indicator receptor for insectivorous bird populations because its diet consists primarily of insects, and it is directly exposed to soil while foraging and while running along the ground between shrubs (Montana Field Guide, 2022a). Sagebrush sparrows breed in sage-dominated steppe and overwinter in dry habitats including creosote and saltbrush dominated desert scrub (Cornell, 2022b). Although the Sites are located within nonbreeding habitat for the sagebrush sparrow (Cornell, 2022b), the vegetative communities at the Sites could support both breeding and nonbreeding use.

3.3.1.2.2 Exposure Dose Model

Exposure doses for indicator receptors were modeled from body size and dietary intake information presented in Table 3-4. The refined ERA dose model used average body weights from literature sources. Prey ingestion rates for ecological indicator receptors were calculated from body weight and estimated feeding guild-specific metabolic rate using allometric equations provided in Nagy (2001), and incidental soil ingestion rates were based on the fraction of soil in diet for similar species obtained from Beyer (1994). The site use terms site utilization factor (SUF) and exposure duration (ED) are 1 for both indicator receptors. The receptor specific SUF is used to quantify the amount of a site that is utilized by an ecological receptor relative to its home range. If the receptor's home range is smaller than the exposure area, the receptor is assumed to fulfill its forage and shelter requirements on the site and the SUF is therefore equal to one. If, however, the receptor's home range is larger than the exposure area, the SUF is equal to the receptor's home range divided by the exposure area. The ED term quantifies how much of an indicator receptor's time is spent exposed to site media. Although the sagebrush sparrow typically migrates between breeding and nonbreeding areas, an ED of 1 was used because the Sites could provide both breeding and nonbreeding habitat. Exposure doses were modeled according to the equation below:

$$\text{Dose} = \left(IR_{soil} \times EPC_{soil} + IR_{prey} \times EPC_{prey}\right) \times \frac{SUF \times ED}{BW}$$

Where:

Dose = exposure dose (mg/kg per day [mg/kg-d])

IR_{soil} = incidental ingestion rate of soil (kg/d)

EPC_{soil} = exposure point concentration of COPEC in soil (mg/kg)

IR_{prey} = ingestion rate of prey items (kg/day)

EPC_{prey} = exposure point concentration of COPEC in prey items (mg/kg; calculated from EPC_{soil} using the biota uptake models in Table 3-5)

SUF = site utilization factor (unitless)

ED = exposure duration (fraction of year)

BW = body weight (kg)

3.3.1.3 Refined Effects Assessment

In the refined ERA, the effects of exposure to COPECs are quantified with TRVs, which are the daily dose at which a specific level of effect occurs. In this refined ERA, because the assessment endpoints are populations of insectivorous birds and mammals rather than individual organisms, the level of effect of concern is the LOAEL. The LOAEL-based TRVs used in this refined ERA presented in Table 3-6 are derived from toxicity tests and are intended to represent doses that do not inhibit levels of survival, growth, and reproduction necessary to sustain populations of ecological receptors.

3.3.2 REFINED ECOLOGICAL HAZARD CHARACTERIZATION

Ecological risk characterization integrates the exposure and effects assessments to derive COPEC-specific HQs equal to the ratio of the exposure dose to the TRV. As the measurement endpoint for evaluating impacts to refined ERA assessment endpoints, the ecological HQ is compared to a criterion of 1, with HQ values exceeding 1 indicate the potential for biological or ecological effects on representative receptor groups.

$$HQ = \frac{Dose}{TRV}$$

Where:

HQ = ecological hazard quotient (unitless)
Dose = ecological exposure dose (mg/kg-d)
TRV = toxicity reference value (mg/kg-d)

As in the SLERA, in addition to HQ estimates based on-site EPCs, background HQ estimates were calculated using the 95% UCL on the concentration of each COPEC in background area soils. Finally, incremental HQ estimates (i.e., ecological HQ associated with exposure to site-related contamination above background levels) were calculated as the difference between site HQ estimates and background HQ estimates. Site, background, and incremental refined ERA HQ estimates are presented in Table 3-7.

3.3.3 REFINED ERA RESULTS

Refined MRM-related ecological HQ estimates for upper trophic level avian and mammalian receptors exposed to molybdenum, selenium and vanadium ranged from 0.010 to 4.9 (Table 3-7). Refined MRM-related ecological HQ estimates for molybdenum did not exceed 1 (to one significant figure) at any site; no COPECs were associated with a refined MRM-related HQ estimates greater than 1 (to one significant figure) at Mac No. 2.

3.3.3.1 Background Area 1

Refined Background Area 1 ecological HQ estimates for upper trophic level receptors ranged from 0.0031 for a sagebrush sparrow exposed to molybdenum, to 0.44 for a sagebrush sparrow exposed to vanadium. All refined Background Area 1 ecological HQs for upper trophic level receptors are less than 1.

3.3.3.2 Background Area 2

Refined Background Area 2 ecological HQ estimates for upper trophic level receptors ranged from 0.0026 for a sagebrush sparrow exposed to molybdenum, to 0.30 for a sagebrush sparrow exposed to vanadium. All refined Background Area 2 ecological HQs for upper trophic level receptors are less than 1.

3.3.3.3 Black Jack No. 1

Refined site and incremental ecological HQs for molybdenum and vanadium do not exceed 1 (to one significant figure) for the sagebrush sparrow or Merriam's shrew. Refined site and incremental ecological HQs for selenium exceed 1 for both the sagebrush sparrow and Merriam's shrew.

3.3.3.4 Black Jack No. 2

Refined site and incremental ecological HQs for molybdenum are below 1 for both the sagebrush sparrow and Merriam's shrew. Refined site and incremental ecological HQs for selenium exceed 1 for both the sagebrush sparrow and Merriam's shrew. Refined site and incremental ecological HQs for vanadium are above 1 for the sagebrush sparrow but below 1 for Merriam's shrew.

3.3.3.5 Mac No. 1

Refined site and incremental ecological HQs for molybdenum are below 1 for both the sagebrush sparrow and Merriam's shrew. Refined site and incremental ecological HQs for selenium exceed 1 for both the sagebrush sparrow and Merriam's shrew. Refined site and incremental ecological HQs for vanadium are above 1 for the sagebrush sparrow but below 1 for Merriam's shrew.

3.3.3.6 Mac No. 2

Refined site and incremental ecological HQs do not exceed 1 (to one significant figure) for the sagebrush sparrow and Merriam's shrew for all COPECs.

3.4 ERA Discussion and Refined Ecological PRG Derivation

Results of the SLERA indicate that every COPEC identified for the Sites has an ecological HQ above 1 for one or more of the Sites. Based on these results, every COPEC is identified as a potential contaminant of ecological concern (COEC) and all four of the sites are appropriate for further ecological evaluation in a refined ERA or for consideration of remedial alternatives for the protection of ecological receptors.

Because remedial alternatives for the Sites will be selected in consideration of sensitive residential human health receptors in addition to ecological receptors, uncertainty in the portrayal of ecological hazard(s) at the site associated with conservative screening-level exposure and effects assumptions was generally considered to be acceptable. However, SLERA hazard estimates for three constituents, molybdenum, selenium, and vanadium, were equal to or greater than 1 (to one significant figure) for upper trophic level receptors at ambient background concentrations, indicating that these COPECs

warranted further consideration in a Step 3A analysis. Although refined site and incremental ecological HQs are lower than screening level ecological HQs, refined ecological HQs above 1 were calculated for three of the sites (i.e., Black Jack No. 1, Black Jac No. 2, and Mac No. 1). All background ecological HQs for molybdenum, selenium, and vanadium at the Sites are below 1, indicating that the Step 3A analysis was a successful refinement to the ERA.

MRM-related COPECs identified as COECs are those COPECs with site and incremental ecological HQ estimates above 1 (to one significant figure) for one or more upper trophic level receptors; COECs are indicated in bold font in Table 3-8. Ecological PRGs will be used to assess the potential for ecological impact associated with COECs during any future response actions. For radium-226 and uranium, the ecological PRG is the lower of the avian and mammalian ecological benchmark used in the SLERA. For selenium and vanadium, ecological PRGs were calculated using the same modeling assumptions that were used in the Step 3A analysis. Specifically, the model was rearranged and solved for a target HQ of 1, as shown below:

$$HQ = \left(IR_{prey} \times EPC_{prey} + IR_{soil} \times PRG\right) \times \frac{1}{TRV} \times \frac{SUF \times ED}{BW}$$

Where:

- HQ = ecological hazard quotient (unitless; set equal to 1 for PRG calculation)
- IR_{prey} = ingestion rate of prey items (kg/day)
- EPC_{prey} = exposure point concentration of COPEC in prey items (mg/kg; calculated from the soil PRG using the biota uptake model in Table 3-3)
- IR_{soil} = incidental ingestion rate of soil (kg/d)
- PRG = ecological preliminary remediation goal for soil (mg/kg)
- TRV = toxicity reference value (mg/kg-d)
- SUF = site utilization factor (unitless)
- ED = exposure duration (fraction of year)
- BW = body weight (kg)

For COECs where the model for biota uptake from soil is linear (e.g., vanadium soil to invertebrates), the above equation was rearranged to solve mathematically for the ecological PRG. For other biota uptake models (e.g., selenium to invertebrates), the Solver Add-in in Excel was used to solve for the ecological PRG corresponding to an HQ of 1.

Refined ecological PRGs for selenium and vanadium, calculated according to the above equation, are shown along with the selected screening-level ecological PRGs for radium-226 and uranium in Table 4-1.

4 Uncertainty Discussion, Risk Assessment Conclusions and Preliminary Remediation Goals

4.1 Uncertainty Discussion

Uncertainties are inherent in the risk assessment process and arise from limitations in the available information, analysis methods, and assumptions used in the risk assessment process. Sources of uncertainty may include chemical characterization information, and the methods and assumptions used in the exposure assessment and effects assessment. Sources of uncertainty in the HHRA and ERA are described in the following subsections.

4.1.1 CONSTITUENT CHARACTERIZATION

The site characterization information available for use in this risk assessment were collected for the purpose of delineating areas of impact, rather than establishing constituent concentrations representative of the Sites as a whole. As a result, the area averaged EPCs used in the HHRA and refined ERA, and the resulting site and incremental cancer risk and noncancer hazard estimates for human health, as well as ecological HQs, are likely biased high. In the SLERA, ecological receptors were evaluated at the maximum detected concentration. The biased nature of sampling means that the maximum concentrations evaluated in the SLERA are likely a valid representation of the actual site maximum concentrations. Therefore, uncertainty associated with constituent characterization in support of the SLERA is low.

4.1.2 EXPOSURE ASSESSMENT

Sources of uncertainty in the HHRA exposure assessment include, but are not limited to, selection of receptors, exposure pathways, exposure assumptions, and EPCs. Consistent with the NNEPA Guidance for the Uniform Application of Fundamental Law to AUM activities, the NAUM Calculation tool exposure assumptions incorporate traditional Navajo land uses, although Sites-specific information supporting such traditional uses at the Sites have not been provided. Areas adjacent to the Sites have rural residences, and agricultural land uses including grazing have been observed in the vicinity of the Sites. Therefore, the Kee'da'whíí téél (hypothetical subsistence lifestyle resident), Kǫǫ eí nahaazáh (easy access open space user), and Kǫǫh bí łíí nakaí (sheep camp receptor) were evaluated in the HHRA. However, some of the exposure assumptions for these scenarios are highly conservative, and potentially unrealistic, as described below:

- A default residential outdoor exposure time of 12 hours per day, and an assumed 70% gamma shielding factor for indoor exposure to radium-226. The custom residential outdoor exposure time of 10 hours per day is not substantially different than the default value. The PRGs for external exposure to radium-226 for both the default and custom residential exposure scenarios are significantly lower than the external exposure PRG for a default USEPA resident, which assumes 1.75 hours per day spent outdoors, and a 40% gamma shielding factor for indoor exposure.
- A home garden capable of producing most fruits and vegetables consumed, as well as production of food for livestock on-site may be overly conservative. Although the amount of produce grown on-site in the model is feasible for a home garden in arable climates, it may be too water intensive in the arid southwest where residences do not currently use well water. Similarly, an assumption that all livestock food is produced on-site is overly conservative in an area that does not use well water for irrigation of hay and for livestock watering.
- The amount of animal products consumed in the default Kee'da'whíí tééh (hypothetical subsistence lifestyle resident) scenario is unrealistically high; the amount of animal products consumed in the custom Kee'da'whíí tééh (hypothetical subsistence lifestyle resident) scenario is still conservatively higher than animal product consumption recommendations from the USDA (2020).

There is uncertainty in the EPCs used in the HHRA and Step 3A analysis related to the biased nature of sampling for contaminant delineation; use of the UCL on the mean concentration as an EPC in risk assessments is considered to be protective, and not overly conservative, for an unbiased dataset. However, use of the UCL on the mean concentration as an EPC in risk assessments that use biased datasets may be overly conservative relative to CTE estimates.

Sources of uncertainty in the SLERA exposure assessment include selection of indicator receptors and EPCs. The selection of indicator receptors for this SLERA was based on the most conservative benchmarks for plant, invertebrate, avian, and mammalian species in the sources reviewed. Uncertainty associated with selection of upper trophic level indicator receptors is low because although the specific organism for which the benchmark was derived may not occur on-site, other animals with similar ecological niches potentially do occur on-site. The SLERA uses EPCs based on maximum detected concentrations, which is conservative by design; the resulting hazard estimates tend to represent overestimates of ecological risk. Uncertainty associated with the use of a maximum detected concentration as the EPC is high; although hotspots of contamination on the site may require further evaluation or consideration of remedial alternatives, those hotspots are not representative of the Sites, as a whole.



Sources of uncertainty in the refined ERA exposure assessment include derivation of modeling parameters for calculating prey item EPCs and ingestion doses. The sagebrush sparrow and Merriam's shrew are site-specific receptors not commonly evaluated in ERAs; however, the ecological HQ is not sensitive to small variations in life history parameters. Therefore, modeled uptake based on limited literature sources for these receptors is not a significant source of uncertainty. It should be noted that the sagebrush sparrow might only utilize the Sites for a portion of the year; the Step 3A analysis assumes that this ecological receptor is on-site either year-round, or during the breeding season, which is a sensitive life stage. Additionally, the sagebrush sparrow diet includes non-insect food items during the nonbreeding season, however, this receptor was conservatively evaluated as a complete invertivore.

4.1.3 EFFECTS ASSESSMENT

The toxicity values used in the HHRA were derived from primarily USEPA sources. Toxicity values that are developed by USEPA generally represent upper bound estimates of toxicity and incorporate uncertainty factors for extrapolation from animal data to humans, differences in individual sensitivity within populations, and the overall confidence in the data set. Because the toxicity values established by USEPA are typically NOAEL-based concentrations and incorporate uncertainty factors, the values are generally considered to be protective. The use of conservative toxicity values in the risk estimate tends to overestimate actual risks.

In the SLERA, use of NOAEL-based benchmarks, which are protective of individual organisms, likely overestimates ecological impacts to populations of organisms. In the Step 3A analysis, LOAEL-based TRVs were used to provide a more accurate portrayal of ecological hazards at the Sites.

4.2 Risk Assessment Conclusions

This HHRA evaluated potential human health risks for three receptors using the NAUM Calculation Tool: Kee'da'whíí tééh (hypothetical subsistence lifestyle resident), Kǫǫ eí nahaazáh (easy access open space user), Kǫǫh bí łíí nakaí (sheep camp receptor), and Chíí dah wiih łeezh (a receptor exposed in washes and drainages). The NAUM Calculation Tool allows the user to evaluate human health risks in default mode (i.e., based on default exposure assumptions derived by the NNEPA), and in custom mode (i.e., based on user-defined exposure assumptions). In order to provide a range of human health risk estimates, this HHRA evaluated potential human health risks for the hypothetical subsistence lifestyle resident and the easy access open space user in both default and custom modes, and the sheep camp receptor in default mode, for a total of six exposure scenarios.

For each exposure scenario, total site cancer risk and noncancer hazard estimates were calculated using UCL on the mean concentrations averaged over each site area; and background cancer risk and noncancer hazard estimates were calculated using UCL on the mean concentrations averaged over a corresponding background area. In addition, incremental cancer risk / noncancer hazard estimates were calculated as the difference between the site cancer risk / noncancer hazard estimates and the background cancer risk / noncancer hazard estimates. Incremental risk and hazard estimates represent the risk contribution from human activities, beyond the natural background risk.



Calculated cumulative cancer risk and noncancer hazard estimates were compared to a cancer risk criterion of 1 x 10^{-4} and a noncancer hazard criterion of 1. The results of the HHRA indicate that cumulative cancer risk and noncancer hazard estimates exceed 1 x 10^{-4} and 1, respectively, for both site and incremental exposures for every exposure scenario at all four sites. Radium-226 was the most significant cancer risk driver, and uranium was the most significant noncancer hazard driver.

For Background Area 1 and Background Area 2, cumulative cancer risk estimates also exceed 1 x 10^{-4} for every exposure scenario. Constituent-specific cancer risk estimates for radium-226 and arsenic are similar at both background areas. Cumulative noncancer hazard estimates for Background Area 1 exceed 1 for the custom and default Kee'da'whíí tééh (full-time Navajo residential) exposure scenarios. Cumulative noncancer hazard estimates for Background Area 2 exceed 1 for the custom Kee'da'whíí tééh (full-time Navajo residential) exposure scenario. Arsenic is the only COPC present in soil at Background Area 1 at concentrations associated with a noncancer hazard estimate greater than 1; no individual COPC had concentrations at Background Area 2 associated with noncancer hazard estimates greater than 1 (to one significant figure).

The fact that background concentrations of COPCs resulted in cancer risk estimates above the cancer risk criterion for all six exposure scenarios shows the conservative nature of the exposure and risk modeling methods and assumptions used in this HHRA. In addition, cancer risk estimates based on USEPA default residential exposure assumptions are approximately 30-fold lower than those based on NAUM residential exposure assumptions; noncancer hazard estimates based on USEPA default assumptions are approximately 5-to 40-fold lower.

The SLERA conducted for the Sites consisted of the first two steps of the USEPA's eight step ecological risk assessment process and was used to determine if there is potential for exposure of ecological receptors to site-related contamination, if characterization data are sufficient to evaluate potential ecological exposures, and, finally, whether a baseline ecological risk assessment (BERA) or refined ERA is warranted. The SLERA evaluated potential ecological hazards for four ecological receptor groups: terrestrial invertebrates, terrestrial plants, terrestrial avians, and terrestrial mammals.

Screening-level ecological hazard estimates were calculated as the ratio of the maximum detected concentration of each COPEC at a site to a NOAEL-based benchmark for a given receptor group to derive a COPEC- and receptor-specific HQ. Site, background, and incremental HQs were calculated for each receptor and compared to an ecological hazard criterion of 1. In this SLERA, every COPEC was associated with an ecological hazard estimate above the criterion of 1 for one or more ecological receptors at all four sites. Additionally, three COPECs were associated with ecological hazard estimates for an upper trophic level receptor equal to or above the criterion of 1 at both background areas.



Because the SLERA predicted potential ecological impacts at ambient background concentrations of three COPECs (molybdenum, selenium, and vanadium), those COPECs were further evaluated in a refined ERA. The refined ERA took the form of a Step 3A ERA and included exposure dose modeling to develop a more realistic evaluation of site impacts. The refined ERA indicates that the potential for ecological impacts to upper trophic level receptors exposed selenium and/or vanadium occurs at Black Jack No. 1, Black Jack No. 2, and Mac No. 1; refined ERA HQ estimates for selenium and vanadium at Mac No. 1 are below 1. The refined ERA HQ estimates provide a more realistic quantification of this potential hazard than the SLERA HQ estimates. Refined ecological HQs were not calculated for Ra-226; screening level HQ estimates for this COPEC are above 1 for all four sites.

Human health and ecological risk estimates calculated in this appendix indicate that concentrations of several COPCs and COPECs should be considered during remedial action. For human health, contaminants of concern (COCs) were identified as those COPCs associated with a constituent-specific site cancer risk or noncancer hazard estimate for soil from 0 to 10 feet bgs greater than 1×10^{-4} or 1, respectively, for a custom Kee'da'whíí tééh (hypothetical subsistence lifestyle resident). The COCs identified for each site are as follows:

- Black Jack No. 1 – arsenic, radium-226, and uranium
- Black Jack No. 2 – arsenic, radium-226, uranium, and vanadium
- Mac No. 1 – arsenic, radium-226, uranium, and vanadium
- Mac No. 2 – arsenic, radium-226, and uranium

For ecological receptors, COECs were identified as those COPECs associated with a constituent-specific screening-level or refined site hazard estimate for surface soil greater than 1 (to one significant figure) for an upper trophic level receptor. The COECs identified for each site are as follows:

- Black Jack No. 1 – radium-226 and selenium
- Black Jack No. 2 – radium-226, selenium, uranium, and vanadium
- Mac No. 1 – radium-226, selenium, uranium, and vanadium
- Mac No. 2 – radium-226

4.3 Preliminary Remediation Goals

Based on the results of the HHRA and ERA, PRGs were developed for consideration during evaluation of remedial alternatives for the mines. The selected PRGs are protective of the most sensitive potentially exposed receptor for each COC, COEC, and soil depth combination at each mine. Additionally, the ambient background concentration is evaluated against the most conservative applicable PRG. The PRGs for mine specific COCs and COECs are presented in Table 4-1.



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Table 2-1 Select Exposure Parameters Used in the Human Health Risk Assessment

Exposure Parameter [a]	Units	Custom				Default			
		Kee'da'whíí tééh (full-time Navajo residential)		Kọọ eí nahaazáh (easy access open space)		Kee'da'whíí tééh (full-time Navajo residential)		Kọọ eí nahaazáh (easy access open space)	
		Child	Adult	Child	Adult	Child	Adult	Child	Adult
Common Exposure Parameters									
Exposure Duration	years	6	69	6	69	6	69	6	69
Averaging Time - Cancer	days	27,375	27,375	27,375	27,375	27,375	27,375	27,375	27,375
Averaging Time - Noncancer	days	2,190	25,185	2,190	25,185	2,190	25,185	2,190	25,185
Exposure Frequency - Direct Contact	days / year	350	350	60	60	350	350	60	60
Body Weight	kilograms	15	80	15	80	15	80	15	80
Soil Ingestion Rate	mg / day	300	200 [b]	33	30	400	360	33	30
Skin Surface Area for Dermal Contact	cm^2 / day	2,373	6,032	2,373	6,032	2,373	6,032	2,373	6,032
Soil Adherence Factor to Skin	mg / cm^2	0.2	0.07	0.2	0.07	0.2	0.07	0.2	0.07
Total Time On-Site for Dust Inhalation	hours / day	22	22	2	2 [c]	22	22	22	22
Time On-Site: Outdoor	hours / day	10	10 [d]	2	2	12	12	2	2
Time On-Site: Indoor	hours / day	12	12 [d]	0	0	10	10	0	0
Inhalation Rate	m^3 / day	10	25	10	25	10	25	10	25
Gamma Shielding Factor Outdoor	unitless	100%	100%	100%	100%	100%	100%	100%	100%
Gamma Shielding Factor Indoor	unitless	70%	70%	--	--	70%	70%	--	--
Site Area	acres	Black Jack No. 1	159	Black Jack No. 2	65	Mac No. 1	42	Mac No. 2	22
Ingestion of Homegrown Produce									
Exposure Frequency - Consumption of Plants	days / year	350	350	350	350	350	350	350	350
Total Plant Consumption	gram / day	417	834	417	834	417	834	417	834
Percent Total Plants Grown Locally	percent	36%	36%	--	--	36%	36%	--	--
Percent Local Produce Grown On-Site	percent	55%	55%	--	--	55%	55%	--	--
Percent ODL Plants Grown On-Site	percent	100%	100%	17%	17%	100%	100%	17%	17%
Mass Loading Factor	unitless [e]	Plant-Specific							
Plant Bioaccumulation Factor	unitless [e]	Constituent-Specific							
Plant Fraction in Diet									
Corn, white	percent	10%	10%	--	--	10%	10%	--	--
Corn, blue	percent	10%	10%	--	--	10%	10%	--	--
Corn, yellow	percent	5%	5%	--	--	5%	5%	--	--
Corn, red speckled	percent	3%	3%	--	--	3%	3%	--	--
Corn, sweet	percent	2%	2%	--	--	2%	2%	--	--
Squash, pumpkin	percent	2%	2%	--	--	2%	2%	--	--
Squash, other	percent	8%	8%	--	--	8%	8%	--	--
Melons, watermelon	percent	5%	5%	--	--	5%	5%	--	--
Melons, cantaloup	percent	5%	5%	--	--	5%	5%	--	--

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Exposure Parameter [a]	Units	Custom				Default			
		Kee'da'whíí tééh (full-time Navajo residential)		Kọọ eí nahaazáh (easy access open space)		Kee'da'whíí tééh (full-time Navajo residential)		Kọọ eí nahaazáh (easy access open space)	
		Child	Adult	Child	Adult	Child	Adult	Child	Adult
Tree Fruit, apples	percent	5%	5%	--	--	5%	5%	--	--
Tree Fruit, apricots	percent	5%	5%	--	--	5%	5%	--	--
Tree Fruit, peaches	percent	5%	5%	--	--	5%	5%	--	--
Beans	percent	10%	10%	--	--	10%	10%	--	--
Brussels sprouts	percent	2%	2%	--	--	2%	2%	--	--
Cucumbers	percent	2%	2%	--	--	2%	2%	--	--
Tomatoes	percent	2%	2%	--	--	2%	2%	--	--
Chili	percent	5%	5%	--	--	5%	5%	--	--
Onions	percent	2%	2%	--	--	2%	2%	--	--
Potatoes	percent	2%	2%	--	--	2%	2%	--	--
Herbs and Medicinal	percent	10%	10%	10%	10%	10%	10%	10%	10%
Ingestion of Animal Products									
Exposure Frequency - Consumption of Animal Products	days / year	350	350	350	350	350	350	350	350
Total Animal Product Consumption	gram / day	492	560 [g]	492	560 [g]	492	983	492	983
Mass Loading Factor - Pasture	unitless [e]	Plant-Specific							
Plant Forage Bioaccumulation Factor	unitless [e]	Constituent-Specific							
Transfer Factor - Constituent Accumulated in Edible Tissue	unitless	Constituent-Specific							
Animal Fraction in Diet									
Chicken	percent	18%	18% [g]	18%	18% [g]	20%	20%	20%	20%
Chicken Eggs	percent	12%	12% [g]	12%	12% [g]	7%	7%	7%	7%
Beef	percent	21%	21% [g]	21%	21% [g]	25%	25%	25%	25%
Milk - Cow	percent	11%	11% [g]	11%	11% [g]	6%	6%	6%	6%
Pig	percent	6%	6% [g]	6%	6% [g]	7%	7%	7%	7%
Goat	percent	4%	4% [g]	4%	4% [g]	5%	5%	5%	5%
Goat Milk	percent	2%	2% [g]	2%	2% [g]	1%	1%	1%	1%
Sheep	percent	17%	17% [g]	17%	17% [g]	20%	20%	20%	20%
Sheep Milk	percent	0%	0%	0%	0%	0%	0%	0%	0%
Horse	percent	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Domesticated Turkey	percent	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Wild Turkey	percent	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Deer	percent	3%	3%	3%	3%	3%	3%	3%	3%
Elk	percent	3%	3%	3%	3%	3%	3%	3%	3%
Rabbit	percent	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Prairie Dog	percent	1%	1%	1%	1%	1%	1%	1%	1%
Badger	percent	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%

Table 2-1 Select Exposure Parameters Used in the Human Health Risk Assessment

Exposure Parameter [a]	Units	Custom				Default			
		Kee'da'whíí tééh (full-time Navajo residential)		Kǫǫ eí nahaazáh (easy access open space)		Kee'da'whíí tééh (full-time Navajo residential)		Kǫǫ eí nahaazáh (easy access open space)	
		Child	Adult	Child	Adult	Child	Adult	Child	Adult
Animal Fraction Harvested Locally, Not Purchased									
Chicken	percent	5%	5%	5%	5%	5%	5%	5%	5%
Chicken Eggs	percent	75%	75%	75%	75%	75%	75%	75%	75%
Beef	percent	25%	25%	25%	25%	25%	25%	25%	25%
Milk - Cow	percent	1%	1%	1%	1%	1%	1%	1%	1%
Pig	percent	5%	5%	5%	5%	5%	5%	5%	5%
Goat	percent	100%	100%	100%	100%	100%	100%	100%	100%
Goat Milk	percent	100%	100%	100%	100%	100%	100%	100%	100%
Sheep	percent	90%	90%	90%	90%	90%	90%	90%	90%
Sheep Milk	percent	90%	90%	90%	90%	90%	90%	90%	90%
Horse	percent	100%	100%	100%	100%	100%	100%	100%	100%
Domesticated Turkey	percent	5%	5%	5%	5%	5%	5%	5%	5%
Wild Turkey	percent	2%	2%	2%	2%	2%	2%	2%	2%
Deer	percent	2%	2%	2%	2%	2%	2%	2%	2%
Elk	percent	2%	2%	2%	2%	2%	2%	2%	2%
Rabbit	percent	100%	100%	100%	100%	100%	100%	100%	100%
Prairie Dog	percent	100%	100%	100%	100%	100%	100%	100%	100%
Badger	percent	100%	100%	100%	100%	100%	100%	100%	100%
Animal Fraction Time on Site [h, i]									
Chicken	percent	100%	100%	0%	0%	100%	100%	0%	0%
Chicken Eggs	percent	100%	100%	0%	0%	100%	100%	0%	0%
Beef	percent	100%	100%	17%	17%	17%	17%	17%	17%
Milk - Cow	percent	100%	100%	17%	17%	17%	17%	17%	17%
Pig	percent	100%	100%	0%	0%	100%	100%	0%	0%
Goat	percent	100%	100%	17%	17%	100%	100%	17%	17%
Goat Milk	percent	100%	100%	17%	17%	100%	100%	17%	17%
Sheep	percent	100%	100%	17%	17%	100%	100%	17%	17%
Sheep Milk	percent	100%	100%	17%	17%	100%	100%	17%	17%
Horse	percent	100%	100%	17%	17%	1.7%	1.7%	12%	12%
Domesticated Turkey	percent	100%	100%	0%	0%	100%	100%	0%	0%
Wild Turkey	percent	5.0%	5.0%	5.0%	5.0%	0.016%	0.016%	0.69%	0.69%
Deer	percent	6.2%	6.2%	6.2%	6.2%	0.020%	0.020%	0.86%	0.86%
Elk	percent	1.2%	1.2%	1.2%	1.2%	0.0039%	0.0039%	0.17%	0.17%
Rabbit	percent	100%	100%	100%	100%	50%	50%	100%	100%
Prairie Dog	percent	100%	100%	100%	100%	100%	100%	100%	100%
Badger	percent	24%	24%	24%	24%	0.075%	0.075%	3.3%	3.3%

Table 2-1 Select Exposure Parameters Used in the Human Health Risk Assessment

Exposure Parameter [a]	Units	Custom				Default			
		Kee'da'whíí tééh (full-time Navajo residential)		Kọọ eí nahaazáh (easy access open space)		Kee'da'whíí tééh (full-time Navajo residential)		Kọọ eí nahaazáh (easy access open space)	
		Child	Adult	Child	Adult	Child	Adult	Child	Adult
Ingestion Rate for Animal Products Produced on-Site[i]									
Chicken	grams / day	4.4	5.0	0	0	4.9	9.8	0	0
Chicken Eggs	grams / day	44	50	0	0	26	52	0	0
Beef	grams / day	26	29	4.3	4.9	5.1	10	5	10
Milk - Cow	grams / day	0.5	0.6	0.090	0.10	0.049	0.098	0.049	0.098
Pig	grams / day	1.5	1.7	0	0	1.7	3.4	0	0
Goat	grams / day	20	22	3.3	3.7	25	49	4.1	8.2
Goat Milk	grams / day	10	11	1.6	1.9	4.9	9.8	0.8	1.6
Sheep	grams / day	75	86	13	14	88	177	15	29
Sheep Milk	grams / day	0	0	0	0	0	0	--	--
Horse	grams / day	2.5	2.8	0	0	0.0	0.1	0.30	0.60
Domesticated Turkey	grams / day	0.074	0.084	0	0	0.07	0.15	0	0
Wild Turkey	grams / day	0.0010	0.0011	0.0010	0.0011	0.000	0.000	0.00014	0.00027
Deer	grams / day	0.018	0.021	0.018	0.021	0.0	0.0	0.0025	0.0051
Elk	grams / day	0.0036	0.0042	0.0036	0.0042	0.0	0.0	0.00050	0.0010
Rabbit	grams / day	2.5	2.8	2.5	2.8	1.2	2.5	2.5	4.9
Prairie Dog	grams / day	4.9	5.6	4.9	5.6	4.9	9.8	4.9	9.8
Badger	grams / day	0.6	0.7	0.6	0.7	0.0	0.0	0.08	0.16
Area Required per Animal									
Chicken, meat and eggs	acre	0.00574							
Cattle, beef and dairy	acre	3							
Pig	acre	0.083							
Goat, meat and milk	acre	0.25							
Sheep, meat and milk	acre	0.25							
Horse	acre	30							
Domesticated Turkey	acre	0.0011							
Wild Turkey	acre	3,200							
Deer	acre	2,560							
Elk	acre	12,850							
Rabbit	acre	1							
Prairie Dog	acre	0.37							
Badger	acre	667							

Table 2-1 Select Exposure Parameters Used in the Human Health Risk Assessment

Exposure Parameter [a]	Units	Custom				Default			
		Kee'da'whíí téél (full-time Navajo residential)		Kǫǫ eí nahaazáh (easy access open space)		Kee'da'whíí téél (full-time Navajo residential)		Kǫǫ eí nahaazáh (easy access open space)	
		Child	Adult	Child	Adult	Child	Adult	Child	Adult

Notes:

cm^2 - cubic meter

m^3 - cubic meter

mg - milligram

[a] Exposure parameter values presented here are default values as provided in the NAUM Calculation Tool, except where noted. Exposure parameters for default receptors that are not associated with a modified custom scenario, as well as default ODL plant exposure pathways, which were not modified for the custom scenarios, are as presented in Attachment A.

[b] An adult soil ingestion rate of 200 mg/day was derived for "rural populations following traditional rural or wilderness lifestyles" in Section 5.5.2. Upper Percentile, Soil Pica, and Geophagy Recommendations of the 2017 ingestion update to the USEPA's Exposure Factor Handbook (USEPA, 2017). The soil ingestion rate is derived as the average of the 90th percentile soil ingestion rates from two tracer studies of indigenous populations. The child soil ingestion rate was assumed to be 100 mg/kg more than the adult rate, consistent with the standard default values for a resident (USEPA, 2014).

[c] Default on site exposure time of 22 hours per day for a default Kǫǫ eí nahaazáh (easy access open space user) was changed to 2 hours per day, consistent with the time on site for external exposure.

[d] Outdoor exposure time is equal to the 90th percentile for all respondents spending time outdoors on a farm from Table 16-20 - Time Spent in Selected Outdoor Locations, Doers Only of the USEPA's Exposure Factors Handbook (USEPA, 2011). Indoor exposure time is equal to 12 hours per day, for a total exposure time of 22 hours on site per day, consistent with the NAUM Calculation Tool.

[e] Mass loading factor has units of grams dry soil per grams fresh plant, and plant bioaccumulation factor has units of [milligrams (mg) constituent per kilogram (kg) fresh plant] per [mg constituent per kg dry soil].

[f] Because ingestion is evaluated separately in the model for several ODL plant types, the ODL plant consumption was reduced in the produce ingestion calculations. To keep the total produce consumption at 100%, percent consumption of squash and fruit were increased.

[g] Total daily animal product consumption was adjusted to reflect protein intake recommendations in the United States Department of Agriculture's (USDA's) Dietary Guidelines for Americans (DGA) 2020-2025 (USDA, 2020). The USDA (2020) Table A3-2 recommends that an individual with a 2,000 calorie per day diet eat 26 ounces of meat, poultry, and eggs per week. The default resident in the NAUM Calculation Tool consumes 32 ounces of meat, poultry, and eggs per day. The total animal product intake rate for an adult was reduced to 560 grams per day for an adult.Because the default consumption rates of eggs and milk were not overly conservative, the percent of diet represented by milk and eggs was increased, while the percent represented by meat and poultry was decreased. The resulting daily intake rates for meat, poultry, and eggs are still conservative at approximately 17 ounces per day for an adult. The child total animal product intake rate is equal to the default rate in the NAUM Calculation Tool.

[h] Animal fraction time on site is the product of the animal's fraction time foraging on site (i.e., the lower of 1, or the range required by each animal divided by the site area) and the animal's time on site (i.e., the amount of time domestic animals spend on site; for a full time resident this is 100%; for easy access open space it is based on a reduced 60 days per year time on site. For free ranging animals, this factor is 100%).

[i] The site area used to evaluate how much of an animal's range is on site is set to 159 acres, the area of Black Jack No. 1. The fraction of range on site will be lower at the smaller mine sites.

Table 2-2 Summary Statistics and EPCs for Soil Samples from 0 to 10 feet bgs

Black Jack No. 1

Analyte	Number of Samples	Minimum Concentration	Maximum Concentration	Distribution	UCL on the Mean Concentration [a]	EPC [b]
Arsenic	52	1.5	14	Normal	8.3	8.3
Molybdenum	52	0.50	105	Normal	11	11
Selenium	52	0.30	148	Normal	17	17
Uranium	77	0.70	650	Normal	62	62
Vanadium	52	12	89	Normal	37	37
Radium 226	77	1.3	139	Normal	21	21

Black Jack No. 2

Analyte	Number of Samples	Minimum Concentration	Maximum Concentration	Distribution	UCL on the Mean Concentration [a]	EPC [b]
Arsenic	63	2.1	15	Normal	5.2	5.2
Molybdenum	63	0.30	39	Normal	4.8	4.8
Selenium	63	0.10	124	Normal	13	13
Uranium	84	0.68	1,110	Normal	96	96
Vanadium	63	7.0	978	Normal	107	107
Radium 226	84	1.1	376	Normal	31	31

Mac No. 1

Analyte	Number of Samples	Minimum Concentration	Maximum Concentration	Distribution	UCL on the Mean Concentration [a]	EPC [b]
Arsenic	32	1.6	17	Normal	5.7	5.7
Molybdenum	32	0.30	29	Normal	5.0	5.0
Selenium	32	0.10	45	Lognormal	11	11
Uranium	50	0.83	1,590	Lognormal	245	245
Vanadium	32	6.1	1,560	Lognormal	183	183
Radium 226	50	0.69	638	Normal	62	62

Mac No. 2

Analyte	Number of Samples	Minimum Concentration	Maximum Concentration	Distribution	UCL on the Mean Concentration [a]	EPC [b]
Arsenic	58	2.0	14	Normal	6.9	6.9
Molybdenum	58	0.20	6.0	Normal	1.5	1.5
Selenium	58	0.10	33	Normal	3.1	3.1
Uranium	79	0.50	390	Normal	43	43
Vanadium	58	9.5	425	Normal	71	71
Radium 226	79	0.84	462	Normal	28	28

Notes:

Metals concentrations are in units of milligrams per kilogram (mg/kg); radium 226 activities are in units of picocuries per gram (pCi/g).

[a] The UCL on the mean concentration was calculated in the USEPA's ProUCL software, version 5.2 (USEPA, 2022b).

[b] The EPC is the lower of the UCL on the mean concentration and the maximum detected concentration.

bgs - below ground surface
EPC - exposure point concentration
UCL - upper confidence limit

Table 2-3 Summary Statistics and EPCs for Background Area Soil Samples

Background Area 1

Analyte	Number of Samples	Minimum Concentration	Maximum Concentration	Distribution	UCL on the Mean Concentration [a]	EPC [b]
Arsenic	20	5.2	7.7	Normal	6.8	6.8
Molybdenum	21	0.40	0.50	Normal	0.43	0.43
Selenium	21	0.60	0.80	Normal	0.72	0.72
Uranium	21	1.2	1.8	Normal	1.5	1.5
Vanadium	20	18	26	Normal	22	22
Radium 226	21	0.80	1.8	Normal	1.3	1.3

Background Area 2

Analyte	Number of Samples	Minimum Concentration	Maximum Concentration	Distribution	UCL on the Mean Concentration [a]	EPC [b]
Arsenic	21	2.2	4.8	Normal	3.6	3.6
Molybdenum	21	0.20	0.70	Normal	0.37	0.37
Selenium	21	0.30	0.80	Normal	0.42	0.42
Uranium	21	0.50	1.2	Normal	1.0	1.0
Vanadium	21	9.7	18	Normal	15	15
Radium 226	19	0.70	1.2	Normal	0.98	0.98

Notes:

Metals concentrations are in units of milligrams per kilogram (mg/kg); radium 226 activities are in units of picocuries per gram (pCi/g).

[a] The UCL on the mean concentration was calculated in the USEPA's ProUCL software, version 5.2 (USEPA, 2022b).

[b] The EPC is the lower of the UCL on the mean concentration and the maximum detected concentration.

EPC - exposure point concentration

UCL - upper confidence limit

Table 2-4 Toxicity Values used in the Human Health Risk Assessment

Analyte	Cancer				Noncancer		Dose Modeling Factors		
	Oral Slope Factor	Inhalation Slope Factor	External Exposure Slope Factor	Food Ingestion Slope Factor	Oral Reference Dose	Inhalation Reference Concentration	ABS_{GI}	ABSd	RBA
Arsenic	1.50E+00 I	4.30E-03 I	--	--	0.0003 I	0.000015 C	1	0.03	0.6
Molybdenum	--	--	--	--	0.005 I	0.002 A	1	0	1
Radium 226 [a]	6.77E-10 U	2.82E-08 U	2.50E-08 U	5.14E-10 U	--	--	--	--	1
Selenium	--	--	--	--	0.005 I	0.02 C	1	0	1
Uranium	--	--	--	--	0.0002 A	0.00004 A	1	0	1
Vanadium	--	--	--	--	0.005 G	0.0001 A	0.026	0	1

Notes:

Oral cancer slope factors for metals are in units of the inverse of milligrams per kilogram per day $(mg/kg\text{-}d)^{-1}$

Inhalation cancer unit risk factors for metals are in units of the inverse of micrograms per cubic meter $(\mu g/m^3)^{-1}$

Oral (soil and food ingestion) and inhalation cancer slope factors for radium 226 are in units of risk per picoCurie (risk/pCi)

External exposure slope factors are in units of risk per year per picoCuries per gram ([risk/year] / [pCi/gram])

Oral reference dose values for metals are in units of milligrams per kilogram per day (mg/kg-d)

Inhalation reference concentrations for metals are in units of milligrams per cubic meter (mg/m^3)

ABS_{GI} - oral absorption efficiencies

ABSd - dermal absorption efficiencies

RBA - relative bioavailability

RSL - Regional Screening Level

[a] Toxicity values for radium 226 are shown for reference; however, it should be noted that the PRG for radium 226 is based on an assumption of secular equilibrium, and incorporates the toxicity of radium 226 daughter products.

Toxicity Values are derived from the following sources:

A Agency for Toxic Substances and Disease Registry (ATSDR) as cited in USEPA's RSL Table
G USEPA's RSL Table User's Guide
I Integrated Risk Information System (IRIS) Database as cited in USEPA's RSL Table
C California EPA Toxicity Values as cited in USEPA's RSL Table
U United States EPA Preliminary Remediation Goals for Radionuclides

Table 2-5 Risk-based Preliminary Remediation Goals by Route of Exposure

Radium 226	Custom Scenarios		Default Scenarios				Arsenic	Custom Scenarios		Default Scenarios			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ ei nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí líí nakaí** (sheep camp)	**Kǫǫ ei nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)		**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫ ei nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí líí nakaí** (sheep camp)	**Kǫǫ ei nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Total PRG	0.049	0.30	0.052	0.16	0.32	0.20	Total PRG	2.1	6.1	2.3	4.2	6.4	5.1
Soil Ingestion	3.2	129	1.8	4.3	129	8.6	Soil Ingestion	26	1,300	19	43	1,300	86
Dust Inhalation	8,030	515,000	19,500	45,500	114,000	45,500	Soil Dermal Exposure	314	1,830	314	732	1,830	732
External Exposure	0.24	13	0.23	0.52	13	0.86	Dust Inhalation	46,400	2,980,000	113,000	263,000	658,000	263,000
Plant Consumption	0.25	1.8	0.25	0.69	1.9	0.75	Plant Consumption	4.7	35	4.7	13	35	14
Animal Consumption	0.11	4.9	0.13	31	51	31	Animal Consumption	10	54	24	53	107	53
Other Dine Lifeway Plant Ingestion	0.45	0.47	0.45	0.45	0.47	0.48	Other Dine Lifeway Plant Ingestion	9.4	9.6	9.4	9.4	9.6	12
Other Dine Lifeway Plant Dermal	--	--	--	--	--	--	Other Dine Lifeway Plant Dermal	111	113	111	111	113	192
Other Dine Lifeway Plant Inhalation	2.7	2.7	2.7	2.7	2.7	2.7	Other Dine Lifeway Plant Inhalation	191	193	191	191	193	191

Molybdenum	Custom Scenarios		Default Scenarios				Selenium	Custom Scenarios		Default Scenarios			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ ei nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí líí nakaí** (sheep camp)	**Kǫǫ ei nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)		**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫ ei nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí líí nakaí** (sheep camp)	**Kǫǫ ei nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Total PRG	10	42	12	27	48	34	Total PRG	12	189	17	119	266	153
Soil Ingestion	261	13,800	196	456	13,800	913	Soil Ingestion	261	13,800	196	456	13,800	913
Soil Dermal Exposure	--	--	--	--	--	--	Soil Dermal Exposure	--	--	--	--	--	--
Dust Inhalation	6,190,000	397,000,000	15,000,000	35,100,000	87,700,000	35,100,000	Dust Inhalation	61,900,000	3,970,000,000	150,000,000	351,000,000	877,000,000	351,000,000
Plant Consumption	17	179	17.3	56	183	72	Plant Consumption	105	864	105	316	882	350
Animal Consumption	44	237	211	452	886	452	Animal Consumption	15	530	24	1,290	2,690	1,290
Other Dine Lifeway Plant Ingestion	68	73	68	68	73	84	Other Dine Lifeway Plant Ingestion	443	460	443	443	460	549
Other Dine Lifeway Plant Dermal	--	--	--	--	--	--	Other Dine Lifeway Plant Dermal	--	--	--	--	--	--
Other Dine Lifeway Plant Inhalation	2,720	2,850	2,720	2,720	2,850	2,720	Other Dine Lifeway Plant Inhalation	175,000	180,000	175,000	175,000	180,000	175,000

Uranium	Custom Scenarios		Default Scenarios				Vanadium	Custom Scenarios		Default Scenarios			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ ei nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí líí nakaí** (sheep camp)	**Kǫǫ ei nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)		**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫ ei nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí líí nakaí** (sheep camp)	**Kǫǫ ei nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Total PRG	3.0	14	2.8	6.2	15	8.1	Total PRG	55	237	65	134	283	168
Soil Ingestion	10	553	7.8	18	553	37	Soil Ingestion	261	13,800	196	456	13,800	913
Soil Dermal Exposure	--	--	--	--	--	--	Soil Dermal Exposure	--	--	--	--	--	--
Dust Inhalation	124,000	7,950,000	301,000	702,000	1,750,000	702,000	Dust Inhalation	310,000	19,900,000	752,000	1,750,000	4,390,000	1,750,000
Plant Consumption	5.6	42	5.6	16	43	17	Plant Consumption	153	1,130	153	438	1,150	458
Animal Consumption	77	419	261	579	1,220	579	Animal Consumption	182	974	633	1,390	2,820	1,390
Other Dine Lifeway Plant Ingestion	24	25	24	24	25	30	Other Dine Lifeway Plant Ingestion	665	678	665	665	678	828
Other Dine Lifeway Plant Dermal	--	--	--	--	--	--	Other Dine Lifeway Plant Dermal	--	--	--	--	--	--
Other Dine Lifeway Plant Inhalation	473	481	473	473	481	473	Other Dine Lifeway Plant Inhalation	1,310	1,320	1,310	1,310	1,320	1,310

Notes:

PRGs presented in this table were calculated for the 159 acre Black Jack No. 1 site. Site area predominantly impacts the animal consumption pathway; the animal consumption pathway PRGs is higher at smaller sites.

Metals concentrations are in units of milligrams per kilogram (mg/kg); radium 226 activities are in units of picocuries per gram (pCi/g).

PRG - preliminary remediation goal

Table 2-6a Summary of Cancer Risk and Noncancer Hazard Estimates - Site

Black Jack No. 1 - Site Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	**3.9E-04**	1.4E-04	**3.6E-04**	**2.0E-04**	1.3E-04	**1.6E-04**
Radium 226	**4.4E-02**	**7.2E-03**	**4.1E-02**	**1.3E-02**	**6.8E-03**	**1.1E-02**
Cumulative Cancer Risk	**4E-02**	**7E-03**	**4E-02**	**1E-02**	**7E-03**	**1E-02**
Noncancer Hazard						
Arsenic	**2.2**	0.53	**1.8**	0.88	0.45	0.72
Molybdenum	1.1	0.26	0.89	0.40	0.22	0.32
Selenium	1.4	0.088	0.98	0.14	0.063	0.11
Uranium	**21**	**4.4**	**22**	**10**	**4.3**	**7.7**
Vanadium	0.67	0.16	0.58	0.28	0.13	0.22
Cumulative Noncancer Hazard	**26**	**5**	**26**	**12**	**5**	**9**

Black Jack No. 2 - Site Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	**2.4E-04**	8.6E-05	**2.3E-04**	1.2E-04	8.1E-05	1.0E-04
Radium 226	**6.3E-02**	**1.0E-02**	**5.9E-02**	**1.9E-02**	**9.7E-03**	**1.6E-02**
Cumulative Cancer Risk	**6E-02**	**1E-02**	**6E-02**	**2E-02**	**1E-02**	**2E-02**
Noncancer Hazard						
Arsenic	1.4	0.33	1.2	0.55	0.28	0.45
Molybdenum	0.48	0.11	0.40	0.18	0.099	0.14
Selenium	1.1	0.064	0.78	0.11	0.050	0.086
Uranium	**32**	**6.8**	**34**	**16**	**6.6**	**12**
Vanadium	**1.9**	0.45	**1.7**	0.8	0.38	0.64
Cumulative Noncancer Hazard	**37**	**8**	**38**	**17**	**7**	**13**

Notes:

Unitless cancer risk and noncancer hazard estimates were calculated using exposure point concentrations presented in Table 2-2 and preliminary remediation goals (PRGs) presented in Table 2-5.

Bold indicates a cancer risk estimate in excess of 1x10-4 or a noncancer hazard estimate in excess of 1 (to one significant figure).

Table 2-6a Summary of Cancer Risk and Noncancer Hazard Estimates - Site

Mac No. 1 - Site Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	**2.6E-04**	9.3E-05	**2.5E-04**	1.3E-04	8.8E-05	1.1E-04
Radium 226	**1.3E-01**	**2.1E-02**	**1.2E-01**	**3.9E-02**	**2.0E-02**	**3.2E-02**
Cumulative Cancer Risk	**1E-01**	**2E-02**	**1E-01**	**4E-02**	**2E-02**	**3E-02**
Noncancer Hazard						
Arsenic	1.5	0.36	1.3	0.60	0.30	0.49
Molybdenum	0.49	0.12	0.42	0.19	0.10	0.15
Selenium	0.84	0.049	0.62	0.088	0.040	0.069
Uranium	**81**	**17**	**87**	**40**	**17**	**30**
Vanadium	**3.3**	0.76	**2.8**	1.4	0.65	1.1
Cumulative Noncancer Hazard	**87**	**19**	**92**	**42**	**18**	**32**

Mac No. 2 - Site Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	**3.0E-04**	1.1E-04	**3.0E-04**	**1.6E-04**	1.1E-04	1.4E-04
Radium 226	**5.4E-02**	**9.1E-03**	**5.4E-02**	**1.7E-02**	**8.9E-03**	**1.4E-02**
Cumulative Cancer Risk	**5E-02**	**9E-03**	**5E-02**	**2E-02**	**9E-03**	**1E-02**
Noncancer Hazard						
Arsenic	**1.6**	0.40	**1.5**	0.72	0.37	0.59
Molybdenum	0.13	0.033	0.12	0.055	0.031	0.044
Selenium	0.24	0.013	0.18	0.026	0.011	0.020
Uranium	**14**	**3.0**	**15**	**7.0**	**3.0**	**5.3**
Vanadium	1.1	0.28	1.1	0.53	0.25	0.42
Cumulative Noncancer Hazard	**17**	**4**	**18**	**8**	**4**	**6**

Notes:

Unitless cancer risk and noncancer hazard estimates were calculated using exposure point concentrations presented in Table 2-2 and preliminary remediation goals (PRGs) presented in Table 2-5.

Bold indicates a cancer risk estimate in excess of 1x10-4 or a noncancer hazard estimate in excess of 1 (to one significant figure).

Table 2-6b Summary of Cancer Risk and Noncancer Hazard Estimates - Background

Background Area 1 Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	**3.2E-04**	1.1E-04	**2.9E-04**	**1.6E-04**	1.1E-04	1.3E-04
Radium 226	**2.7E-03**	**4.4E-04**	**2.5E-03**	**8.1E-04**	**4.1E-04**	**6.7E-04**
Cumulative Cancer Risk	**3E-03**	**5E-04**	**3E-03**	**1E-03**	**5E-04**	**8E-04**
Noncancer Hazard						
Arsenic	**1.8**	0.43	1.5	0.71	0.36	0.58
Molybdenum	0.043	0.0104	0.036	0.016	0.0090	0.013
Selenium	0.058	0.0038	0.042	0.0060	0.0027	0.0047
Uranium	0.49	0.10	0.53	0.24	0.10	0.18
Vanadium	0.41	0.095	0.35	0.17	0.079	0.13
Cumulative Noncancer Hazard	**3**	0.6	**2**	1	0.6	0.9

Background Area 2 Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	**1.7E-04**	5.9E-05	**1.5E-04**	8.5E-05	5.6E-05	7.1E-05
Radium 226	**2.0E-03**	**3.3E-04**	**1.9E-03**	**6.1E-04**	**3.1E-04**	**5.0E-04**
Cumulative Cancer Risk	**2E-03**	**4E-04**	**2E-03**	**7E-04**	**4E-04**	**6E-04**
Noncancer Hazard						
Arsenic	1.0	0.23	0.79	0.38	0.19	0.31
Molybdenum	0.037	0.0089	0.031	0.014	0.0077	0.011
Selenium	0.034	0.0020	0.025	0.004	0.0016	0.0027
Uranium	0.33	0.071	0.36	0.16	0.069	0.12
Vanadium	0.28	0.065	0.24	0.12	0.055	0.092
Cumulative Noncancer Hazard	**2**	0.4	1	0.7	0.3	0.5

Notes:

Unitless cancer risk and noncancer hazard estimates were calculated using exposure point concentrations presented in Table 2-3 and preliminary remediation goals (PRGs) presented in Table 2-5. Three sets of background hazard estimates are calculated for Background Area 2 because, in order for background risk estimates to be consistent with the corresponding site risk estimates, the background PRGs are based on the site-specific exposure areas, rather than the default of 0.5 acres.

Bold indicates a cancer risk estimate in excess of 1x10-4 or a noncancer hazard estimate in excess of 1 (to one significant figure).

Table 2-6b Summary of Cancer Risk and Noncancer Hazard Estimates - Background

Background Area 2 Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	**1.7E-04**	5.9E-05	**1.5E-04**	8.5E-05	5.6E-05	7.1E-05
Radium 226	**2.0E-03**	**3.3E-04**	**1.9E-03**	**6.1E-04**	**3.1E-04**	**5.0E-04**
Cumulative Cancer Risk	**2E-03**	**4E-04**	**2E-03**	**7E-04**	**4E-04**	**6E-04**
Noncancer Hazard						
Arsenic	0.93	0.22	0.79	0.38	0.19	0.31
Molybdenum	0.036	0.0087	0.031	0.014	0.0077	0.011
Selenium	0.033	0.0019	0.025	0.0035	0.0016	0.0027
Uranium	0.33	0.071	0.36	0.16	0.069	0.12
Vanadium	0.27	0.064	0.24	0.12	0.055	0.092
Cumulative Noncancer Hazard	**2**	0.4	1	0.7	0.3	0.5

Background Area 2 Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	**1.5E-04**	5.7E-05	**1.5E-04**	8.5E-05	5.6E-05	7.1E-05
Radium 226	**1.9E-03**	**3.2E-04**	**1.9E-03**	**6.1E-04**	**3.1E-04**	**5.0E-04**
Cumulative Cancer Risk	**2E-03**	**4E-04**	**2E-03**	**7E-04**	**4E-04**	**6E-04**
Noncancer Hazard						
Arsenic	0.84	0.21	0.79	0.38	0.19	0.31
Molybdenum	0.033	0.0083	0.031	0.014	0.0077	0.011
Selenium	0.033	0.0018	0.025	0.004	0.0016	0.0027
Uranium	0.33	0.070	0.36	0.16	0.069	0.12
Vanadium	0.25	0.060	0.24	0.12	0.055	0.092
Cumulative Noncancer Hazard	1	0.4	1	0.7	0.3	0.5

Notes:

Unitless cancer risk and noncancer hazard estimates were calculated using exposure point concentrations presented in Table 2-3 and preliminary remediation goals (PRGs) presented in Table 2-5. Three sets of background hazard estimates are calculated for Background Area 2 because, in order for background risk estimates to be consistent with the corresponding site risk estimates, the background PRGs are based on the site-specific exposure areas, rather than the default of 0.5 acres.
Bold indicates a cancer risk estimate in excess of 1x10-4 or a noncancer hazard estimate in excess of 1 (to one significant figure).

Table 2-6c Summary of Cancer Risk and Noncancer Hazard Estimates - Incremental

Black Jack No. 1 - Incremental Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí téél (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí téél** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	7.4E-05	2.6E-05	6.8E-05	3.7E-05	2.4E-05	3.1E-05
Radium 226	**4.1E-02**	**6.7E-03**	**3.9E-02**	**1.2E-02**	**6.3E-03**	**1.0E-02**
Cumulative Cancer Risk	**4E-02**	**7E-03**	**4E-02**	**1E-02**	**6E-03**	**1E-02**
Noncancer Hazard						
Arsenic	0.42	0.10	0.35	0.17	0.084	0.14
Molybdenum	1.0	0.25	0.86	0.39	0.22	0.31
Selenium	1.3	0.084	0.94	0.13	0.060	0.10
Uranium	**20**	**4.3**	**22**	**9.8**	**4.2**	**7.5**
Vanadium	0.27	0.062	0.23	0.11	0.052	0.088
Cumulative Noncancer Hazard	**23**	**5**	**24**	**11**	**5**	**8**

Black Jack No. 2 - Incremental Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí téél (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí téél** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	7.7E-05	2.7E-05	7.1E-05	3.9E-05	2.6E-05	3.2E-05
Radium 226	**6.1E-02**	**1.0E-02**	**5.7E-02**	**1.8E-02**	**9.4E-03**	**1.5E-02**
Cumulative Cancer Risk	**6E-02**	**1E-02**	**6E-02**	**2E-02**	**9E-03**	**2E-02**
Noncancer Hazard						
Arsenic	0.44	0.10	0.36	0.17	0.088	0.14
Molybdenum	0.44	0.11	0.37	0.16	0.092	0.13
Selenium	1.03	0.062	0.75	0.11	0.048	0.083
Uranium	**32**	**6.7**	**34**	**15**	**6.5**	**12**
Vanadium	**1.7**	0.39	1.4	0.69	0.32	0.55
Cumulative Noncancer Hazard	**35**	**7**	**37**	**17**	**7**	**13**

Notes:

Incremental cancer risk and noncancer hazard estimates were calculated as the difference between the site cancer risk or noncancer hazard estimate and the background risk or hazard estimate.

Bold indicates a cancer risk estimate in excess of 1x10-4 or a noncancer hazard estimate in excess of 1 (to one significant figure).

Table 2-6c Summary of Cancer Risk and Noncancer Hazard Estimates - Incremental

Mac No. 1 - Incremental Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	9.7E-05	3.4E-05	9.1E-05	5.0E-05	3.3E-05	4.2E-05
Radium 226	**1.2E-01**	**2.0E-02**	**1.2E-01**	**3.8E-02**	**1.9E-02**	**3.1E-02**
Cumulative Cancer Risk	**1E-01**	**2E-02**	**1E-01**	**4E-02**	**2E-02**	**3E-02**
Noncancer Hazard						
Arsenic	0.55	0.13	0.46	0.22	0.11	0.18
Molybdenum	0.46	0.11	0.38	0.17	0.096	0.14
Selenium	0.81	0.047	0.59	0.085	0.038	0.066
Uranium	**81**	**17**	**87**	**39**	**17**	**30**
Vanadium	**3.0**	0.70	**2.6**	1.3	0.59	1.0
Cumulative Noncancer Hazard	**86**	**18**	**91**	**41**	**18**	**31**

Mac No. 2 - Incremental Cancer Risk and Noncancer Hazard Estimates

	Custom		Default			
	Kee'da'whíí tééh (full-time Navajo residential)	**Kǫǫ eí nahaazáh** (easy access open space)	**Kee'da'whíí tééh** (full-time Navajo residential)	**Kǫǫh bí łíí nakaí** (sheep camp)	**Kǫǫ eí nahaazáh** (easy access open space)	**Chíí dah wiih łeezh** (washes and drainages)
Cancer Risk						
Arsenic	1.4E-04	5.2E-05	1.4E-04	7.8E-05	5.1E-05	6.5E-05
Radium 226	**5.3E-02**	**8.8E-03**	**5.2E-02**	**1.7E-02**	**8.6E-03**	**1.4E-02**
Cumulative Cancer Risk	**5E-02**	**9E-03**	**5E-02**	**2E-02**	**9E-03**	**1E-02**
Noncancer Hazard						
Arsenic	0.78	0.19	0.73	0.35	0.18	0.28
Molybdenum	0.10	0.025	0.092	0.041	0.023	0.033
Selenium	0.21	0.011	0.15	0.022	0.0099	0.017
Uranium	**14**	**3.0**	**15**	**6.8**	**2.9**	**5.2**
Vanadium	0.90	0.22	0.9	0.42	0.20	0.33
Cumulative Noncancer Hazard	**16**	**3**	**17**	**8**	**3**	**6**

Notes:

Incremental cancer risk and noncancer hazard estimates were calculated as the difference between the site cancer risk or noncancer hazard estimate and the background risk or hazard estimate.

Bold indicates a cancer risk estimate in excess of 1x10-4 or a noncancer hazard estimate in excess of 1 (to one significant figure).

Table 2-7 Site Cancer Risk and Noncancer Hazard Estimate Comparison Between NAUM [a] and Default USEPA Residential Exposure Assumptions

Black Jack No. 1 - Site Cancer Risk and Noncancer Hazard Estimates

	USEPA assumption-based Resident		Custom - Kee'da'whíí téél (full-time Navajo residential)		Default - Kee'da'whíí téél (full-time Navajo residential)	
	PRG	Risk / Hazard	PRG	Risk / Hazard	PRG	Risk / Hazard
Cancer Risk						
Arsenic	68	1.2E-05	2.1	**3.9E-04**	2.3	**3.6E-04**
Radium 226	1.3	**1.7E-03**	0.049	**4.4E-02**	0.052	**4.1E-02**
Cumulative Cancer Risk		**2E-03**		**4E-02**		**4E-02**
Noncancer Hazard						
Arsenic	35	0.24	3.8	**2.2**	4.5	**1.8**
Molybdenum	391	0.028	10	1.1	12	0.89
Selenium	391	0.043	12	1.4	17	0.98
Uranium	16	**4.0**	3.0	**21**	2.8	**22**
Vanadium	390	0.095	55	0.67	65	0.58
Cumulative Noncancer Hazard		**4**		**26**		**26**

Black Jack No. 2 - Site Cancer Risk and Noncancer Hazard Estimates

	USEPA assumption-based Resident		Custom - Kee'da'whíí téél (full-time Navajo residential)		Default - Kee'da'whíí téél (full-time Navajo residential)	
	PRG	Risk / Hazard	PRG	Risk / Hazard	PRG	Risk / Hazard
Cancer Risk						
Arsenic	68	7.7E-06	2.1	**2.4E-04**	2.31	**2.3E-04**
Radium 226	1.3	**2.4E-03**	0.049	**6.3E-02**	0.052	**5.9E-02**
Cumulative Cancer Risk		**2E-03**		**6E-02**		**6E-02**
Noncancer Hazard						
Arsenic	35	0.15	3.8	1.4	4.5	1.2
Molybdenum	391	0.012	10	0.48	12	0.40
Selenium	391	0.034	12	1.1	17	0.78
Uranium	16	**6.2**	3.0	**32**	2.8	**34**
Vanadium	390	0.28	55	**1.9**	65	**1.7**
Cumulative Noncancer Hazard		**7**		**37**		**38**

Mac No. 1 - Site Cancer Risk and Noncancer Hazard Estimates

	USEPA assumption-based Resident		Custom - Kee'da'whíí téél (full-time Navajo residential)		Default - Kee'da'whíí téél (full-time Navajo residential)	
	PRG	Risk / Hazard	PRG	Risk / Hazard	PRG	Risk / Hazard
Cancer Risk						
Arsenic	68	8.4E-06	2.2	**2.6E-04**	2.3	**2.5E-04**
Radium 226	1.3	**4.9E-03**	0.049	**1.3E-01**	0.052	**1.2E-01**
Cumulative Cancer Risk		**5E-03**		**1E-01**		**1E-01**
Noncancer Hazard						
Arsenic	35	0.16	3.8	1.5	4.5	1.3
Molybdenum	391	0.013	10	0.49	12	0.42
Selenium	391	0.027	13	0.84	17	0.62
Uranium	16	**16**	3.0	**81**	2.8	**87**
Vanadium	390	0.47	56	**3.3**	65	**2.8**
Cumulative Noncancer Hazard		**16**		**87**		**92**

Table 2-7 Site Cancer Risk and Noncancer Hazard Estimate Comparison Between NAUM [a] and Default USEPA Residential Exposure Assumptions

Mac No. 2 - Site Cancer Risk and Noncancer Hazard Estimates

	USEPA assumption-based Resident		Custom - Kee'da'whíí téél (full-time Navajo residential)		Default - Kee'da'whíí téél (full-time Navajo residential)	
	PRG	Risk / Hazard	PRG	Risk / Hazard	PRG	Risk / Hazard
Cancer Risk						
Arsenic	68	1.0E-05	2.3	**3.0E-04**	2.3	**3.0E-04**
Radium 226	1.3	**2.2E-03**	0.052	**5.4E-02**	0.052	**5.4E-02**
Cumulative Cancer Risk		**2E-03**		**5E-02**		**5E-02**
Noncancer Hazard						
Arsenic	35	0.20	4.2	**1.6**	4.5	**1.5**
Molybdenum	391	0.0038	11	0.13	12	0.12
Selenium	391	0.0078	13	0.24	17	0.18
Uranium	16	**2.8**	3.1	**14**	2.8	**15**
Vanadium	390	0.18	62	1.1	65	1.1
Cumulative Noncancer Hazard		**3**		**17**		**18**

Notes:

Metals PRG concentrations are in units of milligrams per kilogram (mg/kg); radium 226 PRGs are in units of picocuries per gram (pCi/g). Unitless cancer risk and noncancer hazard estimates were calculated using exposure point concentrations presented in Table 2-2.

Bold indicates a cancer risk estimate in excess of 1x10-4 or a noncancer hazard estimate in excess of 1 (to one significant figure).

PRG - preliminary remediation goal

[a] Navajo Abandoned Uranium Mines Calculation Tool (USEPA, 2022a) custom and defualt assumptions, as described in this human health risk assessment.

Table 3-1 Summary Statistics and Ecological EPCs for Soil Samples from 0 to 2 feet bgs

Black Jack No. 1

Analyte	Number of Samples	Minimum Concentration	Maximum Concentration	Distribution	UCL on the Mean Concentration [a]	Screening-Level EPC [b]	Refined ERA EPC [b]
Arsenic	41	1.5	14	Normal	8.4	14	na
Molybdenum	41	0.50	105	Normal	13	105	13
Selenium	41	0.30	148	Normal	21	148	21
Uranium	52	0.70	650	Normal	81	650	na
Vanadium	41	12	89	Normal	40	89	40
Radium 226	52	1.4	139	Normal	26	139	na

Black Jack No. 2

Analyte	Number of Samples	Minimum Concentration	Maximum Concentration	Distribution	UCL on the Mean Concentration [a]	Screening-Level EPC [b]	Refined ERA EPC [b]
Arsenic	40	2.6	15	Lognormal	6.0	15	na
Molybdenum	40	0.30	39	Normal	6.6	39	6.6
Selenium	40	0.10	124	Normal	19	124	19
Uranium	50	0.70	1,110	Lognormal	637	1,110	na
Vanadium	40	13	978	Normal	153	978	153
Radium 226	50	1.2	376	Normal	49	376	na

Mac No. 1

Analyte	Number of Samples	Minimum Concentration	Maximum Concentration	Distribution	UCL on the Mean Concentration [a]	Screening-Level EPC [b]	Refined ERA EPC [b]
Arsenic	27	1.6	17	Normal	5.7	17	na
Molybdenum	27	0.30	29	Normal	5.4	29	5.4
Selenium	27	0.10	45	Lognormal	14	45	14
Uranium	40	0.83	1,590	Lognormal	268	1,590	na
Vanadium	27	6.1	1,560	Normal	250	1,560	250
Radium 226	40	1.2	638	Normal	73	638	na

Mac No. 2

Analyte	Number of Samples	Minimum Concentration	Maximum Concentration	Distribution	UCL on the Mean Concentration [a]	Screening-Level EPC [b]	Refined ERA EPC [b]
Arsenic	55	2.0	10	Normal	6.8	10	na
Molybdenum	55	0.20	6.0	Normal	1.4	6.0	1.4
Selenium	55	0.10	33	Normal	3.1	33	3.1
Uranium	70	0.60	390	Normal	43	390	na
Vanadium	55	9.5	425	Normal	70	425	70
Radium 226	70	0.84	226	Normal	18	226	na

Notes:

Metals concentrations are in units of milligrams per kilogram (mg/kg); radium 226 activities are in units of picocuries per gram (pCi/g).

[a] The UCL on the mean concentration was calculated in the USEPA's ProUCL software, version 5.2 (USEPA, 2022b). Except for analytes evaluated in the refined ERA (i.e., molybdenum, selenium, and vanadium), the UCL on the mean concentration is presented in this table as a measure of the variability in the data, only, as the screening-level ecological EPC is equal to the maximum detected concentration.

[b] The screening-level ecological EPC is equal to the maximum detected concentration; the refined ERA EPC is equal to the UCL on the mean concentration.

bgs - below ground surface
EPC - exposure point concentration
ERA - ecological risk assessment
na - not applicable
UCL - upper confidence limit

Table 3-2 Screening-Level Ecological Benchmarks

Radium 226	NOAEL	source	LOAEL	source
Invertebrate	1.5	LANL	15	LANL
Plant	54	LANL	540	LANL
Avian	8.2	LANL	82	LANL
Mammalian	370	LANL	3,700	LANL

Arsenic	NOAEL	source	LOAEL	source
Invertebrate	6.8	LANL	68	LANL
Plant	18	EcoSSL/LANL	91	LANL
Avian	43	EcoSSL	150	LANL
Mammalian	46	EcoSSL	51	LANL

Molybdenum	NOAEL	source	LOAEL	source
Invertebrate	NA	--	NA	--
Plant	2	Efroymson	NA	--
Avian	15	LANL	150	LANL
Mammalian	0.475	extrapolated [a]	4.75	Efroymson, 1997

Selenium	NOAEL	source	LOAEL	source
Invertebrate	4.1	EcoSSL/LANL	41	LANL
Plant	0.52	EcoSSL/LANL	3	LANL
Avian	1.2	EcoSSL	1.4	LANL
Mammalian	0.63	EcoSSL	1	LANL

Uranium	NOAEL	source	LOAEL	source
Invertebrate	500	CCME	NA	--
Plant	25	LANL	250	LANL
Avian	1,100	LANL	11,000	LANL
Mammalian	480	LANL	1,200	LANL

Vanadium	NOAEL	source	LOAEL	source
Invertebrate	130	CCME	NA	--
Plant	60	LANL	80	LANL
Avian	7.8	EcoSSL	9.5	LANL
Mammalian	280	EcoSSL	610	LANL

Notes:

Metals concentrations are in units of milligrams per kilogram (mg/kg); radium 226 activities are in units of picocuries per gram (pCi/g).

LOAEL - lowest observed adverse effects level
NA - not available
NOAEL - no observed adverse effects level

Ecological Benchmarks are derived from the following sources:

CCME - Canadian Council of Ministers of the Environment (CCME, 1999; 2007)
Efroymson - Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants (Efroymson et al, 1997)
EcoSSL - United States Environmental Protection Agency's (USEPA's) Ecological Soil Screening Levels (EcoSSLs; USEPA, 2005a; 2005b; 2007a)
LANL - Los Alamos National Laboratory (LANL) ECORISK database, Release 3.3 (LANL, 2015)

[a] No NOAEL is available; 0.475 mg/kg is one-tenth of the LOAEL value from Efroymson et al (1997).

Table 3-3a Screening-Level Ecological Hazard Estimates - Site

Black Jack No. 1 - Site Ecological Hazard Estimates

	Invertebrate	Plant	Avian	Mammal
Arsenic	**2.1**	0.79	0.33	0.31
Molybdenum	NA	**53**	**7.0**	**221**
Radium 226	**93**	**2.6**	**17**	0.38
Selenium	**36**	**285**	**123**	**235**
Uranium	1.3	**26**	0.59	1.4
Vanadium	0.69	1.5	**11**	0.32

Black Jack No. 2 - Site Ecological Hazard Estimates

	Invertebrate	Plant	Avian	Mammal
Arsenic	**2.3**	0.86	0.36	0.33
Molybdenum	NA	**20**	**2.6**	**82**
Radium 226	**251**	**7.0**	**46**	1.0
Selenium	**30**	**238**	**103**	**197**
Uranium	**2.2**	**44**	1.0	**2.3**
Vanadium	**7.5**	**16**	**125**	**3.5**

Mac No. 1 - Site Ecological Hazard Estimates

	Invertebrate	Plant	Avian	Mammal
Arsenic	**2.5**	0.94	0.39	0.37
Molybdenum	NA	**15**	**1.9**	**61**
Radium 226	**425**	**12**	**78**	**1.7**
Selenium	**11**	**86**	**37**	**71**
Uranium	**3.2**	**64**	1.4	**3.3**
Vanadium	**12**	**26**	**200**	**5.6**

Mac No. 2 - Site Ecological Hazard Estimates

	Invertebrate	Plant	Avian	Mammal
Arsenic	**1.5**	0.58	0.24	0.23
Molybdenum	NA	**3.0**	0.40	**13**
Radium 226	**151**	**4.2**	**28**	0.61
Selenium	**8.0**	**63**	**27**	**52**
Uranium	0.78	**16**	0.35	0.81
Vanadium	**3.3**	**7.1**	**54**	**1.5**

Notes:

Unitless ecological hazard estimates were calculated using exposure point concentrations presented in Table 3-1 and no observed adverse effects level- (NOAEL-) based ecological benchmars presented in Table 3-2.

Bold indicates an ecological hazard estimate in excess of 1 (to one significant figure).

Table 3-3b Screening-Level Ecological Hazard Estimates - Background

Background Area 1 Ecological Hazard Estimates

	Invertebrate	Plant	Avian	Mammal
Arsenic	1.1	0.43	0.18	0.17
Molybdenum	NA	0.25	0.033	1.1
Radium 226	1.2	0.033	0.22	0.0049
Selenium	0.20	**1.5**	0.67	1.3
Uranium	0.0036	0.072	0.0016	0.0038
Vanadium	0.20	0.44	**3.4**	0.094

Background Area 2 Ecological Hazard Estimates

	Invertebrate	Plant	Avian	Mammal
Arsenic	0.71	0.27	0.11	0.10
Molybdenum	NA	0.35	0.047	1.5
Radium 226	0.80	0.022	0.15	0.0032
Selenium	0.20	**1.5**	0.67	1.3
Uranium	0.0024	0.048	0.0011	0.0025
Vanadium	0.14	0.30	**2.3**	0.064

Notes:

Unitless background ecological hazard estimates were calculated using the maximum background concentration presented in Table 2-3 and no observed adverse effects level- (NOAEL-) based ecological benchmarks presented in Table 3-2.

Bold indicates an ecological hazard estimate in excess of 1 (to one significant figure).

Table 3-3c Screening-Level Ecological Hazard Estimates - Incremental

Black Jack No. 1 - Incremental Ecological Hazard Estimates

	Invertebrate	Plant	Avian	Mammal
Arsenic	0.96	0.36	0.15	0.14
Molybdenum	NA	**52**	**7.0**	**220**
Radium 226	**91**	**2.5**	**17**	0.37
Selenium	**36**	**283**	**123**	**234**
Uranium	1.3	**26**	0.59	1.4
Vanadium	0.48	1.0	**8.1**	0.22

Black Jack No. 2 - Incremental Ecological Hazard Estimates

	Invertebrate	Plant	Avian	Mammal
Arsenic	**1.6**	0.59	0.25	0.23
Molybdenum	NA	**19**	**2.6**	**81**
Radium 226	**250**	**6.9**	**46**	1.0
Selenium	**30**	**237**	**103**	**196**
Uranium	**2.2**	**44**	1.0	**2.3**
Vanadium	**7.4**	**16**	**123**	**3.4**

Mac No. 1 - Incremental Ecological Hazard Estimates

	Invertebrate	Plant	Avian	Mammal
Arsenic	**1.8**	0.67	0.28	0.26
Molybdenum	NA	**14**	**1.9**	**60**
Radium 226	**425**	**12**	**78**	**1.7**
Selenium	**11**	**85**	**37**	**70**
Uranium	**3.2**	**64**	1.4	**3.3**
Vanadium	**12**	**26**	**198**	**5.5**

Mac No. 2 - Incremental Ecological Hazard Estimates

	Invertebrate	Plant	Avian	Mammal
Arsenic	0.82	0.31	0.13	0.12
Molybdenum	NA	**2.7**	0.35	**11**
Radium 226	**150**	**4.2**	**27**	0.61
Selenium	**7.8**	**62**	**27**	**51**
Uranium	0.78	**16**	0.35	0.81
Vanadium	**3.1**	**6.8**	**52**	1.5

Notes:

Incremental ecological hazard estimates were calculated as the difference between the site ecological hazard estimate and the ecological hazard estimate.

Bold indicates an ecological hazard estimate in excess of 1 (to one significant figure).

Table 3-4 Refined Ecological Risk Assessment Exposure Modeling Parameters

Exposure Parameter	Units	Sagebrush Sparrow		Merriam's shrew	
Body Weight	grams	19	a	4.9	a
Prey Ingestion Rate	grams dw / day	4.2	b	1.0	b
Fraction of Prey Items in Diet					
Plants	% of diet	0%	c	0%	c
Invertebrates	% of diet	100%	c	100%	c
Soil Ingestion Rate	% of diet	10.4%	d	2%	d
Home Range	acres	6	e	2	e
Site Utilization Factor	unitless	1	e	1	e
Exposure Duration	% of year	1	f	1	f

Notes:

dw - dry weight

[a] Sagebrush sparrow body weights range from 15.3 to 21.9 grams. Merriam's shrew is a relatively small shrew, with body weights ranging from 3.3 up to 6.5 grams (Montana Field Guide, 2022b). Body weights listed are the average of these weight ranges.

[b] Ingestion rate is based on the average body weight. Sagebrush sparrow ingestion rate is calculated according to Equation 59 (insectivorous birds), and Merriam's shrew ingestion rate is calculated according to Equation 31 (insectivores) in Nagy (2001).

[c] During the breeding season, the sagebrush sparrow is opportunistic, consuming insects, spiders, seeds and other vegetation. During the nonbreeding season, the sagebrush sparrow consumes primarily seeds. For the purpose of this Refined ERA, the sagebrush sparrow is conservatively assumed to consume 100 percent invertebrates.The Merriam's shrew forages on invertebrates (e.g., caterpillars, beetles, crickets, wasps, and spiders) on the ground (Montana Field Guide, 2022b).

[d] Soil ingestion rates as percent of diet are from Beyer (1994). An American woodcock is used as a surrogate for the American robin, and a whitefooted mouse is used as a surrogate for the Merriam's shrew.

[e] Home ranges for the sagebrush sparrow were found to range from less than 1 to more than 5 hectares, with an average of 2.5 hectares (Holmes and Johnson, 2005). Home range for Merriam's shrew is based on the average home ranges for a short-tailed shrew in USEPA (1993). The Mac and Black Jack sites are larger than these home ranges and, therefore, the site utilization factor is equal to 1.

[e] Exposure duration is set to 1. The sagebrush sparrow migrates between breeding and nonbreeding habitat, however, the sites are located in an area that could be part of both the breeding and nonbreeding range. Additionally, reproduction is a critical life stage. A Merriam's shrew likely spends their entire life in a small area.

Table 3-5 Refined Ecological Risk Assessment Soil-to-Biota COPEC Uptake Models

Analyte	Soil to Invertebrate Uptake Model	source
Molybdenum	1	Default
Selenium	$C_{invert} = exp[-0.075 + 0.733 * LN (C_{soil})]$	USEPA (2007b)
Vanadium	$C_{invert} = 0.042 * C_{soil}$	USEPA (2007b)

Notes:

C_{invert} - concentration in invertebrate

C_{soil} - concentration in soil

COPEC - constituent of potential ecological concern

Table 3-6 Refined Ecological Risk Assessment Toxicity Reference Values

Analyte	Avian	source	Mammalian	source
Molybdenum	2.6	Sample et al. 1996	35	Sample et al. 1996
Selenium	0.82	Geometric mean of LOAELs for growth and reproduction from USEPA's EcoSSLs	0.66	Geometric mean of LOAELs for growth and reproduction from USEPA's EcoSSLs
Vanadium	1.7	Geometric mean of LOAELs for growth and reproduction from USEPA's EcoSSLs	9.4	Geometric mean of LOAELs for growth and reproduction from USEPA's EcoSSLs

Notes:

TRVs are in units of milligrams per kilogram per day (mg/kg-d).

EcoSSL - Ecological Soil Screening Level

LOAEL - lowest observed adverse effects level

TRV - toxicity reference value

USEPA - United States Environmental Protection Agency

Table 3-7 Refined Ecological Hazard Estimates – Site, Background, and Incremental

Black Jack No. 1 - Site, Background, and Incremental Ecological Hazard Estimates

Analyte	Site		Background		Incremental	
	Avian	Mammalian	Avian	Mammalian	Avian	Mammalian
Molybdenum	0.095	1.1	0.0031	0.035	0.092	1.0
Selenium	**3.0**	**2.8**	0.22	0.23	**2.7**	**2.5**
Vanadium	0.78	0.053	0.44	0.030	0.34	0.023

Black Jack No. 2 - Site, Background, and Incremental Ecological Hazard Estimates

Analyte	Site		Background		Incremental	
	Avian	Mammalian	Avian	Mammalian	Avian	Mammalian
Molybdenum	0.047	0.53	0.0026	0.030	0.044	0.50
Selenium	**2.8**	**2.6**	0.15	0.15	**2.6**	**2.4**
Vanadium	**3.0**	0.20	0.30	0.021	**2.7**	0.18

Mac No. 1 - Site, Background, and Incremental Ecological Hazard Estimates

Analyte	Site		Background		Incremental	
	Avian	Mammalian	Avian	Mammalian	Avian	Mammalian
Molybdenum	0.039	0.43	0.0026	0.030	0.036	0.41
Selenium	**2.2**	**2.1**	0.15	0.15	**2.1**	**1.9**
Vanadium	**4.9**	0.34	0.30	0.021	**4.6**	0.32

Mac No. 2 - Site, Background, and Incremental Ecological Hazard Estimates

Analyte	Site		Background		Incremental	
	Avian	Mammalian	Avian	Mammalian	Avian	Mammalian
Molybdenum	0.010	0.12	0.0026	0.030	0.0076	0.086
Selenium	0.68	0.67	0.15	0.15	0.53	0.52
Vanadium	1.4	0.094	0.30	0.021	1.1	0.074

Notes:

Bold indicates an ecological hazard estimate in excess of 1 (to one significant figure)

Site and background ecological hazard estimates were calculated as shown in Attachment C-1 through Attachment C-4. Incremental ecological hazard estimates are calculated as site hazard minus background hazard.

Table 3-8 Screening-Level and Refined Ecological Hazard Estimates for Upper Trophic Level Receptors

Black Jack No. 1

	Site		Background		Incremental	
	Avian	Mammal	Avian	Mammal	Avian	Mammal
Arsenic [a]	0.33	0.31	0.18	0.17	0.15	0.14
Molybdenum [b]	0.095	1.1	0.0031	0.035	0.092	1.0
Radium 226 [a]	**17**	0.38	0.22	0.0049	**17**	0.37
Selenium [b]	**3.0**	**2.8**	0.22	0.23	**2.7**	**2.5**
Uranium [a]	0.59	1.4	0.0016	0.0038	0.59	1.4
Vanadium [b]	0.78	0.053	0.44	0.030	0.34	0.023

Black Jack No. 2

	Site		Background		Incremental	
	Avian	Mammal	Avian	Mammal	Avian	Mammal
Arsenic [a]	0.36	0.33	0.11	0.10	0.25	0.23
Molybdenum [b]	0.047	0.53	0.0026	0.030	0.044	0.50
Radium 226 [a]	**46**	1.0	0.15	0.0032	**46**	1.0
Selenium [b]	**2.8**	**2.6**	0.15	0.15	**2.6**	**2.4**
Uranium [a]	1.0	**2.3**	0.0011	0.0025	1.0	**2.3**
Vanadium [b]	**3.0**	0.20	0.30	0.021	**2.7**	0.18

Mac No. 1

	Site		Background		Incremental	
	Avian	Mammal	Avian	Mammal	Avian	Mammal
Arsenic [a]	0.39	0.37	0.11	0.10	0.28	0.26
Molybdenum [b]	0.039	0.43	0.0026	0.030	0.036	0.41
Radium 226 [a]	**78**	**1.7**	0.15	0.0032	**78**	**1.7**
Selenium [b]	**2.2**	**2.1**	0.15	0.15	**2.1**	**1.9**
Uranium [a]	1.4	**3.3**	0.0011	0.0025	1.4	**3.3**
Vanadium [b]	**4.9**	0.34	0.30	0.021	**4.6**	0.32

Mac No. 2

	Site		Background		Incremental	
	Avian	Mammal	Avian	Mammal	Avian	Mammal
Arsenic [a]	0.24	0.23	0.11	0.10	0.13	0.12
Molybdenum [b]	0.010	0.12	0.0026	0.030	0.0076	0.086
Radium 226 [a]	**28**	0.61	0.15	0.0032	**27**	0.61
Selenium [b]	0.68	0.67	0.15	0.15	0.53	0.52
Uranium [a]	0.35	0.81	0.0011	0.0025	0.35	0.81
Vanadium [b]	1.4	0.094	0.30	0.021	1.1	0.074

Notes:

Bold indicates an ecological hazard estimate in excess of 1 (to one significant figure).

[a] Screening-level ecological hazard estimates calculated using exposure point concentrations presented in Table 3-1 and no observed adverse effects level- (NOAEL-) based ecological benchmars presented in Table 3-2.

[b] Refined ecological hazard estimates calculated using exposure point concentrations presented in Table 3-1, exposure modeling parameters and toxicity reference values (TRVs) presented in Tables 3-4, 3-5, and 3-6, as described in Section 3.3.1.2 and Section 3.3.1.3.

Table 4-1 Summary of Human Health and Ecological PRGs

Black Jack No. 1

COC and/or COEC [a]		Background	Human Health PRG	Ecological PRG	Site PRG or Background			
					0 - 2 ft bgs	basis	2 - 10 ft bgs	basis
Arsenic	COC	7.8	2.1	-	7.8	background	7.8	background
Radium 226	COC & COEC	1.8	0.049	8.2	1.8	background	1.8	background
Selenium	COEC	0.80	-	5.1	5.1	ecological	-	-
Uranium	COC	1.8	3.0	-	3.0	human health	3.0	human health

Black Jack No. 2

COC and/or COEC [a]		Background	Human Health PRG	Ecological PRG	Site PRG or Background			
					0 - 2 ft bgs	basis	2 - 10 ft bgs	basis
Arsenic	COC	4.9	2.1	-	4.9	background	4.9	background
Radium 226	COC & COEC	1.3	0.049	8.2	1.3	background	1.3	background
Selenium	COEC	0.80	-	5.1	5.1	ecological	-	-
Uranium	COC & COEC	1.4	3.0	480	3.0	human health	3.0	human health
Vanadium	COC & COEC	20	55	51	51	ecological	55	human health

Mac No. 1

COC and/or COEC [a]		Background	Human Health PRG	Ecological PRG	Site PRG or Background			
					0 - 2 ft bgs	basis	2 - 10 ft bgs	basis
Arsenic	COC	4.9	2.2	-	4.9	background	4.9	background
Radium 226	COC & COEC	1.3	0.049	8.2	1.3	background	1.3	background
Selenium	COEC	0.80	-	5.1	5.1	ecological	-	-
Uranium	COC & COEC	1.4	3.0	480	3.0	human health	3.0	human health
Vanadium	COC & COEC	20	56	51	51	ecological	56	human health

Mac No. 2

COC and/or COEC [a]		Background	Human Health PRG	Ecological PRG	Site PRG or Background			
					0 - 2 ft bgs	basis	2 - 10 ft bgs	basis
Arsenic	COC	4.9	2.3	-	4.9	background	4.9	background
Radium 226	COC & COEC	1.3	0.052	8.2	1.3	background	1.3	background
Uranium	COC	1.4	3.1	-	3.1	human health	3.1	human health

Notes:

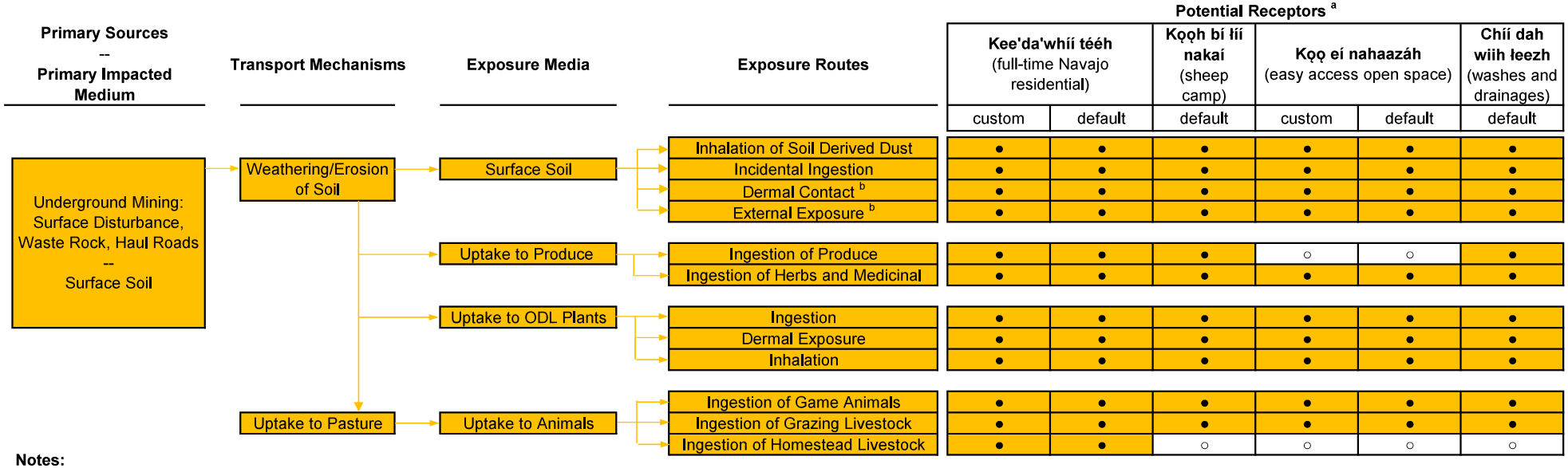
[a] Refer to Section 4.2 of this report for COC and COEC determinations for each mine.

Metals concentrations are in units of milligrams per kilogram (mg/kg); radium 226 activities are in units of picocuries per gram (pCi/g).

- Indicates not applicable - analyte not selected as a COC / COEC for this mine. Note that no analytes are selected as COECs for subsurface (i.e., 0 - 10 ft bgs) soil.

bgs - below ground surface
COC - constituent of concern
COEC - constituent of ecological concern
ft - feet
PRG - preliminary remediation goal

Figure 2-1
Human Health Conceptual Site Model
Appendix C, Mac & Black Jack Mines EE/CA



Notes:

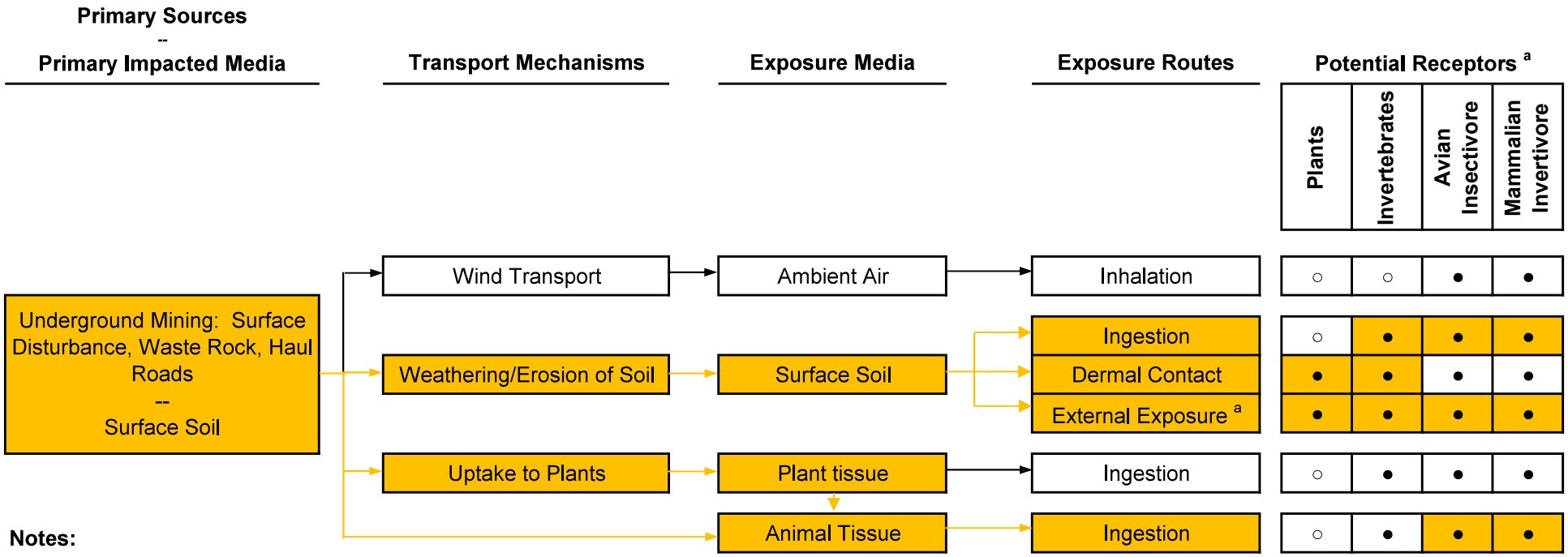
Complete Exposure Pathway
Potentially Complete but Insignificant Pathway
Incomplete Pathway

● Complete Exposure Pathway
● Potentially Complete but Insignificant Pathway
○ Incomplete Exposure Pathway

[a] Potential receptors are those presented in the Navajo Abandoned Uranium Mines Risk (NAUM) Calculation Tool, developed under consultation with the Navajo Nation Environmental Protection Agency (NNEPA) and the United States Environmental Protection Agency (USEPA), except for the Kọọ eí doo nahaazáh dah (site visitor to difficult access open space use). This receptor was not evaluated because the sites do not include any difficult to access open space. The In this risk assessment, "default" receptors were evaluated using the parameters in the Draft NAUM calculation tool as provided on August 19, 2022, and "custom" receptors were evaluated using site-specific exposure assumptions.

[b] Dermal contact is a complete exposure pathway for metals, only. External exposure is a complete exposure pathway for radionuclides, only.

Figure 3-1
Ecological Conceptual Site Model
Mac & Black Jack Mines EE/CA



[a] Upper trophic level receptors evaluated in this ecological risk assessment are an insectivorous bird and an invertivorous mammal; these receptors represent the most conservative feeding guilds.

[b] External exposure is applicable to radionuclides, only.

ATTACHMENT A NAUM CALCULATION TOOL



Attachment A - NAUM Calculation Tool

1. Compiled Exposure Parameters

Compiled Input Human Health Risk Parameters for All Exposure Pathways

Note: The inputs listed on this worksheet cannot be changed here. To change them, go to the Common Parameters worksheet or other pathway-specific worksheets as appropriate for the variable to be changed.

Show Scenario?				Show	Show	Show	Show	Show	Show	Show
				Scenarios Use the row above select show or don't show on the pathway-specific worksheets. Columns will still be shown here and on the Calculator Outputs worksheet; note that the User-Specified Scenario cannot be hidden.						
				User-Specified Scenario	**Navajo Nation Reference Scenarios**					**USEPA Default Scenario [1]**
Parameter		**Symbol**	**Units**	**Custom**	**Kee'da'whíí téél *(full-time Navajo residential)***	**Kǫǫh bí łíí nakaí *(sheep camp)***	**Kǫǫ eí nahaazáh *(easy access open space)***	**Kǫǫ eí doo nahaazáh dah *(difficult access open space)***	**Chíí dah wiih łeezh *(washes and drainages)***	**PRG and RSL Calculator Default Resident**
Common Parameters (*found on the Common Parameters worksheet*)										
Years Spent at Site	Exposure Duration - Adult	ED	years	69	69	69	69	69	69	20
	Exposure Duration - Child	ED_c		6	6	6	6	6	6	6
	Exposure Duration - Lifetime Total	ED_a		75	75	75	75	75	75	26
	Exposure Time - Lifetime Total	t		75	75	75	75	75	75	26
	Averaging Time - Cancer	AT_c	days	27,375	27,375	27,375	27,375	27,375	27,375	25,550
	Averaging Time - Noncancer - Adult	AT_{nc}	days	25,185	25,185	25,185	25,185	25,185	25,185	7,300
	Averaging Time - Noncancer - Child	AT_{nc}	days	2,190	2,190	2,190	2,190	2,190	2,190	2,190
Exposure Frequency	Exposure Frequency - Adult	EF_a	days/year	350	350	150	60	30	150	350
	Exposure Frequency - Child	EF_c		350	350	150	60	30	150	350
Consumption Exposure Frequency	Consumption Exposure Frequency for Animal and Plant Products- Adult	CEF_a	days/year	350	350	350	350	350	350	--
	Consumption Exposure Frequency for Animal and Plant Products- Child	CEF_c	days/year	350	350	350	350	350	350	--
Body Weight	Body Weight - Adult	BW_a	kg	80	80	80	80	80	80	80
	Body Weight - Child	BW_c		15	15	15	15	15	15	15
Conversion Factors	Conversion Factor 1	CF1	g/mg	1/1,000						
	Conversion Factor 2	CF2	kg/mg	1/1,000,000						
	Conversion Factor 3	CF3	day/hours	1/24						
	Conversion Factor 4	CF4	g/kg	1,000						
	Conversion Factor 5	CF5	year/days	1/365						
	Conversion Factor 6	CF6	kg/g	1/1,000						
	Conversion Factor 7	CF7	pCi/Bq	27.027						
Radioactive Decay Function	Decay Constant	λ	1/year	Radionuclide-specific, from USEPA PRG Calculator						
Soil Ingestion Parameters (*found on the Soil Ingestion worksheet*)										
Soil Ingestion Rate	Onsite Soil Ingestion Rate - Adult	IRS_a	mg/day	200	360	360	30	15	180	100
	Onsite Soil Ingestion Rate - Child	IRS_c		300	400	400	33	17	200	200
Dust Inhalation Parameters (*found on the Soil Dust Inhalation worksheet*)										
Inhalation Rate While Onsite	Inhalation Rate when Exposed - Adult	IRA_{res-a}	m^3/day	25	25	25	25	25	25	20
	Inhalation Rate when Exposed - Child	IRA_{res-c}		10	10	10	10	10	10	10
Inhalation Exposure Time	Exposure Time - Adult	ET_a	hours/day	22	22	22	22	22	22	24
	Exposure Time - Child	ET_c		22	22	22	22	22	22	24
Particulate Emission Factor (PEF) Wind Driven	City/Climatic Zone	-	-	Albuquerque, NM	Albuquerque, NM	Albuquerque, NM	Albuquerque, NM	Albuquerque, NM	Albuquerque, NM	Default
	Mean Annual Wind Speed	Um	m/s	4.02	4.02	4.02	4.02	4.02	4.02	4.69
	Areal extent of site surface soil contamination	As	acres	159.00	0.50	0.50	0.50	0.50	0.50	0.50
	Fraction of Vegetative Cover	V	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Particulate Emission Factor	PEF	m^3/kg	2.72E+09	6.61E+09	6.61E+09	6.61E+09	6.61E+09	6.61E+09	1.36E+09
Radiation External Exposure Parameters (*found on the External Gamma worksheet*)										
Shielding Inputs	Gamma Shielding Factor - Outdoor	GSF_o	-	100%	100%	100%	100%	100%	100%	100%
	Gamma Shielding Factor - Indoor	GSF_i		70%	70%	100%	100%	100%	100%	40%
Hours Per Day Onsite	Exposure Time Onsite Outdoors - Adult	ET_{a-o}	hours/day	10	12	12	2	1	12	1.752
	Exposure Time Onsite Indoors - Adult	ET_{a-i}		12	10	8	0	0	0	16.416
	Exposure Time Onsite Outdoors - Child	ET_{c-o}	hours/day	10	12	12	2	1	12	1.752
	Exposure Time Onsite Indoors - Child	ET_{c-i}		12	10	8	0	0	0	16.416

Attachment A - NAUM Calculation Tool

1. Compiled Exposure Parameters

Note: The inputs listed on this worksheet cannot be changed here. To change them, go to the Common Parameters worksheet or other pathway-specific worksheets as appropriate for the variable to be changed.

Show Scenario?	Show	Show	Show	Show	Show	Show	Show
	Scenarios Use the row above select show or don't show on the pathway-specific worksheets. Columns will still be shown here and on the Calculator Outputs worksheet; note that the User-Specified Scenario cannot be hidden.						
	User-Specified Scenario	**Navajo Nation Reference Scenarios**					**USEPA Default Scenario [1]**

Parameter			Symbol	Units	Custom	Kee'da'whíí téél *(full-time Navajo residential)*	Kǫǫh bí łíí nakaí *(sheep camp)*	Kǫǫ eí nahaazáh *(easy access open space)*	Kǫǫ eí doo nahaazáh dah *(difficult access open space)*	Chíí dah wiih łeezh *(washes and drainages)*	PRG and RSL Calculator Default Resident
Metals Dermal Exposure Parameters (*found on the Soil Dermal worksheet*)											
Dermal Exposure Inputs	Surface Area - Adult		SA_a	cm^2/day	6,032	6,032	6,032	6,032	6,032	6,032	6,032
	Surface Area - Child		SA_c		2,373	2,373	2,373	2,373	2,373	2,373	2,373
	Adherence Factor - Adult		AF_a	mg/cm^2	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	Adherence Factor - Child		AF_c		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Plant Consumption Parameters (*found on the Plant Consumption worksheet*)											
Total Plant Consumption	Total Plant Ingestion Rate - Fresh Weight, Adult		IR_a	g/day	834	834	834	834	834	834	--
	Total Plant Ingestion Rate - Fresh Weight, Child		IR_c	g/day	417	417	417	417	417	417	--
Contaminated Fractions	Produce	Annual Average	$CF_{produce}$	-	55.0%	55.0%	20.0%	--	--	10.0%	--
		Fall			75.0%	75.0%	20.0%	--	--	10.0%	--
		Winter			50.0%	50.0%	20.0%	--	--	10.0%	--
		Spring			30.0%	30.0%	--	--	--	--	--
		Summer			65.0%	65.0%	40.0%	--	--	20.0%	--
	Herbs/Medicinal	Annual Average	$CF_{medicinal}$	-	100.0%	100.0%	41.7%	16.7%	8.3%	41.7%	--
Diet Fractions	Corn - White		DF	-	10.0%	10.0%	--	--	--	--	--
	Corn - Blue				10.0%	10.0%	--	--	--	--	--
	Corn - Yellow				5.0%	5.0%	10.0%	--	--	2.0%	--
	Corn - Red Speckled				3.0%	3.0%	--	--	--	--	--
	Corn - Sweet Corn				2.0%	2.0%	--	--	--	--	--
	Squash - Pumpkin				2.0%	2.0%	5.0%	--	--	--	--
	Squash - Other Squash				8.0%	8.0%	8.0%	--	--	2.0%	--
	Melons - Watermelon				5.0%	5.0%	--	--	--	2.0%	--
	Melons - Cantaloupe				5.0%	5.0%	5.0%	--	--	--	--
	Tree Fruit - Apples				5.0%	5.0%	5.0%	--	--	--	--
	Tree Fruit - Apricots				5.0%	5.0%	5.0%	--	--	--	--
	Tree Fruit - Peaches				5.0%	5.0%	--	--	--	--	--
	Other Vegetables - Beans				10.0%	10.0%	--	--	--	--	--
	Other Vegetables - Brussels sprouts				2.0%	2.0%	--	--	--	--	--
	Other Vegetables - Cucumbers				2.0%	2.0%	--	--	--	--	--
	Other Vegetables - Tomatoes				2.0%	2.0%	--	--	--	--	--
	Other Vegetables - Chili				5.0%	5.0%	--	--	--	--	--
	Other Vegetables - Onions				2.0%	2.0%	--	--	--	--	--
	Other Vegetables - Potatoes				2.0%	2.0%	--	--	--	--	--
	Herbs and Medicinal				10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	--
Transfer, Mass Loading, and Bioconcentration Factors	Plant-Soil Transfer Factor		Bv_{wet}	pCi/g-fresh plant per pCi/g-dry soil	Plant-specific based on plant type as indicated by USEPA PRG Calculator; see Plant Consumption worksheet						
	Mass Loading Factor		MLF	g-dry soil per g-fresh plant	Plant-specific based on plant type as indicated by USEPA PRG Calculator; see Plant Consumption worksheet						
	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	mg/kg-dry-plant per mg/kg-dry-soil	Metal-specific, selected from USEPA 2005 or Baes 1984; see Plant Consumption worksheet						
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	mg/kg-dry-plant per mg/kg-dry-soil	Metal-specific, selected from USEPA 2005 or Baes 1984; see Plant Consumption worksheet						

Attachment A - NAUM Calculation Tool

1. Compiled Exposure Parameters

Note: The inputs listed on this worksheet cannot be changed here. To change them, go to the Common Parameters worksheet or other pathway-specific worksheets as appropriate for the variable to be changed.

				Show Scenario?	Show	Show	Show	Show	Show	Show	Show
					Scenarios Use the row above select show or don't show on the pathway-specific worksheets. Columns will still be shown here and on the Calculator Outputs worksheet; note that the User-Specified Scenario cannot be hidden.					
					User-Specified Scenario	**Navajo Nation Reference Scenarios**				**USEPA Default Scenario [1]**
Parameter		**Symbol**	**Units**		**Custom**	**Kee'da'whíí téél *(full-time Navajo residential)***	**Kǫǫh bí łíí nakaí *(sheep camp)***	**Kǫǫ eí nahaazáh *(easy access open space)***	**Kǫǫ eí doo nahaazáh dah *(difficult access open space)***	**Chíí dah wiih łeezh *(washes and drainages)***	**PRG and RSL Calculator Default Resident**
Animal Consumption Parameters *(found on Animal Consumption worksheet)*										
Total Animal Consumption	Total Animal Ingestion Rate - Adult	IR_a	g/day		560	983	983	983	983	983	--
	Total Animal Ingestion Rate - Child	IR_c	g/day		492	492	492	492	492	492	--
Contamination Fractions by Animal Type - Regular Consumption, Annual Average	Chicken	CF	-		5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	--
	Chicken Eggs				75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	--
	Beef				25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	--
	Milk - Cow				1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	--
	Pig				5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	--
	Goat				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	--
	Milk - Goat				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	--
	Sheep				90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	--
	Milk - Sheep				90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	--
	Horse				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	--
	Domesticated Turkey				5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	--
	Wild Turkey				2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	--
	Deer				2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	--
	Elk				2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	--
	Rabbit				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	--
	Prairie Dog				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	--
	Badger				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	--
Diet Fraction	Chicken	DF	-		18.0%	20.0%	20.0%	20.0%	20.0%	20.0%	--
	Chicken Eggs				12.0%	7.0%	7.0%	7.0%	7.0%	7.0%	--
	Beef				21.0%	25.0%	25.0%	25.0%	25.0%	25.0%	--
	Milk - Cow				11.0%	6.0%	6.0%	6.0%	6.0%	6.0%	--
	Pig				6.0%	7.0%	7.0%	7.0%	7.0%	7.0%	--
	Goat				4.0%	5.0%	5.0%	5.0%	5.0%	5.0%	--
	Milk - Goat				2.0%	1.0%	1.0%	1.0%	1.0%	1.0%	--
	Sheep				17.0%	20.0%	20.0%	20.0%	20.0%	20.0%	--
	Milk - Sheep				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	--
	Horse				0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	--
	Domesticated Turkey				0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	--
	Wild Turkey				0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	--
	Deer				3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	--
	Elk				3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	--
	Rabbit				0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	--
	Prairie Dog				1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	--
	Badger				0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	--
Transfer, Mass Loading, and Bioconcentration Factors	Mass-Loading Factor for Pasture	$MLF_{pasture}$	g-dry soil/g-dry plant		0.25						
	Density of Milk	ρ_m	kg/L		1.03						
	Soil Intake Rate	Qs	kg/day		Animal-specific; from USEPA PRG Calculator, see Animal Consumption worksheet						
	Fodder Intake Rate	Qp	kg/day		Animal-specific; from USEPA PRG Calculator, see Animal Consumption worksheet						
	Bioavailability in Soil	Bs	-		Metal-specific; see Animal Consumption worksheet						
	Metabolism Factor	MF	-		Metal-specific; see Animal Consumption worksheet						
	Bioaccumulation Factor for Metals	Ba	days/kg		Animal-specific and metal-specific; from USEPA 2005 or Baes 1984, see Animal Consumption worksheet						
	Dry Soil-to-Plant Transfer Factor	Bv_{dry}	pCi/g-dry-plant per pCi/g-dry-soil		Metal-specific; see Animal Consumption worksheet						
	Radionuclide Transfer Factor	TF_m	pCi/day per pCi/kg		Metal-specific and animal-specific; from USEPA PRG Calculator, see Animal Consumption worksheet						

Attachment A - NAUM Calculation Tool

1. Compiled Exposure Parameters

Note: The inputs listed on this worksheet cannot be changed here. To change them, go to the Common Parameters worksheet or other pathway-specific worksheets as appropriate for the variable to be changed.

Show Scenario?					Show	Show	Show	Show	Show	Show	Show
					Scenarios Use the row above select show or don't show on the pathway-specific worksheets. Columns will still be shown here and on the Calculator Outputs worksheet; note that the User-Specified Scenario cannot be hidden.						
					User-Specified Scenario	**Navajo Nation Reference Scenarios**					**USEPA Default Scenario [1]**
Parameter			**Symbol**	**Units**	**Custom**	**Kee'da'whíí téél *(full-time Navajo residential)***	**Kǫǫh bí łíí nakaí *(sheep camp)***	**Kǫǫ eí nahaazáh *(easy access open space)***	**Kǫǫ eí doo nahaazáh dah *(difficult access open space)***	**Chíí dah wiih łeezh *(washes and drainages)***	**PRG and RSL Calculator Default Resident**
Other Diné Lifeways (*on ODL Plant Ingestion, ODL Plant Dermal, ODL Plant Inhalation*)											
Ingestion Rate by Plant Type	Age-adjusted ingestion rate of medicinal plants.	Navajo Tea	IF_{adj}	g/day	1.0	1.0	1.0	1.0	1.0	1.0	--
		Sumac (skunkbush and other)			6.4	6.4	6.4	6.4	6.4	6.4	--
		Soaptree Yucca			6.4	6.4	6.4	6.4	6.4	0.0	--
		Sagebrush			12.9	12.9	12.9	12.9	12.9	12.9	--
		Corn Pollen and Other Corn			19.3	19.3	19.3	0.0	0.0	19.3	--
		Other Plant Types			6.4	6.4	6.4	6.4	6.4	6.4	--
Dermal Rate by Plant Type	Adult dermal rate of medicinal plants.	Navajo Tea	DCR_a	g/day	2.1	2.1	2.1	2.1	2.1	2.1	--
		Sumac (skunkbush and other)			38.6	38.6	38.6	38.6	38.6	38.6	--
		Soaptree Yucca			38.6	38.6	38.6	38.6	38.6	0.0	--
		Sagebrush			12.9	12.9	12.9	12.9	12.9	12.9	--
		Corn Pollen and Other Corn			38.6	38.6	38.6	0.0	0.0	38.6	--
		Other Plant Types			6.4	6.4	6.4	6.4	6.4	6.4	--
Inhalation Rate by Plant Type	Mass of plant available for inhalation by the receptor.	Navajo Tea	IM_a	g/day	0.0	0.0	0.0	0.0	0.0	0.0	--
		Sumac (skunkbush and other)			0.0	0.0	0.0	0.0	0.0	0.0	--
		Soaptree Yucca			0.0	0.0	0.0	0.0	0.0	0.0	--
		Sagebrush			25.7	25.7	25.7	25.7	25.7	25.7	--
		Corn Pollen and Other Corn			12.9	12.9	12.9	0.0	0.0	12.9	--
		Other Plant Types			6.4	6.4	6.4	6.4	6.4	6.4	--
Inhalation Fraction [2]	Inhalation fraction - the portion of mass released to the air that is inhaled by the receptor.	Navajo Tea	IF	-	10%	10%	10%	10%	10%	10%	--
		Sumac (skunkbush and other)			10%	10%	10%	10%	10%	10%	--
		Soaptree Yucca			10%	10%	10%	10%	10%	10%	--
		Sagebrush			10%	10%	10%	10%	10%	10%	--
		Corn Pollen and Other Corn			10%	10%	10%	10%	10%	10%	--
		Other Plant Types			10%	10%	10%	10%	10%	10%	--

Notes: This table is protected because all inputs are entered on other worksheets.

cm^2/day	Square centimeter per day	m/s	Meters per second
days/kg	Days per kilogram	m^2	Square meter
g	Grams	m^3/day	Cubic meters per day
g/cm^2	Grams per square centimeter	m^3/kg	Cubic meters per kilogram
g/day	Grams per day	mg/cm^2	Milligrams per square centimeter
g/kg	Grams per kilogram	mg/day	Milligrams per day
g/mg	Grams per milligram	mg/m^3	Milligrams per cubic meter
kg	Kilograms	pCi	Picocuries
kg/day	Kilograms per day	pCi/Bq	Picocurie per Becquerel
kg/L	Kilograms per liter	pCi/day	Picocuries per day
kg/mg	Kilograms per milligram	pCi/g	Picocuries per gram

1 Default values for farmer and resident receptors from Preliminary Remediation Goals for Radionuclides (PRG) calculator (USEPA 2021a and 2021b).
2 The values for inhalation fraction are preliminary and based on professional judgment. These values should change when the USEPA and NNEPA provide documented reference scenario input values for this parameter.

References:

Baes, C.F. 1984. Oak Ridge National Laboratory. A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture. September.

U.S. Environmental Protection Agency (USEPA). 2005. Human Health Risk Assessment Protocol (HHRAP) for Hazardous Waste Combustion Facilities, Final. Center of Combustion Science and Engineering. EPA520-R-05-006. September. https://archive.epa.gov/epawaste/hazard/tsd/td/web/html/risk.html#hhrad.

USEPA. 2021a. Preliminary Remediation Goals for Radionuclides (PRG). May. https://epa-prgs.ornl.gov/radionuclides/

USEPA. 2021b. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites. May. https://www.epa.gov/risk/regional-screening-levels-rsls

Attachment A - NAUM Calculation Tool

2.1 - Calculator PRG Outputs - Metals

User-Specified Scenario Custom Receptor PRG Outputs

Note: Rows 8 through 30 of the worksheet show the PRGs only for the radionuclide or metal selected as shown in cell B5 of this worksheet.

Selection = Arsenic
Type = Metal

PRGs shown are based on the target risk and target hazard quotient listed below:			
Target Risk	1E-04	Target Hazard Quotient	1

		Receptor						
PRG Type - Metals	Symbol	Custom	Kee'da'whíí tééh (full-time Navajo residential)	Kǫǫh bí łíí nakaí (sheep camp)	Kǫǫ eí nahaazáh (easy access open space)	Kǫǫ eí doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)	PRG and RSL Calculator Default Resident
Total PRG	**(PRG_{total})**	**2.13**	**2.32**	**4.23**	**6.44**	**7.42**	**5.08**	**34.9**
Soil Ingestion	**(PRG_{s-ing})**	26.1	18.5	43.1	1,300	5,140	86.2	39.1
Soil Dermal Exposure	**(PRG_{derm})**	314	314	732	1,830	3,660	732	330
Dust Inhalation	**(PRG_{inh})**	46,400	113,000	263,000	658,000	1,320,000	263,000	21,300
Plant Consumption	**(PRG_{p-ing})**	4.66	4.66	13.4	35.4	70.8	14.1	--
Animal Consumption	**(PRG_{a-ing})**	10.1	24.8	54	109	270	54	--
Other Dine Lifeway Plant Ingestion	**($PRG_{ODL-ing}$)**	9.36	9.36	9.36	9.56	9.56	11.6	--
Other Dine Lifeway Plant Dermal	**($PRG_{ODL-derm}$)**	111	111	111	113	113	192	--
Other Dine Lifeway Plant Inhalation	**($PRG_{ODL-inh}$)**	191	191	191	193	193	191	--

Notes:

This sheet is protected.

This sheet compiles the calculated PRGs for metals in mg/kg for both cancer and noncancer endpoints. Note that a PRG greater than 100,000 mg/kg is above 10% concentration - the EPA RSL User Guide recommends defaulting to 100,000 mg/kg in these cases.

For metals with both carcinogenic and noncarcinogenic effects, the most protective (lower) of the carcinogenic and noncarcinogenic values is selected as the PRG.

Lead is not included in list of metals because PRGs for lead are calculated separately using the USEPA's Adult Lead Model (ALM) and Integrated Exposure-Uptake Biokinetic Model (IEUBK). Information on these models is available on the USEPA website: https://www.epa.gov/superfund/lead-superfund-sites.

mg/kg Milligrams per kilogram

PRG Preliminary Remediation Goal

Detailed Preliminary Remediation Goals for Metals in Milligrams/Kilogram

Note: Rows 145 through 591 show the detailed PRGs for all metals selected using a value of "TRUE" in cells A62:A81 of the "COPC Selection" worksheet. Rows for unselected metals will be hidden.

Equation:

$$PRG_{total} = \frac{1}{\frac{1}{PRG_{s-ing}} + \frac{1}{PRG_{inh}} + \frac{1}{PRG_{derm}} + \frac{1}{PRG_{p-ing}} + \frac{1}{PRG_{a-ing}} + \frac{1}{PRG_{ODL-ing}} + \frac{1}{PRG_{ODL-derm}} + \frac{1}{PRG_{ODL-inh}}}$$

Attachment A - NAUM Calculation Tool

2.1 - Calculator PRG Outputs - Metals

User-Specified Scenario Custom Receptor PRG Outputs

PRG Type	Metal	Custom Receptor Scenario								
		Total PRG (PRG_{total})	Soil Ingestion ($PRG_{s\text{-}ing}$)	Dust Inhalation (PRG_{inh})	Soil Dermal Exposure (PRG_{derm})	Plant Consumption ($PRG_{p\text{-}ing}$)	Animal Consumption ($PRG_{a\text{-}ing}$)	Other Dine Lifeway Plant Ingestion ($PRG_{ODL\text{-}ing}$)	Other Dine Lifeway Plant Dermal ($PRG_{ODL\text{-}derm}$)	Other Dine Lifeway Plant Inhalation ($PRG_{ODL\text{-}inh}$)
Cancer	Arsenic	2.13	29.7	72,000	314	4.66	10.1	9.36	111	321
	Molybdenum	--	--	--	--	--	--	--	--	--
	Selenium	--	--	--	--	--	--	--	--	--
	Uranium	--	--	--	--	--	--	--	--	--
	Vanadium	--	--	--	--	--	--	--	--	--
Noncancer	Arsenic	3.75	26.1	46,400	330	8.91	12.5	38.8	461	191
	Molybdenum	10	261	6,190,000	--	17.3	43.8	68.1	--	2,720
	Selenium	12.3	261	61,900,000	--	105	15.3	443	--	175,000
	Uranium	3.01	10.4	124,000	--	5.58	77	24	--	473
	Vanadium	55.2	261	310,000	--	153	182	665	--	1,310
Overall	Arsenic	2.13	26.1	46,400	314	4.66	10.1	9.36	111	191
	Molybdenum	10	261	6,190,000	--	17.3	43.8	68.1	--	2,720
	Selenium	12.3	261	61,900,000	--	105	15.3	443	--	175,000
	Uranium	3.01	10.4	124,000	--	5.58	77	24	--	473
	Vanadium	55.2	261	310,000	--	153	182	665	--	1,310

PRG Type	Metal	Kee'da'whíí tééh (full-time Navajo residential) Receptor Scenario								
		Total PRG (PRG_{total})	Soil Ingestion ($PRG_{s\text{-}ing}$)	Dust Inhalation (PRG_{inh})	Soil Dermal Exposure (PRG_{derm})	Plant Consumption ($PRG_{p\text{-}ing}$)	Animal Consumption ($PRG_{a\text{-}ing}$)	Other Dine Lifeway Plant Ingestion ($PRG_{ODL\text{-}ing}$)	Other Dine Lifeway Plant Dermal ($PRG_{ODL\text{-}derm}$)	Other Dine Lifeway Plant Inhalation ($PRG_{ODL\text{-}inh}$)
Cancer	Arsenic	2.32	18.5	175,000	314	4.66	24.8	9.36	111	321
	Molybdenum	--	--	--	--	--	--	--	--	--
	Selenium	--	--	--	--	--	--	--	--	--
	Uranium	--	--	--	--	--	--	--	--	--
	Vanadium	--	--	--	--	--	--	--	--	--
Noncancer	Arsenic	4.59	19.6	113,000	330	8.91	54.3	38.8	461	191
	Molybdenum	12.2	196	15,000,000	--	17.3	243	68.1	--	2,720
	Selenium	12.9	196	150,000,000	--	105	16.5	443	--	175,000
	Uranium	2.82	7.82	301,000	--	5.58	249	24	--	473
	Vanadium	65.6	196	752,000	--	153	747	665	--	1,310
Overall	Arsenic	2.32	18.5	113,000	314	4.66	24.8	9.36	111	191
	Molybdenum	12.2	196	15,000,000	--	17.3	243	68.1	--	2,720
	Selenium	12.9	196	150,000,000	--	105	16.5	443	--	175,000
	Uranium	2.82	7.82	301,000	--	5.58	249	24	--	473
	Vanadium	65.6	196	752,000	--	153	747	665	--	1,310

Attachment A - NAUM Calculation Tool

2.1 - Calculator PRG Outputs - Metals

User-Specified Scenario Custom Receptor PRG Outputs

PRG Type	Metal	Kǫǫh bí łíí nakaí (sheep camp) Receptor Scenario								
		Total PRG	Soil Ingestion	Dust Inhalation	Soil Dermal Exposure	Plant Consumption	Animal Consumption	Other Dine Lifeway Plant Ingestion	Other Dine Lifeway Plant Dermal	Other Dine Lifeway Plant Inhalation
		(PRG_{total})	($PRG_{s\text{-}ing}$)	(PRG_{inh})	(PRG_{derm})	($PRG_{p\text{-}ing}$)	($PRG_{a\text{-}ing}$)	($PRG_{ODL\text{-}ing}$)	($PRG_{ODL\text{-}derm}$)	($PRG_{ODL\text{-}inh}$)
Cancer	Arsenic	4.23	43.1	408,000	732	13.4	54	9.36	111	321
	Molybdenum	--	--	--	--	--	--	--	--	--
	Selenium	--	--	--	--	--	--	--	--	--
	Uranium	--	--	--	--	--	--	--	--	--
	Vanadium	--	--	--	--	--	--	--	--	--
Noncancer	Arsenic	9.63	45.6	263,000	769	25.7	117	38.8	461	191
	Molybdenum	27.1	456	35,100,000	--	56.4	512	68.1	--	2,720
	Selenium	119	456	351,000,000	--	316	1,260	443	--	175,000
	Uranium	6.17	18.3	702,000	--	16.2	555	24	--	473
	Vanadium	136	456	1,750,000	--	438	1,610	665	--	1,310
Overall	Arsenic	4.23	43.1	263,000	732	13.4	54	9.36	111	191
	Molybdenum	27.1	456	35,100,000	--	56.4	512	68.1	--	2,720
	Selenium	119	456	351,000,000	--	316	1,260	443	--	175,000
	Uranium	6.17	18.3	702,000	--	16.2	555	24	--	473
	Vanadium	136	456	1,750,000	--	438	1,610	665	--	1,310

PRG Type	Metal	Kǫǫ eí nahaazáh (easy access open space) Receptor Scenario								
		Total PRG	Soil Ingestion	Dust Inhalation	Soil Dermal Exposure	Plant Consumption	Animal Consumption	Other Dine Lifeway Plant Ingestion	Other Dine Lifeway Plant Dermal	Other Dine Lifeway Plant Inhalation
		(PRG_{total})	($PRG_{s\text{-}ing}$)	(PRG_{inh})	(PRG_{derm})	($PRG_{p\text{-}ing}$)	($PRG_{a\text{-}ing}$)	($PRG_{ODL\text{-}ing}$)	($PRG_{ODL\text{-}derm}$)	($PRG_{ODL\text{-}inh}$)
Cancer	Arsenic	6.44	1,300	1,020,000	1,830	35.4	109	9.56	113	326
	Molybdenum	--	--	--	--	--	--	--	--	--
	Selenium	--	--	--	--	--	--	--	--	--
	Uranium	--	--	--	--	--	--	--	--	--
	Vanadium	--	--	--	--	--	--	--	--	--
Noncancer	Arsenic	18.9	1,380	658,000	1,920	67.7	229	39.6	468	193
	Molybdenum	48.5	13,800	87,700,000	--	183	974	73	--	2,850
	Selenium	266	13,800	877,000,000	--	882	2,640	460	--	180,000
	Uranium	14.6	553	1,750,000	--	43.1	1,170	24.6	--	481
	Vanadium	287	13,800	4,390,000	--	1,150	3,190	678	--	1,320
Overall	Arsenic	6.44	1,300	658,000	1,830	35.4	109	9.56	113	193
	Molybdenum	48.5	13,800	87,700,000	--	183	974	73	--	2,850
	Selenium	266	13,800	877,000,000	--	882	2,640	460	--	180,000
	Uranium	14.6	553	1,750,000	--	43.1	1,170	24.6	--	481
	Vanadium	287	13,800	4,390,000	--	1,150	3,190	678	--	1,320

Attachment A - NAUM Calculation Tool

2.1 - Calculator PRG Outputs - Metals

User-Specified Scenario Custom Receptor PRG Outputs

PRG Type	Metal	Kǫǫ eí doo nahaazáh dah (difficult access open space) Receptor Scenario								
		Total PRG (PRG_{total})	Soil Ingestion ($PRG_{s\text{-}ing}$)	Dust Inhalation (PRG_{inh})	Soil Dermal Exposure (PRG_{derm})	Plant Consumption ($PRG_{p\text{-}ing}$)	Animal Consumption ($PRG_{a\text{-}ing}$)	Other Dine Lifeway Plant Ingestion ($PRG_{ODL\text{-}ing}$)	Other Dine Lifeway Plant Dermal ($PRG_{ODL\text{-}derm}$)	Other Dine Lifeway Plant Inhalation ($PRG_{ODL\text{-}inh}$)
Cancer	Arsenic	7.42	5,140	2,040,000	3,660	70.8	270	9.56	113	326
	Molybdenum	--	--	--	--	--	--	--	--	--
	Selenium	--	--	--	--	--	--	--	--	--
	Uranium	--	--	--	--	--	--	--	--	--
	Vanadium	--	--	--	--	--	--	--	--	--
Noncancer	Arsenic	23.7	5,370	1,320,000	3,850	135	583	39.6	468	193
	Molybdenum	58.2	53,700	175,000,000	--	366	2,560	73	--	2,850
	Selenium	342	53,700	1,750,000,000	--	1,760	6,320	460	--	180,000
	Uranium	18.1	2,150	3,510,000	--	86.3	2,780	24.6	--	481
	Vanadium	356	53,700	8,770,000	--	2,300	8,050	678	--	1,320
Overall	Arsenic	7.42	5,140	1,320,000	3,660	70.8	270	9.56	113	193
	Molybdenum	58.2	53,700	175,000,000	--	366	2,560	73	--	2,850
	Selenium	342	53,700	1,750,000,000	--	1,760	6,320	460	--	180,000
	Uranium	18.1	2,150	3,510,000	--	86.3	2,780	24.6	--	481
	Vanadium	356	53,700	8,770,000	--	2,300	8,050	678	--	1,320

PRG Type	Metal	Chíí dah wiih łeezh (washes and drainages) Receptor Scenario								
		Total PRG (PRG_{total})	Soil Ingestion ($PRG_{s\text{-}ing}$)	Dust Inhalation (PRG_{inh})	Soil Dermal Exposure (PRG_{derm})	Plant Consumption ($PRG_{p\text{-}ing}$)	Animal Consumption ($PRG_{a\text{-}ing}$)	Other Dine Lifeway Plant Ingestion ($PRG_{ODL\text{-}ing}$)	Other Dine Lifeway Plant Dermal ($PRG_{ODL\text{-}derm}$)	Other Dine Lifeway Plant Inhalation ($PRG_{ODL\text{-}inh}$)
Cancer	Arsenic	5.08	86.2	408,000	732	14.1	54	11.6	192	321
	Molybdenum	--	--	--	--	--	--	--	--	--
	Selenium	--	--	--	--	--	--	--	--	--
	Uranium	--	--	--	--	--	--	--	--	--
	Vanadium	--	--	--	--	--	--	--	--	--
Noncancer	Arsenic	11.8	91.3	263,000	769	27	117	48.2	796	191
	Molybdenum	34.1	913	35,100,000	--	71.6	512	83.7	--	2,720
	Selenium	152	913	351,000,000	--	350	1,260	549	--	175,000
	Uranium	8.14	36.5	702,000	--	17.2	555	29.9	--	473
	Vanadium	170	913	1,750,000	--	458	1,610	828	--	1,310
Overall	Arsenic	5.08	86.2	263,000	732	14.1	54	11.6	192	191
	Molybdenum	34.1	913	35,100,000	--	71.6	512	83.7	--	2,720
	Selenium	152	913	351,000,000	--	350	1,260	549	--	175,000
	Uranium	8.14	36.5	702,000	--	17.2	555	29.9	--	473
	Vanadium	170	913	1,750,000	--	458	1,610	828	--	1,310

Attachment A - NAUM Calculation Tool

2.1 - Calculator PRG Outputs - Metals

User-Specified Scenario Custom Receptor PRG Outputs

PRG Type	Metal	PRG and RSL Calculator Default Resident Receptor Scenario								
		Total PRG	Soil Ingestion	Dust Inhalation	Soil Dermal Exposure	Plant Consumption	Animal Consumption	Other Dine Lifeway Plant Ingestion	Other Dine Lifeway Plant Dermal	Other Dine Lifeway Plant Inhalation
		(PRG_{total})	($PRG_{s\text{-}ing}$)	(PRG_{inh})	(PRG_{derm})	($PRG_{p\text{-}ing}$)	($PRG_{a\text{-}ing}$)	($PRG_{ODL\text{-}ing}$)	($PRG_{ODL\text{-}derm}$)	($PRG_{ODL\text{-}inh}$)
Cancer	Arsenic	67.6	77.2	88,800	549	--	--	--	--	--
	Molybdenum	--	--	--	--	--	--	--	--	--
	Selenium	--	--	--	--	--	--	--	--	--
	Uranium	--	--	--	--	--	--	--	--	--
	Vanadium	--	--	--	--	--	--	--	--	--
Noncancer	Arsenic	34.9	39.1	21,300	330	--	--	--	--	--
	Molybdenum	391	391	2,840,000	--	--	--	--	--	--
	Selenium	391	391	28,400,000	--	--	--	--	--	--
	Uranium	15.6	15.6	56,700	--	--	--	--	--	--
	Vanadium	390	391	142,000	--	--	--	--	--	--
Overall	Arsenic	34.9	39.1	21,300	330	--	--	--	--	--
	Molybdenum	391	391	2,840,000	--	--	--	--	--	--
	Selenium	391	391	28,400,000	--	--	--	--	--	--
	Uranium	15.6	15.6	56,700	--	--	--	--	--	--
	Vanadium	390	391	142,000	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

2.2 - Calculator PRG Outputs - Radium

User-Specified Scenario Custom Receptor PRG Outputs

Note: Rows 8 through 30 of the worksheet show the PRGs only for the radionuclide or metal selected as shown in cell B5 of this worksheet.

Selection = Ra-226 in SE
Type = Radionuclide

PRGs shown are based on the target risk and target hazard quotient listed below:			
Target Risk	1E-04	Target Hazard Quotient	1

		Receptor						
PRG Type - Radionuclides	Symbol	Custom	Kee'da'whíí tééh (full-time Navajo residential)	Kǫǫh bí łíí nakaí (sheep camp)	Kǫǫ eí nahaazáh (easy access open space)	Kǫǫ eí doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)	PRG and RSL Calculator Default Resident
Total PRG	**(PRG_{total})**	**0.0546**	**0.0518**	**0.161**	**0.317**	**0.357**	**0.196**	**1.27**
Soil Ingestion	**($PRG_{s\text{-}ing}$)**	3.22	1.84	4.3	129	515	8.6	15.7
Dust Inhalation	**(PRG_{inh})**	19,500	19,500	45,500	114,000	227,000	45,500	14,300
External Exposure	**(PRG_{ext})**	0.241	0.233	0.517	12.9	51.7	0.861	1.38
Plant Consumption	**($PRG_{p\text{-}ing}$)**	0.246	0.246	0.694	1.87	3.75	0.745	--
Animal Consumption	**($PRG_{a\text{-}ing}$)**	0.139	0.128	30.7	51	239	30.7	--
Other Dine Lifeway Plant Ingestion	**($PRG_{ODL\text{-}ing}$)**	0.451	0.451	0.451	0.466	0.466	0.478	--
Other Dine Lifeway Plant Dermal	**($PRG_{ODL\text{-}derm}$)**	--	--	--	--	--	--	--
Other Dine Lifeway Plant Inhalation	**($PRG_{ODL\text{-}inh}$)**	2.7	2.7	2.7	2.74	2.74	2.7	--

Notes:
This sheet is protected.
This sheet compiles the calculated PRGs for radionuclides in pCi/g.
Isotopes selected are based on the contaminants of concern at the NAUM sites.

"in SE" Includes decay chain isotopes in secular equilibrium with the parent isotope

pCi/g Picocuries per gram

PRG Preliminary Remediation Goal

Detailed Preliminary Remediation Goals for Radioactive Isotopes in Picocuries/Gram

Note: Rows 53 through 135 show the detailed PRGs for all radionuclides selected using "TRUE" in cells A10:A18 of the "COPCs" worksheet. Rows for unselected radionuclides will be hidden.

Equation:

$$PRG_{total} = \frac{1}{\frac{1}{PRG_{s-ing}} + \frac{1}{PRG_{inh}} + \frac{1}{PRG_{ext}} + \frac{1}{PRG_{p-ing}} + \frac{1}{PRG_{a-ing}} + \frac{1}{PRG_{ODL-ing}} + \frac{1}{PRG_{ODL-derm}} + \frac{1}{PRG_{ODL-inh}}}$$

Receptor	Isotope	Total PRG	Soil Ingestion	Dust Inhalation	External Exposure	Plant Consumption	Animal Consumption	Other Dine Lifeway Plant Ingestion	Other Dine Lifeway Plant Dermal	Other Dine Lifeway Plant Inhalation
		(PRG_{total})	($PRG_{s\text{-}ing}$)	(PRG_{inh})	(PRG_{ext})	($PRG_{p\text{-}ing}$)	($PRG_{a\text{-}ing}$)	($PRG_{ODL\text{-}ing}$)	($PRG_{ODL\text{-}derm}$)	($PRG_{ODL\text{-}inh}$)
Custom	Ra-226 in SE	0.0546	3.22	19,500	0.241	0.246	0.139	0.451	--	2.7

Receptor	Isotope	Total PRG	Soil Ingestion	Dust Inhalation	External Exposure	Plant Consumption	Animal Consumption	Other Dine Lifeway Plant Ingestion	Other Dine Lifeway Plant Dermal	Other Dine Lifeway Plant Inhalation
		(PRG_{total})	($PRG_{s\text{-}ing}$)	(PRG_{inh})	(PRG_{ext})	($PRG_{p\text{-}ing}$)	($PRG_{a\text{-}ing}$)	($PRG_{ODL\text{-}ing}$)	($PRG_{ODL\text{-}derm}$)	($PRG_{ODL\text{-}inh}$)
Kee'da'whíí tééh (full-time Navajo residential)	Ra-226 in SE	0.0518	1.84	19,500	0.233	0.246	0.128	0.451	--	2.7

Attachment A - NAUM Calculation Tool

2.2 - Calculator PRG Outputs - Radium

User-Specified Scenario Custom Receptor PRG Outputs

Receptor	Isotope	Total PRG	Soil Ingestion	Dust Inhalation	External Exposure	Plant Consumption	Animal Consumption	Other Dine Lifeway Plant Ingestion	Other Dine Lifeway Plant Dermal	Other Dine Lifeway Plant Inhalation
		(PRG_{total})	($PRG_{s\text{-}ing}$)	(PRG_{inh})	(PRG_{ext})	($PRG_{p\text{-}ing}$)	($PRG_{a\text{-}ing}$)	($PRG_{ODL\text{-}ing}$)	($PRG_{ODL\text{-}derm}$)	($PRG_{ODL\text{-}inh}$)
Kǫǫh bí łíí nakaí (sheep camp)	Ra-226 in SE	0.161	4.3	45,500	0.517	0.694	30.7	0.451	--	2.7

Receptor	Isotope	Total PRG	Soil Ingestion	Dust Inhalation	External Exposure	Plant Consumption	Animal Consumption	Other Dine Lifeway Plant Ingestion	Other Dine Lifeway Plant Dermal	Other Dine Lifeway Plant Inhalation
		(PRG_{total})	($PRG_{s\text{-}ing}$)	(PRG_{inh})	(PRG_{ext})	($PRG_{p\text{-}ing}$)	($PRG_{a\text{-}ing}$)	($PRG_{ODL\text{-}ing}$)	($PRG_{ODL\text{-}derm}$)	($PRG_{ODL\text{-}inh}$)
Kǫǫ eí nahaazáh (easy access open space)	Ra-226 in SE	0.317	129	114,000	12.9	1.87	51	0.466	--	2.74

Receptor	Isotope	Total PRG	Soil Ingestion	Dust Inhalation	External Exposure	Plant Consumption	Animal Consumption	Other Dine Lifeway Plant Ingestion	Other Dine Lifeway Plant Dermal	Other Dine Lifeway Plant Inhalation
		(PRG_{total})	($PRG_{s\text{-}ing}$)	(PRG_{inh})	(PRG_{ext})	($PRG_{p\text{-}ing}$)	($PRG_{a\text{-}ing}$)	($PRG_{ODL\text{-}ing}$)	($PRG_{ODL\text{-}derm}$)	($PRG_{ODL\text{-}inh}$)
Kǫǫ eí doo nahaazáh dah (difficult access open space)	Ra-226 in SE	0.357	515	227,000	51.7	3.75	239	0.466	--	2.74

Receptor	Isotope	Total PRG	Soil Ingestion	Dust Inhalation	External Exposure	Plant Consumption	Animal Consumption	Other Dine Lifeway Plant Ingestion	Other Dine Lifeway Plant Dermal	Other Dine Lifeway Plant Inhalation
		(PRG_{total})	($PRG_{s\text{-}ing}$)	(PRG_{inh})	(PRG_{ext})	($PRG_{p\text{-}ing}$)	($PRG_{a\text{-}ing}$)	($PRG_{ODL\text{-}ing}$)	($PRG_{ODL\text{-}derm}$)	($PRG_{ODL\text{-}inh}$)
Chíí dah wiih łeezh (washes and drainages)	Ra-226 in SE	0.196	8.6	45,500	0.861	0.745	30.7	0.478	--	2.7

Receptor	Isotope	Total PRG	Soil Ingestion	Dust Inhalation	External Exposure	Plant Consumption	Animal Consumption	Other Dine Lifeway Plant Ingestion	Other Dine Lifeway Plant Dermal	Other Dine Lifeway Plant Inhalation
		(PRG_{total})	($PRG_{s\text{-}ing}$)	(PRG_{inh})	(PRG_{ext})	($PRG_{p\text{-}ing}$)	($PRG_{a\text{-}ing}$)	($PRG_{ODL\text{-}ing}$)	($PRG_{ODL\text{-}derm}$)	($PRG_{ODL\text{-}inh}$)
PRG and RSL Calculator Default Resident	Ra-226 in SE	1.27	15.7	14,300	1.38	--	--	--	--	--

Attachment A - NAUM Calculation Tool

3 - Common Parameters

Inputs - Common Parameters

Inputs	Parameter	Symbol	Description	Units	User-Specified Scenario [1]	Navajo Nation Reference Scenarios					USEPA Default Scenario
					Custom	Kee'da'whíí tééh *(full-time Navajo residential)*	Kǫǫh bí łíí nakaí *(sheep camp)*	Kǫǫ eí nahaazáh *(easy access open space)*	Kǫǫ eí doo nahaazáh dah *(difficult access open space)*	Chíí dah wiih łeezh *(washes and drainages)*	PRG and RSL Calculator Default Resident
Target Risk and Toxicity	Target Risk	TR	Select target risk with dropdown menu: [2]	unitless	1E-04						
	Target Hazard Quotient	THQ	Select target non-cancer hazard quotient with dropdown menu: [3]		1						
Years Spent at Site	Exposure Duration - Adult	ED_a	Total years on site 6 years old and older. Source for defaults: NNEPA 2021.	years	69	69	69	69	69	69	20
	Exposure Duration - Child	ED_c	Total years on site 0 to 6 years old. Source: NNEPA 2021.		6	6	6	6	6	6	6
	Exposure Duration - Lifetime Total	ED	Calculated, $ED_a + ED_c$.		75	75	75	75	75	75	26
	Exposure Time - Lifetime	t_{year}	Total years onsite, equal to ED.		75	75	75	75	75	75	26
	Lifetime	LT	Lifetime in years.		75	75	75	75	75	75	70
	Averaging Time - Cancer	AT_c	Lifetime in days.	days	27,375	27,375	27,375	27,375	27,375	27,375	25,550
	Averaging Time - Noncancer - Adult	AT_{nc}	Adult Exposure duration x 365 days/year.		25,185	25,185	25,185	25,185	25,185	25,185	7,300
	Averaging Time - Noncancer - Child	AT_{nc}	Child Exposure duration x 365 days/year.		2,190	2,190	2,190	2,190	2,190	2,190	2,190
Time Per Year Onsite	Exposure Frequency - Adult	EF_a	Days per year spent onsite. Source for defaults: NNEPA 2021.	days/ year	350	350	150	60	30	150	350
	Exposure Frequency - Child	EF_c			350	350	150	60	30	150	350
	Exposure Frequency - Adult	EF_a	Months per year spent onsite.	months/ year	11.5	11.5	5	2	1	5	11.5
	Exposure Frequency - Child	EF_c			11.5	11.5	5	2	1	5	11.5
Consumption Exposure Frequency	Consumption Exposure Frequency for Animal and Plant Products- Adult	CEF_a	Number of days per year the receptor consumes products from animals that spend time onsite or plants that are collected onsite. Source: NNEPA 2021.	days/year	350	350	350	350	350	350	--
	Consumption Exposure Frequency for Animal and Plant Products- Child	CEF_c		days/year	350	350	350	350	350	350	--
Body Weight	Body Weight - Adult	BW_a	Average body weight 6 years old and older. Source for defaults: EPA 2022a, 2022b.	Kilograms	80	80	80	80	80	80	80
	Body Weight - Child	BW_c	Average body weight 0 to 6 years old. Source for defaults: EPA 2022a, 2022b.		15	15	15	15	15	15	15
	Body Weight - Adult	BW_a	Average body weight 6 years old and older.	Pounds	176	176	176	176	176	176	176
	Body Weight - Child	BW_c	Average body weight 0 to 6 years old.		33	33	33	33	33	33	33
Site Area	The area of the site. Source: EPA 2022a (default site area).			Acres	159	0.50	0.50	0.50	0.50	0.50	0.50

Notes:

1 Cell H3 can be edited to create a name for a site-specific exposure scenario.

2 Consistent with the National Contingency Plan (EPA 1994), target cancer risks usually range from 1 in 1,000,000 (1E-06) to 1 in 10,000 (1E-04). A target cancer risk of 3 in 10,000 (3E-04) is commonly used for radionuclides (USEPA 2014). On abandoned uranium mines (AUMs), individual contaminants with a cancer risk greater than or equal to 1E-04 for a given receptor-exposure scenario are identified as COCs.

3 For metals that are not classified as carcinogens and for those carcinogens known to cause adverse health effects other than cancer, the hazard is calculated by comparing the intake to a reference dose (ingestion and dermal) or concentration (inhalation). For a single chemical, the comparison yields a ratio termed the hazard quotient (HQ). An HQ of less than or equal to 1 indicates that adverse noncancer health effects are not expected for the individual metal.

References:

EPA. 1994. National Oil and Hazardous Substances Pollution Contingency Plan. Code of Federal Regulations, Title 40, Part 300. September 15.

EPA. 2022a. PRG User's Guide. May

EPA. 2022b. Regional Screening Levels (RSLs) User's Guide. May 18.

NNEPA Superfund Program (NNEPA). 2021. Letter Regarding Navajo Specific Input Parameters—All Other Scenarios. From Dariel Yazzie, Environmental Assistant Director, Navajo Superfund Division. To Sona Chillingaryan, Manager, Tribal Lands Cleanup Section, Superfund Division, U.S. Environmental Protection Agency (USEPA) Region 9, and Sean Hogan, Manager, Tribal Lands Cleanup Section, Superfund Division, USEPA Region 9. September 15.

Formatting guide:		
Type of Worksheet Cell	**Category 1**	**Category 2**
User-editable inputs	**Inputs that can be changed, but only on the current worksheet. Most inputs have limits on the minimum and maximum values.**	**Inputs that can be changed, appear on the current worksheet AND other worksheets, and can be changed on any worksheet they appear on. These will update automatically if changed on any worksheet.**
Non-editable inputs	Inputs that are not receptor-specific. Some are entered on a different worksheet, others are calculated from editable inputs on this worksheet or another worksheet.	Receptor-specific inputs which cannot be edited by the user. Different shades of orange indicate the custom scenario (lightest), Navajo scenarios (lighter) and the USEPA default scenario (darker).
Input headers	In the input receptor column headers, different shades of green in indicate the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	In the input header rows and non-receptor column headers (such as this table), the medium shade indicates summary-level headers, and lightest shade indicates more detailed header information.
Outputs	Different shades of blue indicate outputs for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.
Output headers	Different shades of yellow indicate output headers for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.

Attachment A - NAUM Calculation Tool

4 - Incidental Ingestion of Soil - Common Parameters

Incidental Ingestion of Onsite Soil

Selection = Arsenic	Type = Metal	Concentration = 1 mg/kg

Cleanup Target and Risks [1,6]					User-Specified Scenario	Navajo Nation Reference Scenarios					USEPA Default Scenario
Outputs	**Parameter**	**Description**		**Units**	**Custom**	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bí łíí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**	**PRG and RSL Calculator Default Resident**
Cleanup Targets [1]	Metal Cancer $PRG_{s\text{-}ing}$	Preliminary Remediation Goal based on the cancer toxicity for selected metal		mg/kg	29.7	18.5	43.1	1,300	5,140	86.2	77.2
	Metal Noncancer $PRG_{s\text{-}ing}$ [3]	Preliminary Remediation Goal based on the noncancer roxicity for selected metal		mg/kg	26.1	19.6	45.6	1,380	5,370	91.3	39.1
	Final Metal $PRG_{s\text{-}ing}$ [4, 5]	Preliminary Remediation Goal for the selected metal		mg/kg	26.1	18.5	43.1	1,300	5,140	86.2	39.1
Risks and Hazards	Lifetime Cancer Risk - Metals	Lifetime cancer risk for the selected metal		-	3.4E-06	5.4E-06	2.3E-06	7.7E-08	1.9E-08	1.2E-06	1.3E-06
	Noncancer Hazard - Metals	Noncancer hazard for the selected metal		-	3.8E-02	5.1E-02	2.2E-02	7.2E-04	1.9E-04	1.1E-02	2.6E-02
Inputs	**Parameter**	**Symbol**	**Description**	**Units**	**Custom**	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bí łíí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**	**PRG and RSL Calculator Default Resident**
Soil Ingestion Rate	Total Soil Ingestion Rate - Adult	IRS_a	Total mass of soil incidentally ingested over a day. Source for defaults: NNEPA 2021.	mg/day	200	360	360	30	15	180	100
	Total Soil Ingestion Rate - Child	IRS_c			300	400	400	33	17	200	200
Common Exposure Parameters	Exposure Duration - Adult	ED_a	Total years on site 6 years old and older.	years	69	69	69	69	69	69	20
	Exposure Duration - Child	ED_c	Total years on site 0 to 6 years old.		6	6	6	6	6	6	6
	Exposure Frequency - Adult	EF_a	Days per year spent onsite.	days/year	350	350	150	60	30	150	350
	Exposure Frequency - Child	EF_c			350	350	150	60	30	150	350
	Averaging Time - Cancer	AT_c	Lifetime in days.	days	27,375	27,375	27,375	27,375	27,375	27,375	25,550
	Averaging Time - Noncancer - Adult	AT_{nc}	Exposure duration x 365 days/year	days	25,185	25,185	25,185	25,185	25,185	25,185	7,300
	Averaging Time - Noncancer - Child	AT_{nc}	Exposure duration x 365 days/year	days	2,190	2,190	2,190	2,190	2,190	2,190	2,190
	Body Weight - Adult	BW_a	Average body weight 6 years old and older.	kilograms	80	80	80	80	80	80	80
	Body Weight - Child	BW_c	Average body weight 0 to 6 years old.		15	15	15	15	15	15	15
Risk and Toxicity	Target Risk	TR	The selected target cancer risk.	-	1E-04						
	Target Hazard Quotient	THQ	The selected target noncancer hazard quotient.	-	1						
	Oral Slope Factor - Soil	SF_s	The isotope-specific cancer toxicity value for soil ingestion pathway.	risk/pCi	--						
			The metal-specific cancer toxicity value for ingestion pathways.	$(mg/kg\text{-}day)^{-1}$	1.50E+00						
	Oral Reference Dose	RfD	The metal-specific non-cancer toxicity value for ingestion pathways.	(mg/kg-day)	3.00E-04						
	Relative Bioavailability	RBA	The bioavailability of constituent from soil.	-	0.6						
Conversion Factors	Conversion Factor 1	CF1	Convert grams to milligrams.	g/mg	1/1000						
	Conversion Factor 2	CF2	Convert kilograms to milligrams.	kg/mg	1/1,000,000						
	Conversion Factor 4	CF4	Convert kilograms to grams.	g/kg	1000.000						
	Conversion Factor 7	CF7	Convert pCi to Bq	pCi/Bq	27.027						

Notes:

1 The PRGs are calculated for the six scenarios in the tables below the notes (rows 65 through 127), and are looked up in rows 6 through 9 for the selected metal or radionuclide.
2 Pathway-specific radionuclide PRG for incidental ingestion of onsite soil.
3 The noncancer PRG is the lower of the child and adult noncancer hazard PRG.
4 Pathway-specific metal PRG for incidental ingestion of onsite soil.
5 The final metal PRG is the lower of the cancer risk PRG and the noncancer hazard PRG.
6 The risk and hazards are back-calculated using the selected TR or THQ, the appropriate PRG, and the concentration.

Attachment A - NAUM Calculation Tool

4 - Incidental Ingestion of Soil - Common Parameters

Note that for radionuclides, only 4 can be selected for summary-level input: Ra-226 in SE, U-238 in SE, Th-232 in SE, and K-40, but detailed calculations are shown for 5 other individual radionuclides.

-	Unitless
--	Not applicable
g/mg	Grams per milligram
kg/mg	Kilogram per milligrams
mg/day	Milligrams per day
mg/kg	Milligrams per kilogram
mg/kg-day	Milligrams per kilogram per day
pCi	Picocuries
pCi/g	Picocuries per gram

Equations:

$$PRG_{s-ing} = \frac{TR \times AT_c}{SF_s \times RBA \times \left[\frac{(ED_a \times EF_a \times IRS_a)}{BW_a} + \frac{(ED_c \times EF_c \times IRS_c)}{BW_c}\right] \times CF2}$$

$$PRG_{s-ing} = \frac{THQ \times AT_{nc} \times BW}{\frac{RBA}{RfD} \times ED \times EF \times IRS \times CF2}$$

$$PRG_{s-ing} = \frac{TR}{SF_s \times [(EF_a \times ED_a \times IRS_a) + (EF_c \times ED_c \times IRS_c)] \times CF1}$$

References:

NNEPA Superfund Program (NNEPA). 2021. Letter Regarding Navajo Specific Input Parameters—All Other Scenarios. From Dariel Yazzie, Environmental Assistant Director, Navajo Superfund Division. To Sona Chillingaryan, Manager, Tribal Lands Cleanup Section, Superfund Division, U.S. Environmental Protection Agency (USEPA) Region 9, and Sean Hogan, Manager, Tribal Lands Cleanup Section, Superfund Division, USEPA Region 9. September 15.

Formatting guide:		
Type of Worksheet Cell	**Category 1**	**Category 2**
User-editable inputs	**Inputs that can be changed, but only on the current worksheet. Most inputs have limits on the minimum and maximum values.**	**Inputs that can be changed, appear on the current worksheet AND other worksheets, and can be changed on any worksheet they appear on. These will update automatically if changed on any worksheet.**
Non-editable inputs	Inputs that are not receptor-specific. Some are entered on a different worksheet, others are calculated from editable inputs on this worksheet or another worksheet.	Receptor-specific inputs which cannot be edited by the user. Different shades of orange indicate the custom scenario (lightest), Navajo scenarios (lighter) and the USEPA default scenario (darker).
Input headers	In the input receptor column headers, different shades of green in indicate the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	In the input header rows and non-receptor column headers (such as this table), the medium shade indicates summary-level headers, and lightest shade indicates more detailed header information.
Outputs	Different shades of blue indicate outputs for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.
Output headers	Different shades of yellow indicate output headers for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.

Attachment A - NAUM Calculation Tool

4 - Incidental Ingestion of Soil

PRG Inputs for All Metals														
Parameter	**Receptor**	**Symbol**	**Description**	**Units**	**Aluminum**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Copper**
All	Oral Slope Factor	SF_s	The metal-specific cancer toxicity value for ingestion pathways.	$(mg/kg\text{-}day)^{-1}$	--	--	1.50E+00	--	--	--	--	--	--
	Oral Reference Dose	RfD	The metal-specific non-cancer toxicity value for ingestion pathways.	(mg/kg-day)	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02
	Relative Bioavailability	RBA	The bioavailability of constituent from soil.	-	1	1	0.6	1	1	1	1	1	1
PRG Calculations for All Metals														
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Aluminum**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Copper**
Custom	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	2.97E+01	--	--	--	--	--	--
	Metal Noncancer PRG, child				5.21E+04	2.09E+01	2.61E+01	1.04E+04	1.04E+02	5.21E+00	7.82E+04	1.56E+01	2.09E+03
	Metal Noncancer, adult				4.17E+05	1.67E+02	2.09E+02	8.34E+04	8.34E+02	4.17E+01	6.26E+05	1.25E+02	1.67E+04
	Metal Noncancer PRG				5.21E+04	2.09E+01	2.61E+01	1.04E+04	1.04E+02	5.21E+00	7.82E+04	1.56E+01	2.09E+03
	Final Metal PRG				5.21E+04	2.09E+01	2.61E+01	1.04E+04	1.04E+02	5.21E+00	7.82E+04	1.56E+01	2.09E+03
Kee'da'whíí téél (full-time Navajo residential)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	1.85E+01	--	--	--	--	--	--
	Metal Noncancer PRG, child				3.91E+04	1.56E+01	1.96E+01	7.82E+03	7.82E+01	3.91E+00	5.87E+04	1.17E+01	1.56E+03
	Metal Noncancer, adult				2.32E+05	9.27E+01	1.16E+02	4.63E+04	4.63E+02	2.32E+01	3.48E+05	6.95E+01	9.27E+03
	Metal Noncancer PRG				3.91E+04	1.56E+01	1.96E+01	7.82E+03	7.82E+01	3.91E+00	5.87E+04	1.17E+01	1.56E+03
	Final Metal PRG				3.91E+04	1.56E+01	1.85E+01	7.82E+03	7.82E+01	3.91E+00	5.87E+04	1.17E+01	1.56E+03
Kọọh bi łíí nakaí (sheep camp)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	4.31E+01	--	--	--	--	--	--
	Metal Noncancer PRG, child				9.13E+04	3.65E+01	4.56E+01	1.83E+04	1.83E+02	9.13E+00	1.37E+05	2.74E+01	3.65E+03
	Metal Noncancer, adult				5.41E+05	2.16E+02	2.70E+02	1.08E+05	1.08E+03	5.41E+01	8.11E+05	1.62E+02	2.16E+04
	Metal Noncancer PRG				9.13E+04	3.65E+01	4.56E+01	1.83E+04	1.83E+02	9.13E+00	1.37E+05	2.74E+01	3.65E+03
	Final Metal PRG				9.13E+04	3.65E+01	4.31E+01	1.83E+04	1.83E+02	9.13E+00	1.37E+05	2.74E+01	3.65E+03
Kọọ eí nahaazáh (easy access open space)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	1.30E+03	--	--	--	--	--	--
	Metal Noncancer PRG, child				2.77E+06	1.11E+03	1.38E+03	5.53E+05	5.53E+03	2.77E+02	4.15E+06	8.30E+02	1.11E+05
	Metal Noncancer, adult				1.62E+07	6.49E+03	8.11E+03	3.24E+06	3.24E+04	1.62E+03	2.43E+07	4.87E+03	6.49E+05
	Metal Noncancer PRG				2.77E+06	1.11E+03	1.38E+03	5.53E+05	5.53E+03	2.77E+02	4.15E+06	8.30E+02	1.11E+05
	Final Metal PRG				2.77E+06	1.11E+03	1.30E+03	5.53E+05	5.53E+03	2.77E+02	4.15E+06	8.30E+02	1.11E+05
Kọọ eí doo nahaazáh dah (difficult access open space)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	5.14E+03	--	--	--	--	--	--
	Metal Noncancer PRG, child				1.07E+07	4.29E+03	5.37E+03	2.15E+06	2.15E+04	1.07E+03	1.61E+07	3.22E+03	4.29E+05
	Metal Noncancer, adult				6.49E+07	2.60E+04	3.24E+04	1.30E+07	1.30E+05	6.49E+03	9.73E+07	1.95E+04	2.60E+06
	Metal Noncancer PRG				1.07E+07	4.29E+03	5.37E+03	2.15E+06	2.15E+04	1.07E+03	1.61E+07	3.22E+03	4.29E+05
	Final Metal PRG				1.07E+07	4.29E+03	5.14E+03	2.15E+06	2.15E+04	1.07E+03	1.61E+07	3.22E+03	4.29E+05
Chíí dah wiih łeezh (washes and drainages)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	8.62E+01	--	--	--	--	--	--
	Metal Noncancer PRG, child				1.83E+05	7.30E+01	9.13E+01	3.65E+04	3.65E+02	1.83E+01	2.74E+05	5.48E+01	7.30E+03
	Metal Noncancer, adult				1.08E+06	4.33E+02	5.41E+02	2.16E+05	2.16E+03	1.08E+02	1.62E+06	3.24E+02	4.33E+04
	Metal Noncancer PRG				1.83E+05	7.30E+01	9.13E+01	3.65E+04	3.65E+02	1.83E+01	2.74E+05	5.48E+01	7.30E+03
	Final Metal PRG				1.83E+05	7.30E+01	8.62E+01	3.65E+04	3.65E+02	1.83E+01	2.74E+05	5.48E+01	7.30E+03
PRG and RSL Calculator Default Resident	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	7.72E+01	--	--	--	--	--	--
	Metal Noncancer PRG, child				7.82E+04	3.13E+01	3.91E+01	1.56E+04	1.56E+02	7.82E+00	1.17E+05	2.35E+01	3.13E+03
	Metal Noncancer, adult				8.34E+05	3.34E+02	4.17E+02	1.67E+05	1.67E+03	8.34E+01	1.25E+06	2.50E+02	3.34E+04
	Metal Noncancer PRG				7.82E+04	3.13E+01	3.91E+01	1.56E+04	1.56E+02	7.82E+00	1.17E+05	2.35E+01	3.13E+03
	Final Metal PRG				7.82E+04	3.13E+01	3.91E+01	1.56E+04	1.56E+02	7.82E+00	1.17E+05	2.35E+01	3.13E+03

Attachment A - NAUM Calculation Tool

4 - Incidental Ingestion of Soil

PRG Inputs for All Metals													
Parameter	**Receptor**	**Symbol**	**Description**	**Units**	**Iron**	**Manganese**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Thallium**
All	Oral Slope Factor	SF_s	The metal-specific cancer toxicity value for ingestion pathways.	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Oral Reference Dose	RfD	The metal-specific non-cancer toxicity value for ingestion pathways.	(mg/kg-day)	7.00E-01	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05
	Relative Bioavailability	RBA	The bioavailability of constituent from soil.	-	1	1	1	1	1	1	1	1
PRG Calculations for All Metals												
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Iron**	**Manganese**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Thallium**
Custom	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				3.65E+04	1.25E+03	1.56E+01	2.61E+02	1.04E+03	2.61E+02	2.61E+02	5.21E-01
	Metal Noncancer, adult				2.92E+05	1.00E+04	1.25E+02	2.09E+03	8.34E+03	2.09E+03	2.09E+03	4.17E+00
	Metal Noncancer PRG				3.65E+04	1.25E+03	1.56E+01	2.61E+02	1.04E+03	2.61E+02	2.61E+02	5.21E-01
	Final Metal PRG				3.65E+04	1.25E+03	1.56E+01	2.61E+02	1.04E+03	2.61E+02	2.61E+02	5.21E-01
Kee'da'whíí tééh (full-time Navajo residential)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				2.74E+04	9.39E+02	1.17E+01	1.96E+02	7.82E+02	1.96E+02	1.96E+02	3.91E-01
	Metal Noncancer, adult				1.62E+05	5.56E+03	6.95E+01	1.16E+03	4.63E+03	1.16E+03	1.16E+03	2.32E+00
	Metal Noncancer PRG				2.74E+04	9.39E+02	1.17E+01	1.96E+02	7.82E+02	1.96E+02	1.96E+02	3.91E-01
	Final Metal PRG				2.74E+04	9.39E+02	1.17E+01	1.96E+02	7.82E+02	1.96E+02	1.96E+02	3.91E-01
Kǫǫh bí łíí nakaí (sheep camp)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				6.39E+04	2.19E+03	2.74E+01	4.56E+02	1.83E+03	4.56E+02	4.56E+02	9.13E-01
	Metal Noncancer, adult				3.79E+05	1.30E+04	1.62E+02	2.70E+03	1.08E+04	2.70E+03	2.70E+03	5.41E+00
	Metal Noncancer PRG				6.39E+04	2.19E+03	2.74E+01	4.56E+02	1.83E+03	4.56E+02	4.56E+02	9.13E-01
	Final Metal PRG				6.39E+04	2.19E+03	2.74E+01	4.56E+02	1.83E+03	4.56E+02	4.56E+02	9.13E-01
Kǫǫ eí nahaazáh (easy access open space)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				1.94E+06	6.64E+04	8.30E+02	1.38E+04	5.53E+04	1.38E+04	1.38E+04	2.77E+01
	Metal Noncancer, adult				1.14E+07	3.89E+05	4.87E+03	8.11E+04	3.24E+05	8.11E+04	8.11E+04	1.62E+02
	Metal Noncancer PRG				1.94E+06	6.64E+04	8.30E+02	1.38E+04	5.53E+04	1.38E+04	1.38E+04	2.77E+01
	Final Metal PRG				1.94E+06	6.64E+04	8.30E+02	1.38E+04	5.53E+04	1.38E+04	1.38E+04	2.77E+01
Kǫǫ eí doo nahaazáh dah (difficult access open space)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				7.51E+06	2.58E+05	3.22E+03	5.37E+04	2.15E+05	5.37E+04	5.37E+04	1.07E+02
	Metal Noncancer, adult				4.54E+07	1.56E+06	1.95E+04	3.24E+05	1.30E+06	3.24E+05	3.24E+05	6.49E+02
	Metal Noncancer PRG				7.51E+06	2.58E+05	3.22E+03	5.37E+04	2.15E+05	5.37E+04	5.37E+04	1.07E+02
	Final Metal PRG				7.51E+06	2.58E+05	3.22E+03	5.37E+04	2.15E+05	5.37E+04	5.37E+04	1.07E+02
Chíí dah wiih łeezh (washes and drainages)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				1.28E+05	4.38E+03	5.48E+01	9.13E+02	3.65E+03	9.13E+02	9.13E+02	1.83E+00
	Metal Noncancer, adult				7.57E+05	2.60E+04	3.24E+02	5.41E+03	2.16E+04	5.41E+03	5.41E+03	1.08E+01
	Metal Noncancer PRG				1.28E+05	4.38E+03	5.48E+01	9.13E+02	3.65E+03	9.13E+02	9.13E+02	1.83E+00
	Final Metal PRG				1.28E+05	4.38E+03	5.48E+01	9.13E+02	3.65E+03	9.13E+02	9.13E+02	1.83E+00
PRG and RSL Calculator Default Resident	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				5.48E+04	1.88E+03	2.35E+01	3.91E+02	1.56E+03	3.91E+02	3.91E+02	7.82E-01
	Metal Noncancer, adult				5.84E+05	2.00E+04	2.50E+02	4.17E+03	1.67E+04	4.17E+03	4.17E+03	8.34E+00
	Metal Noncancer PRG				5.48E+04	1.88E+03	2.35E+01	3.91E+02	1.56E+03	3.91E+02	3.91E+02	7.82E-01
	Final Metal PRG				5.48E+04	1.88E+03	2.35E+01	3.91E+02	1.56E+03	3.91E+02	3.91E+02	7.82E-01

Attachment A - NAUM Calculation Tool

4 - Incidental Ingestion of Soil

PRG Inputs for All Metals							
Parameter	**Receptor**	**Symbol**	**Description**	**Units**	**Uranium**	**Vanadium**	**Zinc**
All	Oral Slope Factor	SF_s	The metal-specific cancer toxicity value for ingestion pathways.	$(mg/kg\text{-}day)^{-1}$	--	--	--
	Oral Reference Dose	RfD	The metal-specific non-cancer toxicity value for ingestion pathways.	(mg/kg-day)	2.00E-04	5.00E-03	3.00E-01
	Relative Bioavailability	RBA	The bioavailability of constituent from soil.	-	1	1	1
PRG Calculations for All Metals							
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Uranium**	**Vanadium**	**Zinc**
Custom	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--
	Metal Noncancer PRG, child				1.04E+01	2.61E+02	1.56E+04
	Metal Noncancer, adult				8.34E+01	2.09E+03	1.25E+05
	Metal Noncancer PRG				1.04E+01	2.61E+02	1.56E+04
	Final Metal PRG				1.04E+01	2.61E+02	1.56E+04
Kee'da'whíí téél (full-time Navajo residential)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--
	Metal Noncancer PRG, child				7.82E+00	1.96E+02	1.17E+04
	Metal Noncancer, adult				4.63E+01	1.16E+03	6.95E+04
	Metal Noncancer PRG				7.82E+00	1.96E+02	1.17E+04
	Final Metal PRG				7.82E+00	1.96E+02	1.17E+04
Kǫǫh bí łíí nakaí (sheep camp)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--
	Metal Noncancer PRG, child				1.83E+01	4.56E+02	2.74E+04
	Metal Noncancer, adult				1.08E+02	2.70E+03	1.62E+05
	Metal Noncancer PRG				1.83E+01	4.56E+02	2.74E+04
	Final Metal PRG				1.83E+01	4.56E+02	2.74E+04
Kǫǫ eí nahaazáh (easy access open space)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--
	Metal Noncancer PRG, child				5.53E+02	1.38E+04	8.30E+05
	Metal Noncancer, adult				3.24E+03	8.11E+04	4.87E+06
	Metal Noncancer PRG				5.53E+02	1.38E+04	8.30E+05
	Final Metal PRG				5.53E+02	1.38E+04	8.30E+05
Kǫǫ eí doo nahaazáh dah (difficult access open space)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--
	Metal Noncancer PRG, child				2.15E+03	5.37E+04	3.22E+06
	Metal Noncancer, adult				1.30E+04	3.24E+05	1.95E+07
	Metal Noncancer PRG				2.15E+03	5.37E+04	3.22E+06
	Final Metal PRG				2.15E+03	5.37E+04	3.22E+06
Chíí dah wiih łeezh (washes and drainages)	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--
	Metal Noncancer PRG, child				3.65E+01	9.13E+02	5.48E+04
	Metal Noncancer, adult				2.16E+02	5.41E+03	3.24E+05
	Metal Noncancer PRG				3.65E+01	9.13E+02	5.48E+04
	Final Metal PRG				3.65E+01	9.13E+02	5.48E+04
PRG and RSL Calculator Default Resident	Metal Cancer	$PRG_{s\text{-}ing}$	See above	mg/kg	--	--	--
	Metal Noncancer PRG, child				1.56E+01	3.91E+02	2.35E+04
	Metal Noncancer, adult				1.67E+02	4.17E+03	2.50E+05
	Metal Noncancer PRG				1.56E+01	3.91E+02	2.35E+04
	Final Metal PRG				1.56E+01	3.91E+02	2.35E+04

Attachment A - NAUM Calculation Tool

4 - Incidental Ingestion of Soil

PRG Inputs for All Radionuclides													
Parameter	**Receptor**	**Symbol**	**Description**	**Units**	**Ra-226 in SE**	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Slope Factor	All	SF_s	The isotope-specific cancer toxicity value for soil ingestion pathway.	risk/pCi	5.69E-09	6.20E-09	2.90E-09	5.85E-11	1.72E-09	6.77E-10	1.66E-10	1.48E-10	1.34E-10
Decay Constant	All	λ	0.693/(half life)	$(years)^{-1}$	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
Decay Function	Custom	PRG_{decay}	$PRG_{decay} = \left(\frac{t_{year} \times \lambda}{1 - e^{-\lambda t_{year}}}\right)$	-	1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Kee'da'whíí tééh (full-time Navajo residential)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Kǫǫh bí łíí nakaí (sheep camp)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Kǫǫ eí nahaazáh (easy access open space)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Kǫǫ eí doo nahaazáh dah (difficult access open space)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Chíí dah wiih łeezh (washes and drainages)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	PRG and RSL Calculator Default Resident				1.00	1.00	1.00	1.00	1.46	1.01	1.00	1.00	1.00
PRG Calculations for All Radionuclides													
Parameter	**Receptor**	**Symbol**	**Description**	**Units**	**Ra-226 in SE**	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Rad PRG	Custom	$PRG_{s\text{-}ing}$	See above	pCi/g	3.22E+00	2.95E+00	6.32E+00	3.13E+02	2.76E+01	2.75E+01	1.10E+02	1.24E+02	1.37E+02
	Kee'da'whíí tééh (full-time Navajo residential)				1.84E+00	1.69E+00	3.62E+00	1.79E+02	1.58E+01	1.57E+01	6.32E+01	7.09E+01	7.83E+01
	Kǫǫh bí łíí nakaí (sheep camp)				4.30E+00	3.95E+00	8.44E+00	4.18E+02	3.68E+01	3.67E+01	1.47E+02	1.65E+02	1.83E+02
	Kǫǫ eí nahaazáh (easy access open space)				1.29E+02	1.19E+02	2.53E+02	1.26E+04	1.11E+03	1.10E+03	4.43E+03	4.97E+03	5.48E+03
	Chíí dah wiih łeezh (washes and drainages)				5.15E+02	4.73E+02	1.01E+03	5.01E+04	4.41E+03	4.40E+03	1.77E+04	1.98E+04	2.19E+04
	Chíí dah wiih łeezh (washes and drainages)				8.60E+00	7.89E+00	1.69E+01	8.37E+02	7.37E+01	7.35E+01	2.95E+02	3.31E+02	3.65E+02
	PRG and RSL Calculator Default Resident				1.57E+01	1.44E+01	3.08E+01	1.53E+03	7.58E+01	1.33E+02	5.38E+02	6.03E+02	6.66E+02

Attachment A - NAUM Calculation Tool

5. Dermal Exposure to Soil

Dermal Contact with Onsite Soil Exposure

Selection = Arsenic	Type = Metal	Concentration = 1 mg/kg

Cleanup Target and Risks [1,6]				User-Specified Scenario	Navajo Nation Reference Scenarios					USEPA Default Scenario
Outputs	**Parameter**	**Description**	**Units**	**Custom**	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bí líí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**	**PRG and RSL Calculator Default Resident**
Cleanup Targets	Metal Cancer PRG_{derm}	Preliminary Remediation Goal based on the cancer toxicity for selected metal	mg/kg	314	314	732	1,830	3,660	732	549
	Metal Noncancer PRG_{derm} [2]	Preliminary Remediation Goal based on the noncancer roxicity for selected metal	mg/kg	330	330	769	1,920	3,850	769	330
	Final Metal PRG_{derm} [3,4]	Preliminary Remediation Goal for the selected metal	mg/kg	314	314	732	1,830	3,660	732	330
Risks and Hazards	Lifetime Cancer Risk - Metals	Lifetime cancer risk for the selected metal	-	3.2E-07	3.2E-07	1.4E-07	5.5E-08	2.7E-08	1.4E-07	1.8E-07
	Noncancer Hazard - Metals	Noncancer hazard for the selected metal	-	3.0E-03	3.0E-03	1.3E-03	5.2E-04	2.6E-04	1.3E-03	3.0E-03

Inputs	**Parameter**	**Symbol**	**Description**	**Units**	**Custom**	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bí líí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**	**PRG and RSL Calculator Default Resident**
Dermal Exposure Inputs	Surface Area - Adult	SA_a	Total exposed skin area of body. Source for defaults: NNEPA 2021.	cm^2/day	6,032	6,032	6,032	6,032	6,032	6,032	6,032
	Surface Area - Child	SA_c			2,373	2,373	2,373	2,373	2,373	2,373	2,373
	Adherence Factor - Adult	AF_a	Soil adherence factor to exposed skin. Source for defaults: NNEPA 2021.	mg/cm^2	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	Adherence Factor - Child	AF_c			0.2	0.2	0.2	0.2	0.2	0.2	0.2
Common Exposure Parameters	Exposure Duration - Adult	ED_a	Total years on site 6 years old and older.	years	69	69	69	69	69	69	20
	Exposure Duration - Child	ED_c	Total years on site 0 to 6 years old.		6	6	6	6	6	6	6
	Exposure Frequency - Adult	EF_a	Days per year spent onsite.	days/year	350	350	150	60	30	150	350
	Exposure Frequency - Child	EF_c			350	350	150	60	30	150	350
	Averaging Time - Cancer	AT_c	Lifetime in days.	days	27,375	27,375	27,375	27,375	27,375	27,375	25,550
	Averaging Time - Noncancer - Adult	AT_{nc}	Exposure duration x 365 days/year.	days	25,185	25,185	25,185	25,185	25,185	25,185	7,300
	Averaging Time - Noncancer - Child	AT_{nc}	Exposure duration x 365 days/year.	days	2,190	2,190	2,190	2,190	2,190	2,190	2,190
	Body Weight - Adult	BW_a	Average body weight 6 years old and older.	kg	80	80	80	80	80	80	80
	Body Weight - Child	BW_c	Average body weight 0 to 6 years old.		15	15	15	15	15	15	15
Risk and Toxicity	Target Risk	TR	The selected target cancer risk.	-	1E-04						
	Target Hazard Quotient	THQ	The selected target noncancer hazard quotient.	-	1						
	Oral Slope Factor - Soil	SFs	The metal-specific cancer toxicity value for ingestion pathways.	$(mg/kg\text{-}day)^{-1}$	1.50E+00						
	Oral Reference Dose	RfD	The metal-specific non-cancer toxicity value for ingestion pathways.	(mg/kg-day)	3.00E-04						
	Gastrointestinal Absorption Factor	GIABS	The metal-specific dermal absorption factor that adjusts the toxicity values for the dermal pathway.	-	1						
	Absorption Factor	ABS_d	The metal-specific dermal absorption factor.	-	0.03						
Conversion Factors	Conversion Factor 2	CF2	Convert kilograms to milligrams.	kg/mg	1/1,000,000						

Attachment A - NAUM Calculation Tool

5 - Dermal Exposure to Soil

Notes:

1	The PRGs are calculated for the six scenarios in the tables below the notes (rows 62 through 104), and in rows 7 through 9, the values are looked up for the selected metal. If a metal has no dermal absorption factor (ABS_d) value, no PRGs will be shown.
2	The noncancer PRG is the lower of the child and adult noncancer hazard PRG.
3	Pathway-specific metal PRG for dermal contact with onsite soil.
4	The final metal PRG is the lower of the cancer risk PRG and the noncancer hazard PRG.
5	The risk and hazards are back-calculated using the selected TR or THQ, the appropriate PRG, and the concentration.
-	Unitless
--	Not applicable
cm^2/day	Square centimeters per day
g/mg	Grams per milligram
mg/day	Milligrams per day
mg/kg	Milligrams per kilogram
pCi	Picocuries
pCi/g	Picocuries per gram

Equations:

$$PRG_{derm} = \frac{TR \times AT_c}{\frac{SF}{GIABS} \times \left[\frac{(ED_a \times EF_a \times SA_a \times AF_a)}{BW_a} + \frac{(ED_c \times EF_c \times SA_c \times AF_c)}{BW_c}\right] \times CF2}$$

$$PRG_{derm} = \frac{THQ \times AT_{nc} \times BW}{\frac{1}{RfD \times GIABS} \times ED \times EF \times SA \times AF \times ABS_s \times CF2}$$

References:

NNEPA Superfund Program (NNEPA). 2021. Letter Regarding Navajo Specific Input Parameters—All Other Scenarios. From Dariel Yazzie, Environmental Assistant Director, Navajo Superfund Division. To Sona Chillingaryan, Manager, Tribal Lands Cleanup Section, Superfund Division, U.S. Environmental Protection Agency (USEPA) Region 9, and Sean Hogan, Manager, Tribal Lands Cleanup Section, Superfund Division, USEPA Region 9. September 15.

Formatting guide:		
Type of Worksheet Cell	**Category 1**	**Category 2**
User-editable inputs	**Inputs that can be changed, but only on the current worksheet. Most inputs have limits on the minimum and maximum values.**	**Inputs that can be changed, appear on the current worksheet AND other worksheets, and can be changed on any worksheet they appear on. These will update automatically if changed on any worksheet.**
Non-editable inputs	Inputs that are not receptor-specific. Some are entered on a different worksheet, others are calculated from editable inputs on this worksheet or another worksheet.	Receptor-specific inputs which cannot be edited by the user. Different shades of orange indicate the custom scenario (lightest), Navajo scenarios (lighter) and the USEPA default scenario (darker).
Input headers	In the input receptor column headers, different shades of green in indicate the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	In the input header rows and non-receptor column headers (such as this table), the medium shade indicates summary-level headers, and lightest shade indicates more detailed header information.
Outputs	Different shades of blue indicate outputs for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.
Output headers	Different shades of yellow indicate output headers for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.

Attachment A - NAUM Calculation Tool

5 - Dermal Exposure to Soil

PRG Inputs for All Metals														
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Aluminum**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Copper**	**Iron**
All	Oral Slope Factor	SF_s	The metal-specific cancer toxicity value for ingestion pathways.	$(mg/kg\text{-}day)^{-1}$	--	--	1.50E+00	--	--	--	--	--	--	--
	Oral Reference Dose	RfD	The metal-specific non-cancer toxicity value for ingestion pathways.	(mg/kg-day)	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01
	Gastrointestinal Absorption Factor	GIABS	The metal-specific dermal absorption factor that adjusts the toxicity values for the dermal pathway.	Unitless	1	0.15	1	0.07	0.007	0.025	0.013	1	1	1
	Absorption Factor	ABS_d	The metal-specific dermal absorption factor.		--	--	0.03	--	--	0.001	--	--	--	--
PRG Calculations for All Metals														
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Aluminum**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Copper**	**Iron**
User-Specified Scenario - Custom	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	3.14E+02	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	3.30E+02	--	--	8.24E+01	--	--	--	--
	Metal Noncancer, adult				--	--	1.98E+03	--	--	4.94E+02	--	--	--	--
	Metal Noncancer PRG				--	--	3.30E+02	--	--	8.24E+01	--	--	--	--
	Final Metal PRG				--	--	3.14E+02	--	--	8.24E+01	--	--	--	--
Navajo Nation Reference Scenarios - Kee'da'whíí téél (full-time Navajo residential)	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	3.14E+02	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	3.30E+02	--	--	8.24E+01	--	--	--	--
	Metal Noncancer, adult				--	--	1.98E+03	--	--	4.94E+02	--	--	--	--
	Metal Noncancer PRG				--	--	3.30E+02	--	--	8.24E+01	--	--	--	--
	Final Metal PRG				--	--	3.14E+02	--	--	8.24E+01	--	--	--	--
Kǫǫh bí łíí nakaí (sheep camp)	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	7.32E+02	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	7.69E+02	--	--	1.92E+02	--	--	--	--
	Metal Noncancer, adult				--	--	4.61E+03	--	--	1.15E+03	--	--	--	--
	Metal Noncancer PRG				--	--	7.69E+02	--	--	1.92E+02	--	--	--	--
	Final Metal PRG				--	--	7.32E+02	--	--	1.92E+02	--	--	--	--
Kǫǫ eí nahaazáh (easy access open space)	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	1.83E+03	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	1.92E+03	--	--	4.81E+02	--	--	--	--
	Metal Noncancer, adult				--	--	1.15E+04	--	--	2.88E+03	--	--	--	--
	Metal Noncancer PRG				--	--	1.92E+03	--	--	4.81E+02	--	--	--	--
	Final Metal PRG				--	--	1.83E+03	--	--	4.81E+02	--	--	--	--
Kǫǫ eí doo nahaazáh dah (difficult access open space)	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	3.66E+03	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	3.85E+03	--	--	9.61E+02	--	--	--	--
	Metal Noncancer, adult				--	--	2.31E+04	--	--	5.76E+03	--	--	--	--
	Metal Noncancer PRG				--	--	3.85E+03	--	--	9.61E+02	--	--	--	--
	Final Metal PRG				--	--	3.66E+03	--	--	9.61E+02	--	--	--	--
- Chíí dah wiih łeezh (washes and drainages)	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	7.32E+02	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	7.69E+02	--	--	1.92E+02	--	--	--	--
	Metal Noncancer, adult				--	--	4.61E+03	--	--	1.15E+03	--	--	--	--
	Metal Noncancer PRG				--	--	7.69E+02	--	--	1.92E+02	--	--	--	--
	Final Metal PRG				--	--	7.32E+02	--	--	1.92E+02	--	--	--	--
- PRG and RSL Calculator Default Resident	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	5.49E+02	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	3.30E+02	--	--	8.24E+01	--	--	--	--
	Metal Noncancer, adult				--	--	1.98E+03	--	--	4.94E+02	--	--	--	--
	Metal Noncancer PRG				--	--	3.30E+02	--	--	8.24E+01	--	--	--	--
	Final Metal PRG				--	--	3.30E+02	--	--	8.24E+01	--	--	--	--

Attachment A - NAUM Calculation Tool

5 - Dermal Exposure to Soil

PRG Inputs for All Metals														
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Manganese**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Thallium**	**Uranium**	**Vanadium**	**Zinc**
All	Oral Slope Factor	SF_s	The metal-specific cancer toxicity value for ingestion pathways.	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--	--	--
	Oral Reference Dose	RfD	The metal-specific non-cancer toxicity value for ingestion pathways.	(mg/kg-day)	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
	Gastrointestinal Absorption Factor	GIABS	The metal-specific dermal absorption factor that adjusts the toxicity values for the dermal pathway.	Unitless	0.04	0.07	1	0.04	1	0.04	1	1	0.026	1
	Absorption Factor	ABS_d	The metal-specific dermal absorption factor.		--	--	--	--	--	--	--	--	--	--
PRG Calculations for All Metals														
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Manganese**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Thallium**	**Uranium**	**Vanadium**	**Zinc**
User-Specified Scenario - Custom	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer, adult				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG				--	--	--	--	--	--	--	--	--	--
	Final Metal PRG				--	--	--	--	--	--	--	--	--	--
Navajo Nation Reference Scenarios - Kee'da'whíí tééh (full-time Navajo residential)	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer, adult				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG				--	--	--	--	--	--	--	--	--	--
	Final Metal PRG				--	--	--	--	--	--	--	--	--	--
Kǫǫh bí łíí nakaí (sheep camp)	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer, adult				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG				--	--	--	--	--	--	--	--	--	--
	Final Metal PRG				--	--	--	--	--	--	--	--	--	--
Kǫǫ eí nahaazáh (easy access open space)	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer, adult				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG				--	--	--	--	--	--	--	--	--	--
	Final Metal PRG				--	--	--	--	--	--	--	--	--	--
Kǫǫ eí doo nahaazáh dah (difficult access open space)	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer, adult				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG				--	--	--	--	--	--	--	--	--	--
	Final Metal PRG				--	--	--	--	--	--	--	--	--	--
- Chíí dah wiih łeezh (washes and drainages)	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer, adult				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG				--	--	--	--	--	--	--	--	--	--
	Final Metal PRG				--	--	--	--	--	--	--	--	--	--
- PRG and RSL Calculator Default Resident	Metal Cancer	PRG_{derm}	See above	mg/kg	--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG, child				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer, adult				--	--	--	--	--	--	--	--	--	--
	Metal Noncancer PRG				--	--	--	--	--	--	--	--	--	--
	Final Metal PRG				--	--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

6 - Soil Dust Inhalation

Inhalation of Dust from Onsite Soil Exposure

Selection = Arsenic	Type = Metal	Concentration = 1 mg/kg

Cleanup Target and Risks [1,6]				User-Specified Scenario	Navajo Nation Reference Scenarios					USEPA Default Scenario
Outputs	**Parameter**	**Description**	**Units**	**Custom**	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bi łíí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**	**PRG and RSL Calculator Default Resident**
Cleanup Targets	Metal Cancer PRG_{inh}	Preliminary Remediation Goal based on the cancer toxicity for selected metal	mg/kg	72,000	175,000	408,000	1,020,000	2,040,000	408,000	88,800
	Metal Noncancer PRG_{inh} [3]	Preliminary Remediation Goal based on the noncancer roxicity for selected metal	mg/kg	46,400	113,000	263,000	658,000	1,320,000	263,000	21,300
	Final Metal PRG_{inh} [4, 5]	Preliminary Remediation Goal for the selected metal	mg/kg	46,400	113,000	263,000	658,000	1,320,000	263,000	21,300
Risks and Hazards	Cancer Risk - Metals	Lifetime cancer risk for the selected metal	-	1.4E-09	5.7E-10	2.5E-10	9.8E-11	4.9E-11	2.5E-10	1.1E-09
	Noncancer Hazard - Metals	Noncancer hazard for the selected metal	-	2.2E-05	8.8E-06	3.8E-06	1.5E-06	7.6E-07	3.8E-06	4.7E-05

Parameter		Symbol	Description	Units	Custom	Kee'da'whíí téél (full-time Navajo residential)	Kǫǫh bi łíí nakaí (sheep camp)	Kǫǫ eí nahaazáh (easy access open space)	Kǫǫ eí doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)	PRG and RSL Calculator Default Resident
Inhalation Rate While Onsite	Inhalation Rate - Adult	IRA_a	Air inhalation rate while onsite for adult. Source for defaults: NNEPA 2021.	m^3/day	25	25	25	25	25	25	20
	Inhalation Rate - Child	IRA_c	Air inhalation rate while onsite for child. Source for defaults: NNEPA 2021.	m^3/day	10	10	10	10	10	10	10
	Exposure Time - Adult	ET_a	Exposure time for inhalation pathway. Source for defaults: NNEPA 2021.	hours/day	22	22	22	22	22	22	24
	Exposure Time - Child	ET_c	Exposure time for inhalation pathway. Source for defaults: NNEPA 2021.	hours/day	22	22	22	22	22	22	24
Site-Specific Inputs for Soil Erodibility	City/Climatic Zone	-	Select nearest city from pull down menu. Source for defaults: Nearest city.	-	Albuquerque, NM	Albuquerque, NM	Albuquerque, NM	Albuquerque, NM	Albuquerque, NM	Albuquerque, NM	Default
	Mean Annual Wind Speed - Custom	U_m	Enter custom value or NA to look up wind speed based on City/Climatic Zone	-	NA	NA	NA	NA	NA	NA	NA
	Mean Annual Wind Speed - Final		Autofill from city selection or enter site-specific value, if available.	m/s	4.02	4.02	4.02	4.02	4.02	4.02	4.69
	Areal extent of site surface soil contamination	A_s	Model allows range between 0.5 and 500 acres.	acres	159.00	0.5	0.5	0.5	0.5	0.5	0.5
	Fraction of Vegetative Cover	V	Percentage of site covered in vegetation that prevents windblown dust. Source for defaults: EPA 2022a, 2022b.	-	0.50	0.5	0.5	0.5	0.5	0.50	0.50
	Dispersion constant A	A	The dispersion constants were taken from Exhibit D-2 of the Supplemental Soil Screening Guidance (USEPA 2002).	-	14.9421	14.94	14.94	14.94	14.94	14.94	16.23
	Dispersion constant B	B			17.9869	17.99	17.99	17.99	17.99	17.99	18.78
	Dispersion constant C	C			205.178	205.18	205.18	205.18	205.18	205.18	216.11
	Inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source.	Q/C_{wind}	Calculated (see equation below).	g/m^2-s per kg/m^3	33.70	81.85	81.85	81.85	81.85	81.85	93.77
	Equivalent Threshold Value	U_t	Threshold friction velocity at 7 meters.	m/s	11.32	11.32	11.32	11.32	11.32	11.32	11.32
	Calculated value dependent on U_m/U_t	x	Calculated (see equation below). Value from Soil Screening Guidance Technical Background Document (USEPA 1996) Appendix D, Table 2.	-	2.49	2.49	2.49	2.49	2.49	2.49	2.14
	Function dependent on value of U_m/U_t	F(x)	Value from Soil Screening Guidance Technical Background Document (USEPA 1996) Appendix D, Table 2.	-	5.53E-02	5.53E-02	5.53E-02	5.53E-02	5.53E-02	5.53E-02	1.94E-01
	Particulate Emission Factor	PEF	Calculated (see equation below).	m^3/kg	2.72E+09	6.61E+09	6.61E+09	6.61E+09	6.61E+09	6.61E+09	1.36E+09
Common Exposure Parameters	Exposure Duration - Adult	ED_a	Total years on site 6 years old and older.	years	69	69	69	69	69	69	20
	Exposure Duration - Child	ED_c	Total years on site 0 to 6 years old.		6	6	6	6	6	6	6
	Averaging Time - Cancer	AT_c	Lifetime in days.	days	27,375	27,375	27,375	27,375	27,375	27,375	25,550
	Averaging Time - Noncancer - Adult	AT_{nc}	Exposure duration x 365 days/year	days	25,185	25,185	25,185	25,185	25,185	25,185	7,300
	Averaging Time - Noncancer - Child	AT_{nc}	Exposure duration x 365 days/year	days	2,190	2,190	2,190	2,190	2,190	2,190	2,190
	Exposure Frequency - Adult	EF_a	Days per year spent onsite.	days/year	350	350	150	60	30	150	350
	Exposure Frequency - Child	EF_c			350	350	150	60	30	150	350
Risk and Toxicity	Target Risk	TR	The selected target cancer risk.	-	1E-04						
	Target Hazard Quotient	THQ	The selected target noncancer hazard quotient.	-	1						
	Slope Factor - Inhalation	SF_i	The isotope-specific cancer toxicity value for the inhalation pathway.	risk/pCi	--						
	Inhalation Unit Risk	IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(\mu g/m^3)^{-1}$	4.30E-03						
	Inhalation Reference Concentration	RfC	The metal-specific cancer toxicity value for the inhalation pathway.	(mg/m^3)	1.50E-05						
Conversion Factors	Conversion Factor 3	CF3	Convert days to hours.	day/hours	1/24						
	Conversion Factor 4	CF4	Convert kilograms to grams.	g/kg	1E+03						
	Conversion Factor 7	CF7	Convert pCi to Bq	pCi/Bq	3E+01						

Attachment A - NAUM Calculation Tool
6 - Soil Dust Inhalation

Notes:

1	The PRGs are calculated for the six scenarios in the tables below the notes (rows 153 through 214), and are looked up in rows 6 through 9 for the selected metal or radionuclide. If a metal has no inhalation reference concentration (RfC) value, no PRGs will be shown.
2	Pathway-specific radionuclide PRG for inhalation of onsite soil.
3	The noncancer PRG is the lower of the child and adult noncancer hazard PRG.
4	Pathway-specific metal PRG for inhalation of onsite soil.
5	The final metal PRG is the lower of the cancer risk PRG and the noncancer hazard PRG.
6	The risk and hazards are back-calculated using the selected TR or THQ, the appropriate PRG, and the concentration. Note that for radionuclides, only 4 can be selected for summary-level input: Ra-226 in SE, U-238 in SE, Th-232 in SE, and K-40, but detailed calculations are shown for 5 other individual radionuclides.
-	Unitless
--	Not applicable
$\mu g/m^3$	Micrograms per cubic meters
g/kg	Grams per kilogram
g/m^2-s per kg/m^3	Grams per square meter-second per kilogram per cubic meter
m/s	meters per second
m^3/day	Cubic meters per day
m^3/kg	Cubic meters per kilogram
mg/m^3	Milligrams per cubic meters
pCi	Picocuries
pCi/g	Picocuries per gram

Equations:

$$PRG_{inh} = \frac{TR \times AT_c}{IUR \times [(EF_a \times ED_a \times ET_a) + (EF_c \times ED_c \times ET_c)] \times \frac{1}{PEF} \times CF3 \times CF4}$$

$$PRG_{inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times [(EF_a \times ED_a \times ET_a) + (EF_c \times ED_c \times ET_c)] \times \frac{1}{PEF} \times CF3}$$

$$PRG_{inh} = \frac{TR}{SF_i \times [(ED_a \times EF_a \times ET_a \times IRA_a) + (ED_c \times EF_c \times ET_c \times IRA_c)] \times \frac{1}{PEF} \times CF3 \times CF4}$$

References:

EPA. 2022a. PRG User's Guide. May

EPA. 2022b. Regional Screening Levels (RSLs) User's Guide. May 18.

NNEPA Superfund Program (NNEPA). 2021. Letter Regarding Navajo Specific Input Parameters—All Other Scenarios. From Dariel Yazzie, Environmental Assistant Director, Navajo Superfund Division. To Sona Chillingaryan, Manager, Tribal Lands Cleanup Section, Superfund Division, U.S. Environmental Protection Agency (USEPA) Region 9, and Sean Hogan, Manager, Tribal Lands Cleanup Section, Superfund Division, USEPA Region 9. September 15.

Formatting guide:		
Type of Worksheet Cell	**Category 1**	**Category 2**
User-editable inputs	**Inputs that can be changed, but only on the current worksheet. Most inputs have limits on the minimum and maximum values.**	**Inputs that can be changed, appear on the current worksheet AND other worksheets, and can be changed on any worksheet they appear on. These will update automatically if changed on any worksheet.**
Non-editable inputs	Inputs that are not receptor-specific. Some are entered on a different worksheet, others are calculated from editable inputs on this worksheet or another worksheet.	Receptor-specific inputs which cannot be edited by the user. Different shades of orange indicate the custom scenario (lightest), Navajo scenarios (lighter) and the USEPA default scenario (darker).
Input headers	In the input receptor column headers, different shades of green in indicate the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	In the input header rows and non-receptor column headers (such as this table), the medium shade indicates summary-level headers, and lightest shade indicates more detailed header information.
Outputs	Different shades of blue indicate outputs for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.
Output headers	Different shades of yellow indicate output headers for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.

PEF Equations (USEPA 1996, 2002, 2020):

$$PEF\left(\frac{m^3_{air}}{kg_{soil}}\right) = \frac{Q}{C_{wind}}\left(\frac{\left(\frac{g}{m^2\text{-}s}\right)}{\left(\frac{kg}{m^3}\right)}\right) \times \frac{3{,}600\left(\frac{s}{hour}\right)}{0.036\times(1-V)\times\left(\frac{U_m\left(\frac{m}{s}\right)}{U_t\left(\frac{m}{s}\right)}\right)^3 \times F(x)}$$

where:

$$\frac{Q}{C_{wind}} = A\times\exp\left[\frac{\left(\ln A_s(\text{unu})-B\right)^2}{C}\right]$$

and:

$$\text{if } x<2, F(x) = 1.91207 - 0.0274985x + 0.449113x^2 - 1.09871x^3 + 0.549541x^4$$

$$\text{if } x\geq 2, F(x) = 0.19\left(8x^3+12x\right)e^{\left(-x^2\right)}$$

where:

$$x = 0.886\times\left(\frac{U_t}{U_m}\right)$$

References:

United States Environmental Protection Agency (USEPA). 1996. Soil Screening Guidance: Technical Background Document. EPA/540/R95/128. May. https://rais.ornl.gov/documents/SSG_nonrad_technical.pdf

USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24 . December. https://rais.ornl.gov/documents/SSG_nonrad_supplemental.pdf

USEPA. 2020. Preliminary Remediation Goals for Radionuclides (PRG). https://epa-prgs.ornl.gov/radionuclides/

Attachment A - NAUM Calculation Tool

6 - Soil Dust Inhalation

VALUES FOR THE PARTICULATE EMISSION FACTOR (PEF) EQUATIONS

Meteorological Station	A Constant	B Constant	C Constant	U_m Mean Annual Wind Speed (m/s)	x	F(x)
Default	16.2302	18.7762	216.1080	4.69	2.14	1.94E-01
Albuquerque, NM	14.9421	17.9869	205.1782	4.02	2.49	5.53E-02
Atlanta, GA	14.8349	17.9259	204.1516	4.07	2.47	6.16E-02
Bismarck, ND	15.0235	18.2526	207.3387	4.6	2.18	1.70E-01
Boise, ID	11.3161	19.6437	224.8172	3.98	2.52	4.95E-02
Casper, WY	7.1414	31.1794	382.6078	5.77	1.74	5.70E-01
Charleston, SC	13.7674	18.0441	204.8689	3.89	2.58	3.91E-02
Chicago, IL	16.8653	18.7848	215.0624	4.65	2.16	1.82E-01
Cleveland, OH	12.8612	20.5164	237.2798	4.83	2.08	2.32E-01
Denver, CO	11.3612	19.3324	221.2167	3.93	2.55	4.41E-02
Fresno, CA	10.2152	19.2654	220.0604	2.86	3.51	3.19E-04
Harrisburg, PA	15.5169	18.4248	211.7679	3.44	2.91	8.60E-03
Hartford, CT	12.5907	18.8368	215.4377	3.84	2.61	3.45E-02
Houston, TX	13.6482	18.1754	206.7273	3.49	2.88	1.03E-02
Huntington, WV	9.9253	18.6636	211.8862	2.91	3.45	4.45E-04
Las Vegas, NV	13.3093	19.8387	230.1652	4.07	2.47	6.16E-02
Lincoln, NE	14.1901	18.5634	210.5281	4.65	2.16	1.82E-01
Little Rock, AR	12.4964	18.4476	210.2128	3.58	2.8	1.45E-02
Los Angeles, CA	11.9110	18.4385	209.7845	3.31	3.03	4.74E-03
Miami, FL	12.1960	19.0645	215.3923	4.11	2.44	6.82E-02
Minneapolis, MN	16.2302	18.7762	216.1080	4.69	2.14	1.94E-01
Philadelphia, PA	14.0111	19.6154	225.3397	4.29	2.34	9.93E-02
Phoenix, AZ	10.2871	18.7124	212.2704	2.82	3.56	2.25E-04
Portland, ME	10.4660	20.9077	238.0318	3.89	2.58	3.91E-02
Raleigh, NC	12.3675	18.6337	212.7284	3.44	2.91	8.60E-03
Salem, OR	12.3783	18.9683	218.2086	3.13	3.21	1.87E-03
Salt Lake City, UT	13.2559	19.2978	221.3379	3.93	2.55	4.41E-02
San Francisco, CA	13.8139	20.1624	234.2869	3.89	2.58	3.91E-02
Seattle, WA	14.2253	18.8366	218.1845	4.07	2.47	6.16E-02
Winnemucca, NV	12.8784	17.9804	204.1028	3.53	2.84	1.23E-02

Notes:

Dispersion constants from Exhibit E-3, Supplemental Soil Screening Guidance (USEAP 2002), Appendix D (equivalent to Exhibit D-2).

Mean Annual Wind Speed and F(x) from Soil Screening Guidance Technical Background Document (USEPA 1996) Appendix D Table 2.

References:

USEPA. 1996. Soil Screening Guidance: Technical Background Document. EPA/540/R95/128. May. https://rais.ornl.gov/documents/SSG_nonrad_technical.pdf

USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24 . December. https://rais.ornl.gov/documents/SSG_nonrad_supplemental.pdf

Attachment A - NAUM Calculation Tool

6. Soil Dust Inhalation

PRG Inputs for All Metals															
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Aluminum**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Copper**	**Iron**
All	Inhalation Unit Risk	IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(\mu g/m^3)^{-1}$	--	--	4.30E-03	--	2.40E-03	1.80E-03	--	9.00E-03	--	--
	Inhalation Reference Concentration	RfC	The metal-specific noncancer toxicity value for the inhalation pathway.	(mg/m^3)	5.00E-03	3.00E-04	1.50E-05	5.00E-04	2.00E-05	1.00E-05	--	6.00E-06	--	--
PRG Calculations for All Metals															
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Aluminum**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Copper**	**Iron**
Custom	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	1.75E+05	--	3.13E+05	4.18E+05	--	8.36E+04	--	--
	Metal Noncancer PRG, child				3.76E+07	2.26E+06	1.13E+05	3.76E+06	1.50E+05	7.52E+04	--	4.51E+04	--	--
	Metal Noncancer, adult				3.76E+07	2.26E+06	1.13E+05	3.76E+06	1.50E+05	7.52E+04	--	4.51E+04	--	--
	Metal Noncancer PRG				3.76E+07	2.26E+06	1.13E+05	3.76E+06	1.50E+05	7.52E+04	--	4.51E+04	--	--
	Final Metal PRG				3.76E+07	2.26E+06	1.13E+05	3.76E+06	1.50E+05	7.52E+04	--	4.51E+04	--	--
Kee'da'whíí tééh (full-time Navajo residential)	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	1.75E+05	--	3.13E+05	4.18E+05	--	8.36E+04	--	--
	Metal Noncancer PRG, child				3.76E+07	2.26E+06	1.13E+05	3.76E+06	1.50E+05	7.52E+04	--	4.51E+04	--	--
	Metal Noncancer, adult				3.76E+07	2.26E+06	1.13E+05	3.76E+06	1.50E+05	7.52E+04	--	4.51E+04	--	--
	Metal Noncancer PRG				3.76E+07	2.26E+06	1.13E+05	3.76E+06	1.50E+05	7.52E+04	--	4.51E+04	--	--
	Final Metal PRG				3.76E+07	2.26E+06	1.13E+05	3.76E+06	1.50E+05	7.52E+04	--	4.51E+04	--	--
Kǫǫh bí łíí nakaí (sheep camp)	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	4.08E+05	--	7.31E+05	9.75E+05	--	1.95E+05	--	--
	Metal Noncancer PRG, child				8.77E+07	5.26E+06	2.63E+05	8.77E+06	3.51E+05	1.75E+05	--	1.05E+05	--	--
	Metal Noncancer, adult				8.77E+07	5.26E+06	2.63E+05	8.77E+06	3.51E+05	1.75E+05	--	1.05E+05	--	--
	Metal Noncancer PRG				8.77E+07	5.26E+06	2.63E+05	8.77E+06	3.51E+05	1.75E+05	--	1.05E+05	--	--
	Final Metal PRG				8.77E+07	5.26E+06	2.63E+05	8.77E+06	3.51E+05	1.75E+05	--	1.05E+05	--	--
Kǫǫ eí nahaazáh (easy access open space)	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	1.02E+06	--	1.83E+06	2.44E+06	--	4.87E+05	--	--
	Metal Noncancer PRG, child				2.19E+08	1.32E+07	6.58E+05	2.19E+07	8.77E+05	4.39E+05	--	2.63E+05	--	--
	Metal Noncancer, adult				2.19E+08	1.32E+07	6.58E+05	2.19E+07	8.77E+05	4.39E+05	--	2.63E+05	--	--
	Metal Noncancer PRG				2.19E+08	1.32E+07	6.58E+05	2.19E+07	8.77E+05	4.39E+05	--	2.63E+05	--	--
	Final Metal PRG				2.19E+08	1.32E+07	6.58E+05	2.19E+07	8.77E+05	4.39E+05	--	2.63E+05	--	--
Kǫǫ eí doo nahaazáh dah (difficult access open space)	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	2.04E+06	--	3.66E+06	4.87E+06	--	9.75E+05	--	--
	Metal Noncancer PRG, child				4.39E+08	2.63E+07	1.32E+06	4.39E+07	1.75E+06	8.77E+05	--	5.26E+05	--	--
	Metal Noncancer, adult				4.39E+08	2.63E+07	1.32E+06	4.39E+07	1.75E+06	8.77E+05	--	5.26E+05	--	--
	Metal Noncancer PRG				4.39E+08	2.63E+07	1.32E+06	4.39E+07	1.75E+06	8.77E+05	--	5.26E+05	--	--
	Final Metal PRG				4.39E+08	2.63E+07	1.32E+06	4.39E+07	1.75E+06	8.77E+05	--	5.26E+05	--	--
Chíí dah wiih łeezh (washes and drainages)	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	4.08E+05	--	7.31E+05	9.75E+05	--	1.95E+05	--	--
	Metal Noncancer PRG, child				8.77E+07	5.26E+06	2.63E+05	8.77E+06	3.51E+05	1.75E+05	--	1.05E+05	--	--
	Metal Noncancer, adult				8.77E+07	5.26E+06	2.63E+05	8.77E+06	3.51E+05	1.75E+05	--	1.05E+05	--	--
	Metal Noncancer PRG				8.77E+07	5.26E+06	2.63E+05	8.77E+06	3.51E+05	1.75E+05	--	1.05E+05	--	--
	Final Metal PRG				8.77E+07	5.26E+06	2.63E+05	8.77E+06	3.51E+05	1.75E+05	--	1.05E+05	--	--
PRG and RSL Calculator Default Resident	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	8.88E+04	--	1.59E+05	2.12E+05	--	4.24E+04	--	--
	Metal Noncancer PRG, child				7.09E+06	4.25E+05	2.13E+04	7.09E+05	2.84E+04	1.42E+04	--	8.51E+03	--	--
	Metal Noncancer, adult				7.09E+06	4.25E+05	2.13E+04	7.09E+05	2.84E+04	1.42E+04	--	8.51E+03	--	--
	Metal Noncancer PRG				7.09E+06	4.25E+05	2.13E+04	7.09E+05	2.84E+04	1.42E+04	--	8.51E+03	--	--
	Final Metal PRG				7.09E+06	4.25E+05	2.13E+04	7.09E+05	2.84E+04	1.42E+04	--	8.51E+03	--	--

Attachment A - NAUM Calculation Tool

6. Soil Dust Inhalation

PRG Inputs for All Metals														
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Manganese**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Thallium**	**Uranium**	**Vanadium**	**Zinc**
All	Inhalation Unit Risk	IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(\mu g/m^3)^{-1}$	--	--	--	2.60E-04	--	--	--	--	--	--
	Inhalation Reference Concentration	RfC	The metal-specific noncancer toxicity value for the inhalation pathway.	(mg/m^3)	5.00E-05	3.00E-04	2.00E-03	9.00E-05	2.00E-02	--	--	4.00E-05	1.00E-04	--
PRG Calculations for All Metals														
Receptor	**Parameter**	**Symbol**	**Description**	**Units**	**Manganese**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Thallium**	**Uranium**	**Vanadium**	**Zinc**
Custom	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	--	2.89E+06	--	--	--	--	--	--
	Metal Noncancer PRG, child				3.76E+05	2.26E+06	1.50E+07	6.77E+05	1.50E+08	--	--	3.01E+05	7.52E+05	--
	Metal Noncancer, adult				3.76E+05	2.26E+06	1.50E+07	6.77E+05	1.50E+08	--	--	3.01E+05	7.52E+05	--
	Metal Noncancer PRG				3.76E+05	2.26E+06	1.50E+07	6.77E+05	1.50E+08	--	--	3.01E+05	7.52E+05	--
	Final Metal PRG				3.76E+05	2.26E+06	1.50E+07	6.77E+05	1.50E+08	--	--	3.01E+05	7.52E+05	--
Kee'da'whíí tééh (full-time Navajo residential)	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	--	2.89E+06	--	--	--	--	--	--
	Metal Noncancer PRG, child				3.76E+05	2.26E+06	1.50E+07	6.77E+05	1.50E+08	--	--	3.01E+05	7.52E+05	--
	Metal Noncancer, adult				3.76E+05	2.26E+06	1.50E+07	6.77E+05	1.50E+08	--	--	3.01E+05	7.52E+05	--
	Metal Noncancer PRG				3.76E+05	2.26E+06	1.50E+07	6.77E+05	1.50E+08	--	--	3.01E+05	7.52E+05	--
	Final Metal PRG				3.76E+05	2.26E+06	1.50E+07	6.77E+05	1.50E+08	--	--	3.01E+05	7.52E+05	--
Kǫǫh bí łíí nakaí (sheep camp)	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	--	6.75E+06	--	--	--	--	--	--
	Metal Noncancer PRG, child				8.77E+05	5.26E+06	3.51E+07	1.58E+06	3.51E+08	--	--	7.02E+05	1.75E+06	--
	Metal Noncancer, adult				8.77E+05	5.26E+06	3.51E+07	1.58E+06	3.51E+08	--	--	7.02E+05	1.75E+06	--
	Metal Noncancer PRG				8.77E+05	5.26E+06	3.51E+07	1.58E+06	3.51E+08	--	--	7.02E+05	1.75E+06	--
	Final Metal PRG				8.77E+05	5.26E+06	3.51E+07	1.58E+06	3.51E+08	--	--	7.02E+05	1.75E+06	--
Kǫǫ eí nahaazáh (easy access open space)	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	--	1.69E+07	--	--	--	--	--	--
	Metal Noncancer PRG, child				2.19E+06	1.32E+07	8.77E+07	3.95E+06	8.77E+08	--	--	1.75E+06	4.39E+06	--
	Metal Noncancer, adult				2.19E+06	1.32E+07	8.77E+07	3.95E+06	8.77E+08	--	--	1.75E+06	4.39E+06	--
	Metal Noncancer PRG				2.19E+06	1.32E+07	8.77E+07	3.95E+06	8.77E+08	--	--	1.75E+06	4.39E+06	--
	Final Metal PRG				2.19E+06	1.32E+07	8.77E+07	3.95E+06	8.77E+08	--	--	1.75E+06	4.39E+06	--
Kǫǫ eí doo nahaazáh dah (difficult access open space)	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	--	3.37E+07	--	--	--	--	--	--
	Metal Noncancer PRG, child				4.39E+06	2.63E+07	1.75E+08	7.90E+06	1.75E+09	--	--	3.51E+06	8.77E+06	--
	Metal Noncancer, adult				4.39E+06	2.63E+07	1.75E+08	7.90E+06	1.75E+09	--	--	3.51E+06	8.77E+06	--
	Metal Noncancer PRG				4.39E+06	2.63E+07	1.75E+08	7.90E+06	1.75E+09	--	--	3.51E+06	8.77E+06	--
	Final Metal PRG				4.39E+06	2.63E+07	1.75E+08	7.90E+06	1.75E+09	--	--	3.51E+06	8.77E+06	--
Chíí dah wiih łeezh (washes and drainages)	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	--	6.75E+06	--	--	--	--	--	--
	Metal Noncancer PRG, child				8.77E+05	5.26E+06	3.51E+07	1.58E+06	3.51E+08	--	--	7.02E+05	1.75E+06	--
	Metal Noncancer, adult				8.77E+05	5.26E+06	3.51E+07	1.58E+06	3.51E+08	--	--	7.02E+05	1.75E+06	--
	Metal Noncancer PRG				8.77E+05	5.26E+06	3.51E+07	1.58E+06	3.51E+08	--	--	7.02E+05	1.75E+06	--
	Final Metal PRG				8.77E+05	5.26E+06	3.51E+07	1.58E+06	3.51E+08	--	--	7.02E+05	1.75E+06	--
PRG and RSL Calculator Default Resident	Metal Cancer	$PRGi_{nh}$	See above	mg/kg	--	--	--	1.47E+06	--	--	--	--	--	--
	Metal Noncancer PRG, child				7.09E+04	4.25E+05	2.84E+06	1.28E+05	2.84E+07	--	--	5.67E+04	1.42E+05	--
	Metal Noncancer, adult				7.09E+04	4.25E+05	2.84E+06	1.28E+05	2.84E+07	--	--	5.67E+04	1.42E+05	--
	Metal Noncancer PRG				7.09E+04	4.25E+05	2.84E+06	1.28E+05	2.84E+07	--	--	5.67E+04	1.42E+05	--
	Final Metal PRG				7.09E+04	4.25E+05	2.84E+06	1.28E+05	2.84E+07	--	--	5.67E+04	1.42E+05	--

Attachment A - NAUM Calculation Tool

6. Soil Dust Inhalation

PRG Inputs for All Radionuclides													
Parameter	**Receptor**	**Symbol**	**Description**	**Units**	**Ra-226 in SE**	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Slope Factor	All	SFi	The isotope-specific cancer toxicity value for the inhalation pathway.	risk/pCi	5.92E-08	1.45E-07	2.31E-07	2.22E-10	1.59E-08	2.82E-08	3.41E-08	2.78E-08	2.36E-08
Decay Constant	All	λ	0.693/(half life)	$(years)^{-1}$	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
Decay Function	Custom	PRG_{decay}	$PRG_{decay} = \left(\frac{t_{year} \times \lambda}{1 - e^{-\lambda t_{year}}}\right)$	-	1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Kee'da'whíí tééh (full-time Navajo residential)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	K ọọh bí íí nakaí (sheep camp)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Kọọ eí nahaazáh (easy access open space)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	K ọọ eí doo nahaazáh dah (difficult access open space)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Chíí dah wiih łeezh (washes and drainages)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	PRG and RSL Calculator Default Resident				1.00	1.00	1.00	1.00	1.46	1.01	1.00	1.00	1.00

PRG Calculations for All Radionuclides													
Parameter	**Receptor**	**Symbol**	**Description**	**Units**	**Ra-226 in SE**	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Rad PRG	Custom	PRG_{inh}	See above	pCi/g	1.95E+04	7.96E+03	5.00E+03	5.20E+06	1.88E+05	4.16E+04	3.39E+04	4.15E+04	4.89E+04
	Kee'da'whíí tééh (full-time Navajo residential)				1.95E+04	7.96E+03	5.00E+03	5.20E+06	1.88E+05	4.16E+04	3.39E+04	4.15E+04	4.89E+04
	Kọọh bí íí nakaí (sheep camp)				4.55E+04	1.86E+04	1.17E+04	1.21E+07	4.39E+05	9.71E+04	7.90E+04	9.69E+04	1.14E+05
	Kọọ eí nahaazáh (easy access open space)				1.14E+05	4.64E+04	2.91E+04	3.03E+07	1.10E+06	2.43E+05	1.98E+05	2.42E+05	2.85E+05
	Chíí dah wiih łeezh (washes and drainages)				2.27E+05	9.29E+04	5.83E+04	6.07E+07	2.19E+06	4.85E+05	3.95E+05	4.84E+05	5.71E+05
	Chíí dah wiih łeezh (washes and drainages)				4.55E+04	1.86E+04	1.17E+04	1.21E+07	4.39E+05	9.71E+04	7.90E+04	9.69E+04	1.14E+05
	PRG and RSL Calculator Default Resident				1.43E+04	5.82E+03	3.66E+03	3.80E+06	7.75E+04	3.01E+04	2.48E+04	3.04E+04	3.58E+04

Attachment A - NAUM Calculation Tool

7 - External Exposure to Radiation

External Exposure to Ionizing Radiation while Onsite

Selection =	Ra-226 in SE	Type =	Radionuclide	Concentration =	1	pCi/g

Cleanup Target and Risks [1,3]					User-Specified Scenario	Navajo Nation Reference Scenarios					USEPA Default Scenario
Outputs	**Parameter**	**Description**		**Units**	**Custom**	**Kee'da'whíí tééh (full-time Navajo residential)**	**Kǫǫh bí łíí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**	**PRG and RSL Calculator Default Resident**
Cleanup Targets [1]	Rad PRG_{ext} [2]	The calculated PRG for the selected radionuclide.		pCi/g	0.241	0.233	0.517	12.9	51.7	0.861	1.38
Risks and Hazards [3]	Lifetime Cancer Risk - Radionuclides	The calculated cancer risk for the radionuclide selected in cell E1, based on the concentration selected in cell I1.		-	4.1E-04	4.3E-04	1.9E-04	7.8E-06	1.9E-06	1.2E-04	7.2E-05
Inputs	**Parameter**	**Symbol**	**Description**	**Units**	**Custom**	**Kee'da'whíí tééh (full-time Navajo residential)**	**Kǫǫh bí łíí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**	**PRG and RSL Calculator Default Resident**
Shielding of Gamma Radiation	Gamma Shielding Factor - Outdoor	GSF_o	Percentage of gamma radiation from the ground that reaches a person onsite. This is a measure of how much gamma radiation passes through a shielding material sitting on top of the ground (e.g., a house floor). Source for defaults: NNEPA 2021.	-	100%	100%	100%	100%	100%	100%	100%
	Gamma Shielding Factor - Indoor	GSF_i			70%	70%	100%	100%	100%	100%	40%
	Exposure Time Onsite Outdoors - Adult	ET_{a-o}	Amount of daily time spent: Onsite and outdoors. Source for defaults: NNEPA 2021.	hours	10	12	12	2	1	12	1.752
	Exposure Time Onsite Indoors - Adult	ET_{a-i}	Amount of daily time spent: Onsite and indoors. Source for defaults: NNEPA 2021.		12	10	8	0	0	0	16.416
	Exposure Time Onsite Outdoors - Child	ET_{c-o}	Amount of daily time spent: Onsite and outdoors. Source for defaults: NNEPA 2021.	hours	10	12	12	2	1	12	1.752
	Exposure Time Onsite Indoors - Child	ET_{c-i}	Amount of daily time spent: Onsite and indoors. Source for defaults: NNEPA 2021.		12	10	8	0	0	0	16.416
Common Exposure Parameters	Exposure Duration - Adult	ED_a	Total years on site 6 years old and older.	years	69	69	69	69	69	69	20
	Exposure Duration - Child	ED_c	Total years on site 0 to 6 years old.		6	6	6	6	6	6	6
	Exposure Duration - Lifetime Total	ED	Calculated $ED_a + ED_c$		75	75	75	75	75	75	26
	Exposure Frequency - Adult	EF_a	Days per year spent onsite.	days/year	350	350	150	60	30	150	350
	Exposure Frequency - Child	EF_c			350	350	150	60	30	150	350
Risk and Toxicity	Target Risk	TR	The selected target cancer risk.	-	1E-04						
	Slope Factor - External	SF_{ext}	The isotope-specific cancer toxicity value for the external gamma pathway.	risk/year pCi/g	8.37E-06						
	Soil Volume Area Correction Factor [4]	ACF_{ext-sv}	The isotope-specific value for the external gamma pathway. Source for defaults: ORNL 2014. [4]	-	0.9						1
Conversion Factors	Conversion Factor 3	CF3	Converts from hours to days.	day/hours	1/24						
	Conversion Factor 5	CF5	Converts from days to year.	year/days	1/365						
	Conversion Factor 4	CF4	Convert kilograms to grams.	g/kg	1000						
	Conversion Factor 7	CF7	Convert pCi to Bq	pCi/Bq	27						

Notes:

1 The PRGs are calculated for the six scenarios in the tables below the notes (rows 54 through 73), and are looked up in row 6 for the selected radionuclide.

2 Pathway-specific radionuclide PRG for external exposure.

3 The risks are back-calculated using the selected TR, the appropriate PRG, and the concentration.

4 The ACF is assumed to be the default value of 0.9 from USEPA guidance based on a default contaminated site size of 0.5 acres m^2 (ORNL 2014) for Navajo Nation scenarios, and 1 for the USEPA default scenario. The uncertainty associated with this approach is generally expected to be less than 10 percent for the external gamma PRG, and less than that for overall PRGs.

Note that only 4 radionuclides can be selected for summary-level input: Ra-226 in SE, U-238 in SE, Th-232 in SE, and K-40, but detailed calculations are shown for 5 other individual radionuclides.

\- Unitless

pCi Picocuries

pCi/g Picocuries per gram

Equations:

$$PRG_{ext} = \frac{TR}{SF_{ext} \times ACF_{ext-sv} \times ED \times EF \times [(ET_o \times GSF_o) + (ET_i \times GSF_i)] \times CF3 \times CF5}$$

$$Risk = Concentration \times SF_{ext} \times ACF_{ext-sv} \times ED \times EF \times [(ET_o \times GSF_o) + (ET_i \times GSF_i)] \times CF3 \times CF5$$

References:

ORNL. 2014. Area Correct Factors for Contaminated Soil for Use in Risk and Dose Assessment Models. September. https://epa-prgs.ornl.gov/radionuclides/ACF_FINAL.pdf

NNEPA Superfund Program (NNEPA). 2021. Letter Regarding Navajo Specific Input Parameters—All Other Scenarios. From Dariel Yazzie, Environmental Assistant Director, Navajo Superfund Division. To Sona Chillingaryan, Manager, Tribal Lands Cleanup Section, Superfund Division, U.S. Environmental Protection Agency (USEPA) Region 9, and Sean Hogan, Manager, Tribal Lands Cleanup Section, Superfund Division, USEPA Region 9. September 15.

Attachment A - NAUM Calculation Tool

7 - External Exposure to Radiation

Formatting guide:		
Type of Worksheet Cell	**Category 1**	**Category 2**
User-editable inputs	**Inputs that can be changed, but only on the current worksheet. Most inputs have limits on the minimum and maximum values.**	**Inputs that can be changed, appear on the current worksheet AND other worksheets, and can be changed on any worksheet they appear on. These will update automatically if changed on any worksheet.**
Non-editable inputs	Inputs that are not receptor-specific. Some are entered on a different worksheet, others are calculated from editable inputs on this worksheet or another worksheet.	Receptor-specific inputs which cannot be edited by the user. Different shades of orange indicate the custom scenario (lightest), Navajo scenarios (lighter) and the USEPA default scenario (darker).
Input headers	In the input receptor column headers, different shades of green in indicate the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	In the input header rows and non-receptor column headers (such as this table), the medium shade indicates summary-level headers, and lightest shade indicates more detailed header information.
Outputs	Different shades of blue indicate outputs for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.
Output headers	Different shades of yellow indicate output headers for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.

PRG Inputs for All Radionuclides

Parameter	Receptor	Symbol	Description	Units	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Slope Factor	All	SF_s	The isotope-specific cancer toxicity value for the external gamma pathway.	risk/pCi	8.37E-06	8.49E-06	1.14E-05	7.99E-07	1.48E-09	2.50E-08	8.45E-10	2.53E-10	1.24E-10
Decay Constant	All	λ	0.693/(half life)	$(years)^{-1}$	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
Decay Function	Custom	PRG_{decay}	$PRG_{decay} = \left(\frac{t_{year} \times \lambda}{1 - e^{-\lambda t_{year}}}\right)$	-	1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Kee'da'whíí tééh (full-time Navajo residential)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Kǫǫh bí łíí nakaí (sheep camp)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Kǫǫ eí nahaazáh (easy access open space)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Kǫǫ eí doo nahaazáh dah (difficult access open space)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	Chíí dah wiih łeezh (washes and drainages)				1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
	PRG and RSL Calculator Default Resident				1.00	1.00	1.00	1.00	1.46	1.01	1.00	1.00	1.00

PRG Calculations for All Radionuclides

Receptor	Parameter	Symbol	Description	Units	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Rad PRG	Custom	PRG_{ext}	See above	pCi/g	2.41E-01	2.37E-01	1.77E-01	2.52E+00	3.53E+03	8.19E+01	2.39E+03	7.97E+03	1.63E+04
	Kee'da'whíí tééh (full-time Navajo residential)				2.33E-01	2.30E-01	1.71E-01	2.44E+00	3.41E+03	7.93E+01	2.31E+03	7.71E+03	1.57E+04
	Kǫǫh bí łíí nakaí (sheep camp)				5.17E-01	5.10E-01	3.79E-01	5.41E+00	7.57E+03	1.76E+02	5.12E+03	1.71E+04	3.49E+04
	Kǫǫ eí nahaazáh (easy access open space)				1.29E+01	1.27E+01	9.49E+00	1.35E+02	1.89E+05	4.40E+03	1.28E+05	4.28E+05	8.72E+05
	Kǫǫ eí doo nahaazáh dah (difficult access open space)				5.17E+01	5.10E+01	3.79E+01	5.41E+02	7.57E+05	1.76E+04	5.12E+05	1.71E+06	3.49E+06
	Chíí dah wiih łeezh (washes and drainages)				8.61E-01	8.49E-01	6.32E-01	9.02E+00	1.26E+04	2.93E+02	8.54E+03	2.85E+04	5.81E+04
	PRG and RSL Calculator Default Resident				1.38E+00	1.36E+00	1.02E+00	1.45E+01	1.14E+04	4.66E+02	1.37E+04	4.57E+04	9.33E+04

References:

ORNL. 2014. Area Correct Factors for Contaminated Soil for Use in Risk and Dose Assessment Models. September.
https://epa-prgs.ornl.gov/radionuclides/ACF_FINAL.pdf

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Plant Consumption Exposure Pathway

Selection =	Arsenic	Type = Metal	Concentration =	1	mg/kg

Cleanup Target and Risks [1,6]			Units	User-Specified Scenario	Navajo Nation Reference Scenarios					USEPA Default Scenario
Outputs	**Parameter**	**Description**		**Custom**	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bi líí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**	**PRG and RSL Calculator Default Resident**
Cleanup Targets	Metal Cancer $PRG_{p\text{-}ing}$	Preliminary Remediation Goal based on the cancer toxicity for selected metal	mg/kg	4.66	4.66	13.4	35.4	70.8	14.1	--
	Metal Noncancer $PRG_{p\text{-}ing}$ [2,3]	Preliminary Remediation Goal based on the noncancer roxicity for selected metal	mg/kg	8.91	8.91	25.7	30.1	135	27	--
	Final Metal $PRG_{p\text{-}ing}$ [4,5]	Preliminary Remediation Goal for the selected metal	mg/kg	4.66	4.66	13.4	30.1	70.8	14.1	--
Risks and Hazards	Cancer Risk - Metals	Lifetime cancer risk for the selected metal	-	2.1E-05	2.1E-05	7.5E-06	2.8E-06	1.4E-06	7.1E-06	--
	Noncancer Hazard - Metals	Noncancer hazard for the selected metal	-	1.1E-01	1.1E-01	3.9E-02	3.3E-02	7.4E-03	3.7E-02	--

Inputs	**Parameter**		**Symbol**	**Description**	**Units**	**Custom**	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bi líí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**
Total Plant Consumption	Total Plant Ingestion Rate - Adult		IR_a	Total mass of plants eaten per day from both onsite and offsite sources. Source for defaults: NNEPA 2021 for adults, child set to half of adult.	g fresh plant/day	834	834	834	834	834	834
	Total Plant Ingestion Rate - Child		IR_c			417	417	417	417	417	417
Contaminated Fraction of Produce	**Adult**	**Annual Average**	$CF_{produce}$	Contaminated Fraction - the average percentage of plants eaten that are grown locally and assumed to be onsite (e.g., from a nearby field or wild collection area vs. from the supermarket or a local community market). The child CF is set equal to the adult CF. Source for defaults: NNEPA 2021.	Percent	**55%**	**55%**	**20%**	**--**	**--**	**10%**
		Fall				**75%**	75%	20%	--	--	10%
		Winter				**50%**	50%	20%	--	--	10%
		Spring				**30%**	30%	--	--	--	--
		Summer				**65%**	65%	40%	--	--	20%
		Herbs and Medicinal				**100%**	100%	42%	17%	8%	42%
	Child	**Annual Average**				**55%**	**55%**	**20%**	**--**	**--**	**10%**
		Fall				75%	75%	20%	--	--	10%
		Winter				50%	50%	20%	--	--	10%
		Spring				30%	30%	--	--	--	--
		Summer				65%	65%	40%	--	--	20%
		Herbs and Medicinal				100%	100%	42%	17%	8%	42%
Onsite Fraction	**Fraction of Plant Types Grown Onsite**		OSF	This factor accounts for produce types that cannot be grown onsite, likely because of climate. These types of produce were not included in diet fractions provided by NNEPA. Source for defaults: EPA 2011. [7]	Percent	**36%**	36%	36%	36%	36%	36%
Diet Fraction by Plant Type (both Adult and Child)	**Total Plants**		DF	Diet fraction and ingestion rates for produce, herbs and medicinal plants consumed on a regular basis, but excluding ceremonial and non-regular TEK plants accounted for on separate tab. Source for defaults: NNEPA 2021.	Percent	100%	100%	48%	10%	10%	16%
	Total Plants with Onsite Component					**36%**	**36%**	**17%**	**4%**	**4%**	**6%**
	Produce					**90%**	**90%**	**38%**	**0%**	**0%**	**6%**
	Total Corn					**30%**	**30%**	**10%**	**0%**	**0%**	**2%**
	Total Squash					**10%**	**10%**	**13%**	**0%**	**0%**	**2%**
	Total Melons					**10%**	**10%**	**5%**	**0%**	**0%**	**2%**
	Total Tree Fruit					**15%**	**15%**	**10%**	**0%**	**0%**	**0%**
	Total Other Vegetables					**25%**	**25%**	**0%**	**0%**	**0%**	**0%**
	Herbs and Medicinal					**10%**	**10%**	**10%**	**10%**	**10%**	**10%**
	Corn	White				**10%**	10%	--	--	--	--
		Blue				**10%**	10%	--	--	--	--
		Yellow				**5%**	5%	10%	--	--	2%
		Red Speckled				**3%**	3%	--	--	--	--
		Sweet Corn				**2%**	2%	--	--	--	--
	Squash	Pumpkin				**2%**	2%	5%	--	--	--
		Other Squash				**8%**	8%	8%	--	--	2%
	Melons	Watermelon				**5%**	5%	--	--	--	2%
		Cantaloupe				**5%**	5%	5%	--	--	--
	Tree Fruit	Apples				**5%**	5%	5%	--	--	--
		Apricots				**5%**	5%	5%	--	--	--
		Peaches				**5%**	5%	--	--	--	--
	Other Vegetables	Beans				**10%**	10%	--	--	--	--
		Brussels sprouts				**2%**	2%	--	--	--	--
		Cucumbers				**2%**	2%	--	--	--	--
		Tomatoes				**2%**	2%	--	--	--	--
		Chili				**5%**	5%	--	--	--	--
		Onions				**2%**	2%	--	--	--	--
		Potatoes				**2%**	2%	--	--	--	--
	Herbs and Medicinal	Navajo Tea				**10%**	10%	10%	10%	10%	10%
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Custom	Kee'da'whíí téél (full-time Navajo residential)	Kọọh bi líí nakai (sheep camp)	Kọọ ei nahaazáh (easy access open space)	Kọọ ei doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)
Ingestion Rate by Plant Type - Adult	**Total Plants with Onsite Component**		IR_a	Ingestion rates for produce, herbs and medicinal plants consumed by adults on a regular basis, but excluding ceremonial and non-regular TEK plants accounted for on separate tab. $IR_a = (IR_{a,total} \times DF)$	g fresh plant/day	**300.2**	**300.2**	**300.2**	**300.2**	**300.2**	**300.2**
	Produce					**270.2**	**270.2**	**114.1**	**0.0**	**0.0**	**18.0**
	Total Corn					**90.1**	**90.1**	**30.0**	**0.0**	**0.0**	**6.0**
	Total Squash					**30.0**	**30.0**	**39.0**	**0.0**	**0.0**	**6.0**
	Total Melons					**30.0**	**30.0**	**15.0**	**0.0**	**0.0**	**6.0**
	Total Tree Fruit					**45.0**	**45.0**	**30.0**	**0.0**	**0.0**	**0.0**
	Total Other Vegetables					**75.1**	**75.1**	**0.0**	**0.0**	**0.0**	**0.0**
	Herbs and Medicinal					**30.0**	**30.0**	**30.0**	**30.0**	**30.0**	**30.0**
	Corn	White				30.0	30.0	--	--	--	--
		Blue				30.0	30.0	--	--	--	--
		Yellow				15.0	15.0	30.0	--	--	6.0
		Red Speckled				9.0	9.0	--	--	--	--
		Sweet Corn				6.0	6.0	--	--	--	--
	Squash	Pumpkin				6.0	6.0	15.0	--	--	--
		Other Squash				24.0	24.0	24.0	--	--	6.0
	Melons	Watermelon				15.0	15.0	--	--	--	6.0
		Cantaloupe				15.0	15.0	15.0	--	--	--
	Tree Fruit	Apples				15.0	15.0	15.0	--	--	--
		Apricots				15.0	15.0	15.0	--	--	--
		Peaches				15.0	15.0	--	--	--	--
	Other Vegetables	Beans				30.0	30.0	--	--	--	--
		Brussels sprouts				6.0	6.0	--	--	--	--
		Cucumbers				6.0	6.0	--	--	--	--
		Tomatoes				6.0	6.0	--	--	--	--
		Chili				15.0	15.0	--	--	--	--
		Onions				6.0	6.0	--	--	--	--
		Potatoes				6.0	6.0	--	--	--	--
	Herbs and Medicinal	Navajo Tea				30.0	30.0	30.0	30.0	30.0	30.0
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	Custom	Kee'da'whíí téél (full-time Navajo residential)	Kọọh bi líí nakai (sheep camp)	Kọọ ei nahaazáh (easy access open space)	Kọọ ei doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)
Ingestion Rate by Plant Type - Child	**Total Plants with Onsite Component**		IR_c	Ingestion rates for produce, herbs and medicinal plants consumed by children on a regular basis, but excluding ceremonial and non-regular TEK plants accounted for on separate tab. $IR_c = (IR_{c,total} \times DF)$	g fresh plant/day	**150.1**	**150.1**	**150.1**	**150.1**	**150.1**	**150.1**
	Produce					**135.1**	**135.1**	**57.0**	**0.0**	**0.0**	**9.0**
	Total Corn					**45.0**	**45.0**	**15.0**	**0.0**	**0.0**	**3.0**
	Total Squash					**15.0**	**15.0**	**19.5**	**0.0**	**0.0**	**3.0**
	Total Melons					**15.0**	**15.0**	**7.5**	**0.0**	**0.0**	**3.0**
	Total Tree Fruit					**22.5**	**22.5**	**15.0**	**0.0**	**0.0**	**0.0**
	Total Other Vegetables					**37.5**	**37.5**	**0.0**	**0.0**	**0.0**	**0.0**
	Herbs and Medicinal					**15.0**	**15.0**	**15.0**	**15.0**	**15.0**	**15.0**
	Corn	White				15.0	15.0	--	--	--	--
		Blue				15.0	15.0	--	--	--	--
		Yellow				7.5	7.5	15.0	--	--	3.0
		Red Speckled				4.5	4.5	--	--	--	--
		Sweet Corn				3.0	3.0	--	--	--	--
	Squash	Pumpkin				3.0	3.0	7.5	--	--	--
		Other Squash				12.0	12.0	12.0	--	--	3.0
	Melons	Watermelon				7.5	7.5	--	--	--	3.0
		Cantaloupe				7.5	7.5	7.5	--	--	--
	Tree Fruit	Apples				7.5	7.5	7.5	--	--	--
		Apricots				7.5	7.5	7.5	--	--	--
		Peaches				7.5	7.5	--	--	--	--
	Other Vegetables	Beans				15.0	15.0	--	--	--	--
		Brussels sprouts				3.0	3.0	--	--	--	--
		Cucumbers				3.0	3.0	--	--	--	--
		Tomatoes				3.0	3.0	--	--	--	--
		Chili				7.5	7.5	--	--	--	--
		Onions				3.0	3.0	--	--	--	--
		Potatoes				3.0	3.0	--	--	--	--
	Herbs and Medicinal	Navajo Tea				15.0	15.0	15.0	15.0	15.0	15.0
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description and Units	Source (all receptors)	Units	Custom	Kee'da'whíí téél (full-time Navajo residential)	Kǫǫh bí łíí nakaí (sheep camp)	Kǫǫ ei nahaazáh (easy access open space)	Kǫǫ ei doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)
Plant Transfer Factors for Radionuclides	Corn	White	Br_{wet}	Plant transfer factors for specific produce types (pCi/g-fresh plant per pCi/g-dry soil) Plant tranfer factors used are based on the defaults from the EPA PRG online calculator, with the following exceptions: Similarity to other plants: Other squash: Non-leafy fruit (similar to pumpkin). Beans: Legume seed (similar to lima beans). Brussels sprouts: Leaf (similar to cabbage). Chili: Non-leafy fruit (similar to peppers). Recommendation from IAEA TRS-472: Apricots: Woody tree (p. 65) Watermelon and cantaloupe: Herbaceous (p.65). Herbs and Medicinal plants: Sunflower leaf where available (Ra, U) based on similarity of Navajo tea, sagebrush, and Mormon tea to sunflower (pp. 56, 61). Leaf is used for other radionuclides.	Maize Grain	pCi/g-fresh plant per pCi/g-dry soil	--					
		Blue			Maize Grain		--					
		Yellow			Maize Grain		--					
		Red Speckled			Maize Grain		--					
		Sweet Corn			Maize Grain		--					
	Squash	Pumpkin			Non-Leafy Fruit		--					
		Other Squash			Non-Leafy Fruit		--					
	Melons	Watermelon			Herbaceous		--					
		Cantaloupe			Herbaceous		--					
	Tree Fruit	Apples			Woody Tree		--					
		Apricots			Woody Tree		--					
		Peaches			Woody Tree		--					
	Other Vegetables	Beans			Legume Seed		--					
		Brussels sprouts			Leaf		--					
		Cucumbers			Non-Leafy Fruit		--					
		Tomatoes			Non-Leafy Fruit		--					
		Chili			Non-Leafy Fruit		--					
		Onions			Root		--					
		Potatoes			Tuber		--					
	Herbs and Medicinal:	Navajo Tea			Sunflower Leaf		--					
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										
Mass Loading Factors for Radionuclides and Metals	Corn	White	$MLF_{produce}$	Mass loading factors for specific produce types (g-dry soil per g-fresh plant). For produce, proxies were used as noted in column F. For herbs and medicinal plants, an average value was used as described in the footnotes.[8]	Corn	g-dry soil per g-fresh plant	1.45E-04					
		Blue			Corn		1.45E-04					
		Yellow			Corn		1.45E-04					
		Red Speckled			Corn		1.45E-04					
		Sweet Corn			Corn		1.45E-04					
	Squash	Pumpkin			Pumpkins		5.80E-05					
		Other Squash			Pumpkins		5.80E-05					
	Melons	Watermelon			Pumpkins		5.80E-05					
		Cantaloupe			Pumpkins		5.80E-05					
	Tree Fruit	Apples			Apples		1.60E-04					
		Apricots			Peaches		1.50E-04					
		Peaches			Peaches		1.50E-04					
	Other Vegetables	Beans			Snap beans		5.00E-03					
		Brussels sprouts			Cabbage		1.05E-04					
		Cucumbers			Cucumbers		4.00E-05					
		Tomatoes			Tomatoes		1.77E-03					
		Chili			Peppers		2.22E-03					
		Onions			Onions		9.70E-05					
		Potatoes			Potatoes		2.10E-04					
	Herbs and Medicinal:	Navajo Tea			Sagebrush		2.40E-02					
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										
Conversion Factor for Dry Weight Transfer Factors to Fresh Weight for Metals	Corn	White	$MC_{produce}$	The conversion factors are taken from the Soil Screening Guidance, Appendix G, Table G-1 (EPA 1996): 1. Specific fruit or vegetable values are used for squash, apples, peaches, beans, Brussels sprouts, cucumbers, and tomatoes) 2. The average value for fruits was used for watermelon, cantaloupe, and apricots. 3. The average value for vegetables was used for all corn types, pumpkin, chili, onions, and potatoes. For herbs and medicinal plants, an average value was used as described in the footnotes.[8]		kg dry plant/kg fresh plant	0.085					
		Blue					0.085					
		Yellow					0.085					
		Red Speckled					0.085					
		Sweet Corn					0.085					
	Squash	Pumpkin					0.085					
		Other Squash					0.082					
	Melons	Watermelon					0.15					
		Cantaloupe					0.15					
	Tree Fruit	Apples					0.159					
		Apricots					0.15					
		Peaches					0.131					
	Other Vegetables	Beans					0.111					
		Brussels sprouts					0.151					
		Cucumbers					0.039					
		Tomatoes					0.059					
		Chili					0.085					
		Onions					0.085					
		Potatoes					0.085					
	Herbs and Medicinal:	Navajo Tea					0.5875					
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Custom	Kee'da'whíí tééh (full-time Navajo residential)	Kọọh bi líí nakaí (sheep camp)	Kọọ ei nahaazáh (easy access open space)	Kọọ ei doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)
Common Exposure Parameters	Exposure Duration - Adult		ED_a	Total years onsite	years	69	69	69	69	69	69
	Exposure Duration - Child		ED_c			6	6	6	6	6	6
	Averaging Time - Cancer		AT_c	Lifetime in days.	days	27,375	27,375	27,375	27,375	27,375	27,375
	Averaging Time - Noncancer - Adult		At_{nc-a}	Exposure duration x 365 days/year	days	25,185	25,185	25,185	25,185	25,185	25,185
	Averaging Time - Noncancer - Child		At_{nc-c}			2,190	2,190	2,190	2,190	2,190	2,190
	Consumption Exposure Frequency - Adult		CEF_a	Number of days per year the receptor consumes plant products collected onsite.	days/ year	350	350	350	350	350	350
	Consumption Exposure Frequency - Child		CEF_c			350	350	350	350	350	350
	Body Weight - Adult		BW_a	Average body weight	kg	80	80	80	80	80	80
	Body Weight - Child		BW_c			15	15	15	15	15	15
Risk and Toxicity	Target Risk		TR	The selected target cancer risk.	-	1E-04					
	Target Hazard Quotient		THQ	The selected target noncancer hazard quotient.	-	1					
	Oral Slope Factor - Food		SF_f	The isotope-specific cancer toxicity value for food ingestion pathway.	risk/pCi	--					
				The metal-specific cancer toxicity value for ingestion pathways.	$(mg/kg\text{-}day)^{-1}$	1.50E+00					
	Oral Reference Dose		RfD	The metal-specific non-cancer toxicity value for ingestion pathways.	(mg/kg-day)	3.00E-04					
	Conversion Factor 6		CF6	Convert kilograms to grams	kg/g	1.00E-03					
	Conversion Factor 7		CF7	Convert pCi to Bq	pCi/Bq	27.027027					
Age-Adjusted Ingestion Rate for Metals	Corn	White	$IRF_{p,adj}$	Age-adjusted ingestion rate for metals in produce. $IRF_{p,adj} = \left(EF_c \times ED_c \times \frac{IR_c}{BW_c}\right) + \left(EF_a \times ED_a \times \frac{IR_a}{BW_a}\right)$	g-dry weight of plant per kg-body weight	11,165	11,165	--	--	--	--
		Blue				11,165	11,165	--	--	--	--
		Yellow				5,583	5,583	11,165	--	--	2,233
		Red Speckled				3,350	3,350	--	--	--	--
		Sweet Corn				2,233	2,233	--	--	--	--
	Squash	Pumpkin				2,233	2,233	5,583	--	--	--
		Other Squash				8,932	8,932	8,932	--	--	2,233
	Melons	Watermelon				5,583	5,583	--	--	--	2,233
		Cantaloupe				5,583	5,583	5,583	--	--	--
	Tree Fruit	Apples				5,583	5,583	5,583	--	--	--
		Apricots				5,583	5,583	5,583	--	--	--
		Peaches				5,583	5,583	--	--	--	--
	Other Vegetables	Beans				11,165	11,165	--	--	--	--
		Brussels sprouts				2,233	2,233	--	--	--	--
		Cucumbers				2,233	2,233	--	--	--	--
		Tomatoes				2,233	2,233	--	--	--	--
		Chili				5,583	5,583	--	--	--	--
		Onions				2,233	2,233	--	--	--	--
		Potatoes				2,233	2,233	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				11,165	11,165	11,165	11,165	11,165	11,165
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Custom	Kee'da'whíí tééh (full-time Navajo residential)	Kọọh bí łíí nakaí (sheep camp)	Kọọ eí nahaazáh (easy access open space)	Kọọ eí doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)
Age-Adjusted Ingestion Fractions for Produce and Herbs/ Medicinal for Radionuclides	Corn	White	IF_{adj}	Age-adjusted ingestion fraction for radionuclides in produce. $IF_{adj} = (EF_c \times ED_c \times IR_c) + (EF_a \times ED_a \times IR_a)$	grams	756,605	756,605	--	--	--	--
		Blue				756,605	756,605	--	--	--	--
		Yellow				378,302	378,302	756,605	--	--	151,321
		Red Speckled				226,981	226,981	--	--	--	--
		Sweet Corn				151,321	151,321	--	--	--	--
	Squash	Pumpkin				151,321	151,321	378,302	--	--	--
		Other Squash				605,284	605,284	605,284	--	--	151,321
	Melons	Watermelon				378,302	378,302	--	--	--	151,321
		Cantaloupe				378,302	378,302	378,302	--	--	--
	Tree Fruit	Apples				378,302	378,302	378,302	--	--	--
		Apricots				378,302	378,302	378,302	--	--	--
		Peaches				378,302	378,302	--	--	--	--
	Other Vegetables	Beans				756,605	756,605	--	--	--	--
		Brussels sprouts				151,321	151,321	--	--	--	--
		Cucumbers				151,321	151,321	--	--	--	--
		Tomatoes				151,321	151,321	--	--	--	--
		Chili				378,302	378,302	--	--	--	--
		Onions				151,321	151,321	--	--	--	--
		Potatoes				151,321	151,321	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				756,605	756,605	756,605	756,605	756,605	756,605
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Notes:

1 This calculator does not contain all the produce types available in the USEPA PRG calculator, and some produce types included here are not available in that calculator.

2 The PRGs are calculated for the six scenarios in the tables below the notes (rows 370 through 888), and are looked up in rows 6 through 9 for the selected metal or radionuclide.

3 Pathway-specific radionuclide PRG for ingestion of plants grown in onsite soil.

4 The noncancer PRG is the lower of the child and adult noncancer hazard PRG.

5 Pathway-specific metal PRG for ingestion of plants grown in onsite soil.

6 The final metal PRG is the lower of the cancer risk PRG and the noncancer hazard PRG.

7 The risk and hazards are back-calculated using the selected TR or THQ, the appropriate PRG, and the concentration.

8 The MLFs and fresh-to-dry conversion factors for herbal and medicinal plants were calculated using the average for 6 proxy plant types after removing the highest and lowest values, as documented in the table below:

Equations:

$$PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$$

$$Risk = \sum_{i=1}^{n} Risk(i)$$

Plant type	MLF (g dry soil/g dry plant)	Source	Removed for MLF calculation?	Fresh-to-dry conversion factor	Source	Fresh-to-dry conversion factor calculation?
Navajo Tea	0.024	Hinton 1992; Sagebrush proxy	No	0.9	USU 2001; leaves and stems for fibrous leaves or mat forbs (Table 2)	Yes
Sumac (skunkbush and other)	0.024	Hinton 1992; Sagebrush proxy	No	0.5	USU 2001; older and full size green leaves on a decidious shrub (Table 3)	No
Rocky Mountain Juniper	0.024	Hinton 1992; Sagebrush proxy	No	0.55	USU 2001; older and full size green leaves on an evergreen coniferous (Table 4)	No
Sagebrush	0.024	Hinton 1992	No	0.65	USU 2001; older and full size green leaves on a decidious shrub (Table 3)	No
Mormon tea	0.024	Hinton 1992; Sagebrush proxy	No	0.65	USU 2001; older and full size green leaves on a decidious shrub (Table 3)	No
Wild parsley	0.25	Hinton 1992; Pasture proxy	Yes	0.9	USU 2001; leaves and stems for fibrous leaves or mat forbs (Table 2)	Yes
Corn tassels	0.0017	Pinder & McLeod, 1989	Yes	0.085	Average of vegetables; EPA 1996	Yes
Other Confidential Plants	None used	Insufficient information provided to evaluate.	N/A	None used	Insufficient information provided to evaluate.	None used
Average	**0.024**	--	--	**0.5875**	--	--

References for the above table:

Hinton, T.G. 1992. Contamination of Plants by Resuspension: A Review, with Critique of Measurement Methods. The Science of the Total Environment. Vol. 121, pp. 177-193).

Pinder, J.E. & K.W. McLeod. 1989. Mass Loading Soil Particles on Plant Surfaces. Health Physics. Vol. 57, no. 6, pp. 935-942.

Utah State University Extension (USU). 2001. Range Management Fact Sheet: Calculating Available Forage. M. Pratt & G.A. Rasmussen. May.

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

8 The Fraction of Plant Types Grown Onsite is set based on calculations using mean ingestion rates for "American Indian, Alaskan Native" residents in Table 9-15 of EPA 2015, as detailed in the table below:

Produce Type	Grown Onsite	Rationale	Mean Ingestion Rate (g/kg-day)	Mean Ingestion Rate of Produce Grown Onsite (g/kg-day)
Apples	X		1.93	1.93
Asparagus			0.81	
Bananas			0.87	
Beans	X		0.7	0.7
Beets			0.02	
Berries and Small Fruit			0.26	
Broccoli			1.18	
Bulb Vegetables			0.25	
Cabbage			0.34	
Carrots			0.26	
Citrus Fruits			1.61	
Corn	X		0.55	0.55
Cucumbers	X		0.23	0.23
Cucurbits	X		1.04	1.04
Fruiting Vegetables			0.93	
Leafy Vegetables	X		0.59	0.59
Legumes			0.44	
Lettuce			0.34	
Okra			0.4	
Onions	X		0.25	0.25
Peaches	X		0.54	0.54
Pears			1.31	
Peas			0.59	
Peppers	X		0.09	0.09
Pome Fruit			1.89	
Pumpkins	X		0.11	0.11
Root Tuber Vegetables			1.71	
Stalk/Stem Vegetables			0.25	
Stone Fruit			0.6	
Strawberries			0.11	
Tomatoes	X		0.92	0.92
Tropical Fruits			0.79	
White Potatoes	X		1.4	1.4
Total Ingestion of produce grown onsite			**23.31**	**8.35**
Fraction of Produce Grown Onsite (total ingestion rate of produce grown onsite/total ingestion rate)				**36%**

Note that for radionuclides, only 4 can be selected for summary-level input: Ra-226 in SE, U-238 in SE, Th-232 in SE, and K-40, but detailed calculations are shown for 5 other individual radionuclides.

g/day	Grams per day
g/mg	Grams per milligram
kg	Kilogram
kg/g	Kilogram per gram
mg/day	Milligrams per day
mg/kg	Milligrams per kilogram
mg/kg-day	Milligrams per kilogram per day
pCi	Picocuries
pCi/g	Picocuries per gram

Formatting guide:		
Type of Worksheet Cell	**Category 1**	**Category 2**
User-editable inputs	**Inputs that can be changed, but only on the current worksheet. Most inputs have limits on the minimum and maximum values.**	**Inputs that can be changed, appear on the current worksheet AND other worksheets, and can be changed on any worksheet they appear on. These will update automatically if changed on any worksheet.**
Non-editable inputs	Inputs that are not receptor-specific. Some are entered on a different worksheet, others are calculated from editable inputs on this worksheet or another worksheet.	Receptor-specific inputs which cannot be edited by the user. Different shades of orange indicate the custom scenario (lightest), Navajo scenarios (lighter) and the USEPA default scenario (darker).
Input headers	In the input receptor column headers, different shades of green in indicate the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	In the input header rows and non-receptor column headers (such as this table), the medium shade indicates summary-level headers, and lightest shade indicates more detailed header information.
Outputs	Different shades of blue indicate outputs for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.
Output headers	Different shades of yellow indicate output headers for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	1.50E+00	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Blue	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Yellow	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Red Speckled	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Sweet Corn	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
	Squash	Pumpkin	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Other Squash	Br_{ag}			3.28E-04	2.62E-03	5.19E-04	2.64E-03	2.12E-04	1.03E-02
	Melons	Watermelon	Br_{ag}			6.00E-04	4.79E-03	9.50E-04	4.83E-03	3.87E-04	1.88E-02
		Cantaloupe	Br_{ag}			6.00E-04	4.79E-03	9.50E-04	4.83E-03	3.87E-04	1.88E-02
	Tree Fruit	Apples	Br_{ag}			6.36E-04	5.07E-03	1.01E-03	5.12E-03	4.10E-04	1.99E-02
		Apricots	Br_{ag}			6.00E-04	4.79E-03	9.50E-04	4.83E-03	3.87E-04	1.88E-02
		Peaches	Br_{ag}			5.24E-04	4.18E-03	8.29E-04	4.22E-03	3.38E-04	1.64E-02
	Other Vegetables	Beans	Br_{ag}			4.44E-04	3.54E-03	7.03E-04	3.57E-03	2.86E-04	1.39E-02
		Brussels sprouts	Br_{ag}			6.04E-04	4.82E-03	9.56E-04	4.86E-03	3.90E-04	1.89E-02
		Cucumbers	Br_{ag}			1.56E-04	1.24E-03	2.47E-04	1.26E-03	1.01E-04	4.88E-03
		Tomatoes	Br_{ag}			2.36E-04	1.88E-03	3.73E-04	1.90E-03	1.52E-04	7.38E-03
		Chili	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Onions	Br_{root}			5.53E-05	2.55E-03	6.80E-04	1.28E-03	1.28E-04	5.44E-03
		Potatoes	Br_{root}			5.53E-05	2.55E-03	6.80E-04	1.28E-03	1.28E-04	5.44E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			2.35E-03	1.87E-02	3.72E-03	1.89E-02	1.52E-03	7.34E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Custom					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	4.66E+00	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	4.35E+02	--	--	--
		Blue				--	--	4.35E+02	--	--	--
		Yellow				--	--	8.70E+02	--	--	--
		Red Speckled				--	--	1.45E+03	--	--	--
		Sweet Corn				--	--	2.18E+03	--	--	--
	Squash	Pumpkin				--	--	2.49E+03	--	--	--
		Other Squash				--	--	6.44E+02	--	--	--
	Melons	Watermelon				--	--	5.90E+02	--	--	--
		Cantaloupe				--	--	5.90E+02	--	--	--
	Tree Fruit	Apples				--	--	5.10E+02	--	--	--
		Apricots				--	--	5.41E+02	--	--	--
		Peaches				--	--	6.07E+02	--	--	--
	Other Vegetables	Beans				--	--	5.21E+01	--	--	--
		Brussels sprouts				--	--	1.40E+03	--	--	--
		Cucumbers				--	--	5.18E+03	--	--	--
		Tomatoes				--	--	6.93E+02	--	--	--
		Chili				--	--	2.16E+02	--	--	--
		Onions				--	--	1.91E+03	--	--	--
		Potatoes				--	--	1.67E+03	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	5.90E+00	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.50E+00	3.00E-04	4.00E-02	7.00E-01	2.40E-02	3.00E-04	5.00E-03
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02	2.50E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02	6.00E-02
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02
		Blue	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02
		Yellow	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02
		Red Speckled	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02
		Sweet Corn	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02
	Squash	Pumpkin	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02
		Other Squash	Br_{ag}			4.00E-04	1.64E-03	3.28E-02	3.28E-04	2.05E-02	1.19E-03	2.05E-02
	Melons	Watermelon	Br_{ag}			7.32E-04	3.00E-03	6.00E-02	6.00E-04	3.75E-02	2.18E-03	3.75E-02
		Cantaloupe	Br_{ag}			7.32E-04	3.00E-03	6.00E-02	6.00E-04	3.75E-02	2.18E-03	3.75E-02
	Tree Fruit	Apples	Br_{ag}			7.76E-04	3.18E-03	6.36E-02	6.36E-04	3.98E-02	2.31E-03	3.98E-02
		Apricots	Br_{ag}			7.32E-04	3.00E-03	6.00E-02	6.00E-04	3.75E-02	2.18E-03	3.75E-02
		Peaches	Br_{ag}			6.39E-04	2.62E-03	5.24E-02	5.24E-04	3.28E-02	1.90E-03	3.28E-02
	Other Vegetables	Beans	Br_{ag}			5.42E-04	2.22E-03	4.44E-02	4.44E-04	2.78E-02	1.61E-03	2.78E-02
		Brussels sprouts	Br_{ag}			7.37E-04	3.02E-03	6.04E-02	6.04E-04	3.78E-02	2.19E-03	3.78E-02
		Cucumbers	Br_{ag}			1.90E-04	7.80E-04	1.56E-02	1.56E-04	9.75E-03	5.66E-04	9.75E-03
		Tomatoes	Br_{ag}			2.88E-04	1.18E-03	2.36E-02	2.36E-04	1.48E-02	8.56E-04	1.48E-02
		Chili	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02
		Onions	Br_{root}			3.83E-04	5.95E-04	2.13E-02	8.50E-05	4.25E-03	3.06E-03	5.10E-03
		Potatoes	Br_{root}			3.83E-04	5.95E-04	2.13E-02	8.50E-05	4.25E-03	3.06E-03	5.10E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			2.87E-03	1.18E-02	2.35E-01	2.35E-03	1.47E-01	8.52E-03	1.47E-01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--
		Blue				--	--	--	--	--	--	--
		Yellow				--	--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--	--
		Apricots				--	--	--	--	--	--	--
		Peaches				--	--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--	--
		Chili				--	--	--	--	--	--	--
		Onions				--	--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--	--
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Blue	Br_{ag}			7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Yellow	Br_{ag}			7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Red Speckled	Br_{ag}			7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Sweet Corn	Br_{ag}			7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
	Squash	Pumpkin	Br_{ag}			7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Other Squash	Br_{ag}			7.63E-04	1.60E-03	1.13E-02	7.04E-05	6.97E-04	4.51E-04	7.95E-03
	Melons	Watermelon	Br_{ag}			1.40E-03	2.93E-03	2.07E-02	1.29E-04	1.28E-03	8.25E-04	1.46E-02
		Cantaloupe	Br_{ag}			1.40E-03	2.93E-03	2.07E-02	1.29E-04	1.28E-03	8.25E-04	1.46E-02
	Tree Fruit	Apples	Br_{ag}			1.48E-03	3.10E-03	2.19E-02	1.36E-04	1.35E-03	8.75E-04	1.54E-02
		Apricots	Br_{ag}			1.40E-03	2.93E-03	2.07E-02	1.29E-04	1.28E-03	8.25E-04	1.46E-02
		Peaches	Br_{ag}			1.22E-03	2.55E-03	1.81E-02	1.12E-04	1.11E-03	7.21E-04	1.27E-02
	Other Vegetables	Beans	Br_{ag}			1.03E-03	2.16E-03	1.53E-02	9.52E-05	9.44E-04	6.11E-04	1.08E-02
		Brussels sprouts	Br_{ag}			1.41E-03	2.94E-03	2.08E-02	1.30E-04	1.28E-03	8.31E-04	1.46E-02
		Cucumbers	Br_{ag}			3.63E-04	7.61E-04	5.38E-03	3.35E-05	3.32E-04	2.15E-04	3.78E-03
		Tomatoes	Br_{ag}			5.49E-04	1.15E-03	8.14E-03	5.06E-05	5.02E-04	3.25E-04	5.72E-03
		Chili	Br_{ag}			7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Onions	Br_{root}			6.80E-04	1.87E-03	8.50E-03	3.40E-05	3.40E-04	2.55E-04	7.65E-02
		Potatoes	Br_{root}			6.80E-04	1.87E-03	8.50E-03	3.40E-05	3.40E-04	2.55E-04	7.65E-02
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			5.47E-03	1.15E-02	8.11E-02	5.04E-04	4.99E-03	3.23E-03	5.70E-02
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Outputs	Parameter		Symbol	Description	Units	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--
		Blue				--	--	--	--	--	--	--
		Yellow				--	--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--	--
		Apricots				--	--	--	--	--	--	--
		Peaches				--	--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--	--
		Chili				--	--	--	--	--	--	--
		Onions				--	--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--	--
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	1.50E+00	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Blue	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Yellow	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Red Speckled	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Sweet Corn	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
	Squash	Pumpkin	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Other Squash	Br_{ag}			3.28E-04	2.62E-03	5.19E-04	2.64E-03	2.12E-04	1.03E-02
	Melons	Watermelon	Br_{ag}			6.00E-04	4.79E-03	9.50E-04	4.83E-03	3.87E-04	1.88E-02
		Cantaloupe	Br_{ag}			6.00E-04	4.79E-03	9.50E-04	4.83E-03	3.87E-04	1.88E-02
	Tree Fruit	Apples	Br_{ag}			6.36E-04	5.07E-03	1.01E-03	5.12E-03	4.10E-04	1.99E-02
		Apricots	Br_{ag}			6.00E-04	4.79E-03	9.50E-04	4.83E-03	3.87E-04	1.88E-02
		Peaches	Br_{ag}			5.24E-04	4.18E-03	8.29E-04	4.22E-03	3.38E-04	1.64E-02
	Other Vegetables	Beans	Br_{ag}			4.44E-04	3.54E-03	7.03E-04	3.57E-03	2.86E-04	1.39E-02
		Brussels sprouts	Br_{ag}			6.04E-04	4.82E-03	9.56E-04	4.86E-03	3.90E-04	1.89E-02
		Cucumbers	Br_{ag}			1.56E-04	1.24E-03	2.47E-04	1.26E-03	1.01E-04	4.88E-03
		Tomatoes	Br_{ag}			2.36E-04	1.88E-03	3.73E-04	1.90E-03	1.52E-04	7.38E-03
		Chili	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Onions	Br_{root}			5.53E-05	2.55E-03	6.80E-04	1.28E-03	1.28E-04	5.44E-03
		Potatoes	Br_{root}			5.53E-05	2.55E-03	6.80E-04	1.28E-03	1.28E-04	5.44E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			2.35E-03	1.87E-02	3.72E-03	1.89E-02	1.52E-03	7.34E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Kee'da'whíí tééh (full-time Navajo residential)					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	4.66E+00	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	4.35E+02	--	--	--
		Blue				--	--	4.35E+02	--	--	--
		Yellow				--	--	8.70E+02	--	--	--
		Red Speckled				--	--	1.45E+03	--	--	--
		Sweet Corn				--	--	2.18E+03	--	--	--
	Squash	Pumpkin				--	--	2.49E+03	--	--	--
		Other Squash				--	--	6.44E+02	--	--	--
	Melons	Watermelon				--	--	5.90E+02	--	--	--
		Cantaloupe				--	--	5.90E+02	--	--	--
	Tree Fruit	Apples				--	--	5.10E+02	--	--	--
		Apricots				--	--	5.41E+02	--	--	--
		Peaches				--	--	6.07E+02	--	--	--
	Other Vegetables	Beans				--	--	5.21E+01	--	--	--
		Brussels sprouts				--	--	1.40E+03	--	--	--
		Cucumbers				--	--	5.18E+03	--	--	--
		Tomatoes				--	--	6.93E+02	--	--	--
		Chili				--	--	2.16E+02	--	--	--
		Onions				--	--	1.91E+03	--	--	--
		Potatoes				--	--	1.67E+03	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	5.90E+00	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.50E+00	3.00E-04	4.00E-02	7.00E-01	2.40E-02	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Blue	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Yellow	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Red Speckled	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Sweet Corn	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
	Squash	Pumpkin	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Other Squash	Br_{ag}			4.00E-04	1.64E-03	3.28E-02	3.28E-04	2.05E-02	1.19E-03
	Melons	Watermelon	Br_{ag}			7.32E-04	3.00E-03	6.00E-02	6.00E-04	3.75E-02	2.18E-03
		Cantaloupe	Br_{ag}			7.32E-04	3.00E-03	6.00E-02	6.00E-04	3.75E-02	2.18E-03
	Tree Fruit	Apples	Br_{ag}			7.76E-04	3.18E-03	6.36E-02	6.36E-04	3.98E-02	2.31E-03
		Apricots	Br_{ag}			7.32E-04	3.00E-03	6.00E-02	6.00E-04	3.75E-02	2.18E-03
		Peaches	Br_{ag}			6.39E-04	2.62E-03	5.24E-02	5.24E-04	3.28E-02	1.90E-03
	Other Vegetables	Beans	Br_{ag}			5.42E-04	2.22E-03	4.44E-02	4.44E-04	2.78E-02	1.61E-03
		Brussels sprouts	Br_{ag}			7.37E-04	3.02E-03	6.04E-02	6.04E-04	3.78E-02	2.19E-03
		Cucumbers	Br_{ag}			1.90E-04	7.80E-04	1.56E-02	1.56E-04	9.75E-03	5.66E-04
		Tomatoes	Br_{ag}			2.88E-04	1.18E-03	2.36E-02	2.36E-04	1.48E-02	8.56E-04
		Chili	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Onions	Br_{root}			3.83E-04	5.95E-04	2.13E-02	8.50E-05	4.25E-03	3.06E-03
		Potatoes	Br_{root}			3.83E-04	5.95E-04	2.13E-02	8.50E-05	4.25E-03	3.06E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			2.87E-03	1.18E-02	2.35E-01	2.35E-03	1.47E-01	8.52E-03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Blue	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Yellow	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Red Speckled	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Sweet Corn	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
	Squash	Pumpkin	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Other Squash	Br_{ag}			2.05E-02	7.63E-04	1.60E-03	1.13E-02	7.04E-05	6.97E-04
	Melons	Watermelon	Br_{ag}			3.75E-02	1.40E-03	2.93E-03	2.07E-02	1.29E-04	1.28E-03
		Cantaloupe	Br_{ag}			3.75E-02	1.40E-03	2.93E-03	2.07E-02	1.29E-04	1.28E-03
	Tree Fruit	Apples	Br_{ag}			3.98E-02	1.48E-03	3.10E-03	2.19E-02	1.36E-04	1.35E-03
		Apricots	Br_{ag}			3.75E-02	1.40E-03	2.93E-03	2.07E-02	1.29E-04	1.28E-03
		Peaches	Br_{ag}			3.28E-02	1.22E-03	2.55E-03	1.81E-02	1.12E-04	1.11E-03
	Other Vegetables	Beans	Br_{ag}			2.78E-02	1.03E-03	2.16E-03	1.53E-02	9.52E-05	9.44E-04
		Brussels sprouts	Br_{ag}			3.78E-02	1.41E-03	2.94E-03	2.08E-02	1.30E-04	1.28E-03
		Cucumbers	Br_{ag}			9.75E-03	3.63E-04	7.61E-04	5.38E-03	3.35E-05	3.32E-04
		Tomatoes	Br_{ag}			1.48E-02	5.49E-04	1.15E-03	8.14E-03	5.06E-05	5.02E-04
		Chili	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Onions	Br_{root}			5.10E-03	6.80E-04	1.87E-03	8.50E-03	3.40E-05	3.40E-04
		Potatoes	Br_{root}			5.10E-03	6.80E-04	1.87E-03	8.50E-03	3.40E-05	3.40E-04
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			1.47E-01	5.47E-03	1.15E-02	8.11E-02	5.04E-04	4.99E-03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	1.50E+00	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	3.00E-01	1.00E+00	4.00E-04	3.00E-04	2.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Blue	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Yellow	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Red Speckled	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Sweet Corn	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
	Squash	Pumpkin	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Other Squash	Br_{ag}			4.51E-04	7.95E-03	3.28E-04	2.62E-03	5.19E-04	2.64E-03
	Melons	Watermelon	Br_{ag}			8.25E-04	1.46E-02	6.00E-04	4.79E-03	9.50E-04	4.83E-03
		Cantaloupe	Br_{ag}			8.25E-04	1.46E-02	6.00E-04	4.79E-03	9.50E-04	4.83E-03
	Tree Fruit	Apples	Br_{ag}			8.75E-04	1.54E-02	6.36E-04	5.07E-03	1.01E-03	5.12E-03
		Apricots	Br_{ag}			8.25E-04	1.46E-02	6.00E-04	4.79E-03	9.50E-04	4.83E-03
		Peaches	Br_{ag}			7.21E-04	1.27E-02	5.24E-04	4.18E-03	8.29E-04	4.22E-03
	Other Vegetables	Beans	Br_{ag}			6.11E-04	1.08E-02	4.44E-04	3.54E-03	7.03E-04	3.57E-03
		Brussels sprouts	Br_{ag}			8.31E-04	1.46E-02	6.04E-04	4.82E-03	9.56E-04	4.86E-03
		Cucumbers	Br_{ag}			2.15E-04	3.78E-03	1.56E-04	1.24E-03	2.47E-04	1.26E-03
		Tomatoes	Br_{ag}			3.25E-04	5.72E-03	2.36E-04	1.88E-03	3.73E-04	1.90E-03
		Chili	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Onions	Br_{root}			2.55E-04	7.65E-02	5.53E-05	2.55E-03	6.80E-04	1.28E-03
		Potatoes	Br_{root}			2.55E-04	7.65E-02	5.53E-05	2.55E-03	6.80E-04	1.28E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			3.23E-03	5.70E-02	2.35E-03	1.87E-02	3.72E-03	1.89E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Cancer PRG for Specific Metals - Kǫǫh bí łíí nakaí (sheep c: Aluminum	Antimony	Arsenic	Barium
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	1.34E+01	--
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	1.20E+03	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	2.74E+03	--
		Other Squash				--	--	--	--	1.77E+03	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	1.62E+03	--
	Tree Fruit	Apples				--	--	--	--	1.40E+03	--
		Apricots				--	--	--	--	1.49E+03	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	1.42E+01	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Blue	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Yellow	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Red Speckled	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Sweet Corn	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
	Squash	Pumpkin	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Other Squash	Br_{ag}			2.12E-04	1.03E-02	4.00E-04	1.64E-03	3.28E-02	3.28E-04
	Melons	Watermelon	Br_{ag}			3.87E-04	1.88E-02	7.32E-04	3.00E-03	6.00E-02	6.00E-04
		Cantaloupe	Br_{ag}			3.87E-04	1.88E-02	7.32E-04	3.00E-03	6.00E-02	6.00E-04
	Tree Fruit	Apples	Br_{ag}			4.10E-04	1.99E-02	7.76E-04	3.18E-03	6.36E-02	6.36E-04
		Apricots	Br_{ag}			3.87E-04	1.88E-02	7.32E-04	3.00E-03	6.00E-02	6.00E-04
		Peaches	Br_{ag}			3.38E-04	1.64E-02	6.39E-04	2.62E-03	5.24E-02	5.24E-04
	Other Vegetables	Beans	Br_{ag}			2.86E-04	1.39E-02	5.42E-04	2.22E-03	4.44E-02	4.44E-04
		Brussels sprouts	Br_{ag}			3.90E-04	1.89E-02	7.37E-04	3.02E-03	6.04E-02	6.04E-04
		Cucumbers	Br_{ag}			1.01E-04	4.88E-03	1.90E-04	7.80E-04	1.56E-02	1.56E-04
		Tomatoes	Br_{ag}			1.52E-04	7.38E-03	2.88E-04	1.18E-03	2.36E-02	2.36E-04
		Chili	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Onions	Br_{root}			1.28E-04	5.44E-03	3.83E-04	5.95E-04	2.13E-02	8.50E-05
		Potatoes	Br_{root}			1.28E-04	5.44E-03	3.83E-04	5.95E-04	2.13E-02	8.50E-05
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			1.52E-03	7.34E-02	2.87E-03	1.18E-02	2.35E-01	2.35E-03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	amp) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02	1.38E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02	1.00E-01
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Blue	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Yellow	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Red Speckled	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Sweet Corn	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
	Squash	Pumpkin	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Other Squash	Br_{ag}			2.05E-02	1.19E-03	2.05E-02	7.63E-04	1.60E-03	1.13E-02
	Melons	Watermelon	Br_{ag}			3.75E-02	2.18E-03	3.75E-02	1.40E-03	2.93E-03	2.07E-02
		Cantaloupe	Br_{ag}			3.75E-02	2.18E-03	3.75E-02	1.40E-03	2.93E-03	2.07E-02
	Tree Fruit	Apples	Br_{ag}			3.98E-02	2.31E-03	3.98E-02	1.48E-03	3.10E-03	2.19E-02
		Apricots	Br_{ag}			3.75E-02	2.18E-03	3.75E-02	1.40E-03	2.93E-03	2.07E-02
		Peaches	Br_{ag}			3.28E-02	1.90E-03	3.28E-02	1.22E-03	2.55E-03	1.81E-02
	Other Vegetables	Beans	Br_{ag}			2.78E-02	1.61E-03	2.78E-02	1.03E-03	2.16E-03	1.53E-02
		Brussels sprouts	Br_{ag}			3.78E-02	2.19E-03	3.78E-02	1.41E-03	2.94E-03	2.08E-02
		Cucumbers	Br_{ag}			9.75E-03	5.66E-04	9.75E-03	3.63E-04	7.61E-04	5.38E-03
		Tomatoes	Br_{ag}			1.48E-02	8.56E-04	1.48E-02	5.49E-04	1.15E-03	8.14E-03
		Chili	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Onions	Br_{root}			4.25E-03	3.06E-03	5.10E-03	6.80E-04	1.87E-03	8.50E-03
		Potatoes	Br_{root}			4.25E-03	3.06E-03	5.10E-03	6.80E-04	1.87E-03	8.50E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			1.47E-01	8.52E-03	1.47E-01	5.47E-03	1.15E-02	8.11E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E-05	2.00E-04	5.00E-03	3.00E-01	1.00E+00	4.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	8.58E-04	8.50E-03	5.50E-03	9.70E-02	4.00E-03	3.19E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.00E-04	4.00E-03	3.00E-03	9.00E-01	6.50E-04	3.00E-02
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03
		Blue	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03
		Yellow	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03
		Red Speckled	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03
		Sweet Corn	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03
	Squash	Pumpkin	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03
		Other Squash	Br_{ag}			7.04E-05	6.97E-04	4.51E-04	7.95E-03	3.28E-04	2.62E-03
	Melons	Watermelon	Br_{ag}			1.29E-04	1.28E-03	8.25E-04	1.46E-02	6.00E-04	4.79E-03
		Cantaloupe	Br_{ag}			1.29E-04	1.28E-03	8.25E-04	1.46E-02	6.00E-04	4.79E-03
	Tree Fruit	Apples	Br_{ag}			1.36E-04	1.35E-03	8.75E-04	1.54E-02	6.36E-04	5.07E-03
		Apricots	Br_{ag}			1.29E-04	1.28E-03	8.25E-04	1.46E-02	6.00E-04	4.79E-03
		Peaches	Br_{ag}			1.12E-04	1.11E-03	7.21E-04	1.27E-02	5.24E-04	4.18E-03
	Other Vegetables	Beans	Br_{ag}			9.52E-05	9.44E-04	6.11E-04	1.08E-02	4.44E-04	3.54E-03
		Brussels sprouts	Br_{ag}			1.30E-04	1.28E-03	8.31E-04	1.46E-02	6.04E-04	4.82E-03
		Cucumbers	Br_{ag}			3.35E-05	3.32E-04	2.15E-04	3.78E-03	1.56E-04	1.24E-03
		Tomatoes	Br_{ag}			5.06E-05	5.02E-04	3.25E-04	5.72E-03	2.36E-04	1.88E-03
		Chili	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03
		Onions	Br_{root}			3.40E-05	3.40E-04	2.55E-04	7.65E-02	5.53E-05	2.55E-03
		Potatoes	Br_{root}			3.40E-05	3.40E-04	2.55E-04	7.65E-02	5.53E-05	2.55E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			5.04E-04	4.99E-03	3.23E-03	5.70E-02	2.35E-03	1.87E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Cancer PRG for Specific Meta Aluminum	Antimony
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	1.50E+00	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	6.33E-03	3.22E-02	2.58E-03	1.25E-01	4.88E-03	2.00E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	8.00E-03	1.50E-02	1.50E-03	6.40E-02	4.50E-03	7.00E-03
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Blue	Br_{ag}			5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Yellow	Br_{ag}			5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Red Speckled	Br_{ag}			5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Sweet Corn	Br_{ag}			5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
	Squash	Pumpkin	Br_{ag}			5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Other Squash	Br_{ag}			5.19E-04	2.64E-03	2.12E-04	1.03E-02	4.00E-04	1.64E-03
	Melons	Watermelon	Br_{ag}			9.50E-04	4.83E-03	3.87E-04	1.88E-02	7.32E-04	3.00E-03
		Cantaloupe	Br_{ag}			9.50E-04	4.83E-03	3.87E-04	1.88E-02	7.32E-04	3.00E-03
	Tree Fruit	Apples	Br_{ag}			1.01E-03	5.12E-03	4.10E-04	1.99E-02	7.76E-04	3.18E-03
		Apricots	Br_{ag}			9.50E-04	4.83E-03	3.87E-04	1.88E-02	7.32E-04	3.00E-03
		Peaches	Br_{ag}			8.29E-04	4.22E-03	3.38E-04	1.64E-02	6.39E-04	2.62E-03
	Other Vegetables	Beans	Br_{ag}			7.03E-04	3.57E-03	2.86E-04	1.39E-02	5.42E-04	2.22E-03
		Brussels sprouts	Br_{ag}			9.56E-04	4.86E-03	3.90E-04	1.89E-02	7.37E-04	3.02E-03
		Cucumbers	Br_{ag}			2.47E-04	1.26E-03	1.01E-04	4.88E-03	1.90E-04	7.80E-04
		Tomatoes	Br_{ag}			3.73E-04	1.90E-03	1.52E-04	7.38E-03	2.88E-04	1.18E-03
		Chili	Br_{ag}			5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Onions	Br_{root}			6.80E-04	1.28E-03	1.28E-04	5.44E-03	3.83E-04	5.95E-04
		Potatoes	Br_{root}			6.80E-04	1.28E-03	1.28E-04	5.44E-03	3.83E-04	5.95E-04
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			3.72E-03	1.89E-02	1.52E-03	7.34E-02	2.87E-03	1.18E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
						...ls - Kǫǫ eí nahaazáh (easy access open space)					
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	3.54E+01	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.54E+01	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	4.00E-02	7.00E-01	2.40E-02	3.00E-04	5.00E-03	2.00E-02
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-01	4.00E-03	2.50E-01	1.45E-02	2.50E-01	9.31E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	1.00E-03	5.00E-02	3.60E-02	6.00E-02	8.00E-03
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04
		Blue	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04
		Yellow	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04
		Red Speckled	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04
		Sweet Corn	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04
	Squash	Pumpkin	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04
		Other Squash	Br_{ag}			3.28E-02	3.28E-04	2.05E-02	1.19E-03	2.05E-02	7.63E-04
	Melons	Watermelon	Br_{ag}			6.00E-02	6.00E-04	3.75E-02	2.18E-03	3.75E-02	1.40E-03
		Cantaloupe	Br_{ag}			6.00E-02	6.00E-04	3.75E-02	2.18E-03	3.75E-02	1.40E-03
	Tree Fruit	Apples	Br_{ag}			6.36E-02	6.36E-04	3.98E-02	2.31E-03	3.98E-02	1.48E-03
		Apricots	Br_{ag}			6.00E-02	6.00E-04	3.75E-02	2.18E-03	3.75E-02	1.40E-03
		Peaches	Br_{ag}			5.24E-02	5.24E-04	3.28E-02	1.90E-03	3.28E-02	1.22E-03
	Other Vegetables	Beans	Br_{ag}			4.44E-02	4.44E-04	2.78E-02	1.61E-03	2.78E-02	1.03E-03
		Brussels sprouts	Br_{ag}			6.04E-02	6.04E-04	3.78E-02	2.19E-03	3.78E-02	1.41E-03
		Cucumbers	Br_{ag}			1.56E-02	1.56E-04	9.75E-03	5.66E-04	9.75E-03	3.63E-04
		Tomatoes	Br_{ag}			2.36E-02	2.36E-04	1.48E-02	8.56E-04	1.48E-02	5.49E-04
		Chili	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04
		Onions	Br_{root}			2.13E-02	8.50E-05	4.25E-03	3.06E-03	5.10E-03	6.80E-04
		Potatoes	Br_{root}			2.13E-02	8.50E-05	4.25E-03	3.06E-03	5.10E-03	6.80E-04
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			2.35E-01	2.35E-03	1.47E-01	8.52E-03	1.47E-01	5.47E-03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Blue	Br_{ag}			1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Yellow	Br_{ag}			1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Red Speckled	Br_{ag}			1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Sweet Corn	Br_{ag}			1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
	Squash	Pumpkin	Br_{ag}			1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Other Squash	Br_{ag}			1.60E-03	1.13E-02	7.04E-05	6.97E-04	4.51E-04	7.95E-03
	Melons	Watermelon	Br_{ag}			2.93E-03	2.07E-02	1.29E-04	1.28E-03	8.25E-04	1.46E-02
		Cantaloupe	Br_{ag}			2.93E-03	2.07E-02	1.29E-04	1.28E-03	8.25E-04	1.46E-02
	Tree Fruit	Apples	Br_{ag}			3.10E-03	2.19E-02	1.36E-04	1.35E-03	8.75E-04	1.54E-02
		Apricots	Br_{ag}			2.93E-03	2.07E-02	1.29E-04	1.28E-03	8.25E-04	1.46E-02
		Peaches	Br_{ag}			2.55E-03	1.81E-02	1.12E-04	1.11E-03	7.21E-04	1.27E-02
	Other Vegetables	Beans	Br_{ag}			2.16E-03	1.53E-02	9.52E-05	9.44E-04	6.11E-04	1.08E-02
		Brussels sprouts	Br_{ag}			2.94E-03	2.08E-02	1.30E-04	1.28E-03	8.31E-04	1.46E-02
		Cucumbers	Br_{ag}			7.61E-04	5.38E-03	3.35E-05	3.32E-04	2.15E-04	3.78E-03
		Tomatoes	Br_{ag}			1.15E-03	8.14E-03	5.06E-05	5.02E-04	3.25E-04	5.72E-03
		Chili	Br_{ag}			1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Onions	Br_{root}			1.87E-03	8.50E-03	3.40E-05	3.40E-04	2.55E-04	7.65E-02
		Potatoes	Br_{root}			1.87E-03	8.50E-03	3.40E-05	3.40E-04	2.55E-04	7.65E-02
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			1.15E-02	8.11E-02	5.04E-04	4.99E-03	3.23E-03	5.70E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	1.50E+00	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Blue	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Yellow	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Red Speckled	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Sweet Corn	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
	Squash	Pumpkin	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Other Squash	Br_{ag}			3.28E-04	2.62E-03	5.19E-04	2.64E-03	2.12E-04	1.03E-02
	Melons	Watermelon	Br_{ag}			6.00E-04	4.79E-03	9.50E-04	4.83E-03	3.87E-04	1.88E-02
		Cantaloupe	Br_{ag}			6.00E-04	4.79E-03	9.50E-04	4.83E-03	3.87E-04	1.88E-02
	Tree Fruit	Apples	Br_{ag}			6.36E-04	5.07E-03	1.01E-03	5.12E-03	4.10E-04	1.99E-02
		Apricots	Br_{ag}			6.00E-04	4.79E-03	9.50E-04	4.83E-03	3.87E-04	1.88E-02
		Peaches	Br_{ag}			5.24E-04	4.18E-03	8.29E-04	4.22E-03	3.38E-04	1.64E-02
	Other Vegetables	Beans	Br_{ag}			4.44E-04	3.54E-03	7.03E-04	3.57E-03	2.86E-04	1.39E-02
		Brussels sprouts	Br_{ag}			6.04E-04	4.82E-03	9.56E-04	4.86E-03	3.90E-04	1.89E-02
		Cucumbers	Br_{ag}			1.56E-04	1.24E-03	2.47E-04	1.26E-03	1.01E-04	4.88E-03
		Tomatoes	Br_{ag}			2.36E-04	1.88E-03	3.73E-04	1.90E-03	1.52E-04	7.38E-03
		Chili	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Onions	Br_{root}			5.53E-05	2.55E-03	6.80E-04	1.28E-03	1.28E-04	5.44E-03
		Potatoes	Br_{root}			5.53E-05	2.55E-03	6.80E-04	1.28E-03	1.28E-04	5.44E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			2.35E-03	1.87E-02	3.72E-03	1.89E-02	1.52E-03	7.34E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	7.08E+01	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	7.08E+01	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.50E+00	3.00E-04	4.00E-02	7.00E-01	2.40E-02	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Blue	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Yellow	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Red Speckled	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Sweet Corn	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
	Squash	Pumpkin	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Other Squash	Br_{ag}			4.00E-04	1.64E-03	3.28E-02	3.28E-04	2.05E-02	1.19E-03
	Melons	Watermelon	Br_{ag}			7.32E-04	3.00E-03	6.00E-02	6.00E-04	3.75E-02	2.18E-03
		Cantaloupe	Br_{ag}			7.32E-04	3.00E-03	6.00E-02	6.00E-04	3.75E-02	2.18E-03
	Tree Fruit	Apples	Br_{ag}			7.76E-04	3.18E-03	6.36E-02	6.36E-04	3.98E-02	2.31E-03
		Apricots	Br_{ag}			7.32E-04	3.00E-03	6.00E-02	6.00E-04	3.75E-02	2.18E-03
		Peaches	Br_{ag}			6.39E-04	2.62E-03	5.24E-02	5.24E-04	3.28E-02	1.90E-03
	Other Vegetables	Beans	Br_{ag}			5.42E-04	2.22E-03	4.44E-02	4.44E-04	2.78E-02	1.61E-03
		Brussels sprouts	Br_{ag}			7.37E-04	3.02E-03	6.04E-02	6.04E-04	3.78E-02	2.19E-03
		Cucumbers	Br_{ag}			1.90E-04	7.80E-04	1.56E-02	1.56E-04	9.75E-03	5.66E-04
		Tomatoes	Br_{ag}			2.88E-04	1.18E-03	2.36E-02	2.36E-04	1.48E-02	8.56E-04
		Chili	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Onions	Br_{root}			3.83E-04	5.95E-04	2.13E-02	8.50E-05	4.25E-03	3.06E-03
		Potatoes	Br_{root}			3.83E-04	5.95E-04	2.13E-02	8.50E-05	4.25E-03	3.06E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			2.87E-03	1.18E-02	2.35E-01	2.35E-03	1.47E-01	8.52E-03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Blue	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Yellow	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Red Speckled	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Sweet Corn	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
	Squash	Pumpkin	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Other Squash	Br_{ag}			2.05E-02	7.63E-04	1.60E-03	1.13E-02	7.04E-05	6.97E-04
	Melons	Watermelon	Br_{ag}			3.75E-02	1.40E-03	2.93E-03	2.07E-02	1.29E-04	1.28E-03
		Cantaloupe	Br_{ag}			3.75E-02	1.40E-03	2.93E-03	2.07E-02	1.29E-04	1.28E-03
	Tree Fruit	Apples	Br_{ag}			3.98E-02	1.48E-03	3.10E-03	2.19E-02	1.36E-04	1.35E-03
		Apricots	Br_{ag}			3.75E-02	1.40E-03	2.93E-03	2.07E-02	1.29E-04	1.28E-03
		Peaches	Br_{ag}			3.28E-02	1.22E-03	2.55E-03	1.81E-02	1.12E-04	1.11E-03
	Other Vegetables	Beans	Br_{ag}			2.78E-02	1.03E-03	2.16E-03	1.53E-02	9.52E-05	9.44E-04
		Brussels sprouts	Br_{ag}			3.78E-02	1.41E-03	2.94E-03	2.08E-02	1.30E-04	1.28E-03
		Cucumbers	Br_{ag}			9.75E-03	3.63E-04	7.61E-04	5.38E-03	3.35E-05	3.32E-04
		Tomatoes	Br_{ag}			1.48E-02	5.49E-04	1.15E-03	8.14E-03	5.06E-05	5.02E-04
		Chili	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Onions	Br_{root}			5.10E-03	6.80E-04	1.87E-03	8.50E-03	3.40E-05	3.40E-04
		Potatoes	Br_{root}			5.10E-03	6.80E-04	1.87E-03	8.50E-03	3.40E-05	3.40E-04
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			1.47E-01	5.47E-03	1.15E-02	8.11E-02	5.04E-04	4.99E-03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	1.50E+00	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	3.00E-01	1.00E+00	4.00E-04	3.00E-04	2.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Blue	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Yellow	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Red Speckled	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Sweet Corn	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
	Squash	Pumpkin	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Other Squash	Br_{ag}			4.51E-04	7.95E-03	3.28E-04	2.62E-03	5.19E-04	2.64E-03
	Melons	Watermelon	Br_{ag}			8.25E-04	1.46E-02	6.00E-04	4.79E-03	9.50E-04	4.83E-03
		Cantaloupe	Br_{ag}			8.25E-04	1.46E-02	6.00E-04	4.79E-03	9.50E-04	4.83E-03
	Tree Fruit	Apples	Br_{ag}			8.75E-04	1.54E-02	6.36E-04	5.07E-03	1.01E-03	5.12E-03
		Apricots	Br_{ag}			8.25E-04	1.46E-02	6.00E-04	4.79E-03	9.50E-04	4.83E-03
		Peaches	Br_{ag}			7.21E-04	1.27E-02	5.24E-04	4.18E-03	8.29E-04	4.22E-03
	Other Vegetables	Beans	Br_{ag}			6.11E-04	1.08E-02	4.44E-04	3.54E-03	7.03E-04	3.57E-03
		Brussels sprouts	Br_{ag}			8.31E-04	1.46E-02	6.04E-04	4.82E-03	9.56E-04	4.86E-03
		Cucumbers	Br_{ag}			2.15E-04	3.78E-03	1.56E-04	1.24E-03	2.47E-04	1.26E-03
		Tomatoes	Br_{ag}			3.25E-04	5.72E-03	2.36E-04	1.88E-03	3.73E-04	1.90E-03
		Chili	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Onions	Br_{root}			2.55E-04	7.65E-02	5.53E-05	2.55E-03	6.80E-04	1.28E-03
		Potatoes	Br_{root}			2.55E-04	7.65E-02	5.53E-05	2.55E-03	6.80E-04	1.28E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			3.23E-03	5.70E-02	2.35E-03	1.87E-02	3.72E-03	1.89E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Cancer PRG for Specific Metals - Chíí dah wiih łeezh (wash					
						--	--	--	--	1.41E+01	--
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Blue	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Yellow	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Red Speckled	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Sweet Corn	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
	Squash	Pumpkin	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Other Squash	Br_{ag}			2.12E-04	1.03E-02	4.00E-04	1.64E-03	3.28E-02	3.28E-04
	Melons	Watermelon	Br_{ag}			3.87E-04	1.88E-02	7.32E-04	3.00E-03	6.00E-02	6.00E-04
		Cantaloupe	Br_{ag}			3.87E-04	1.88E-02	7.32E-04	3.00E-03	6.00E-02	6.00E-04
	Tree Fruit	Apples	Br_{ag}			4.10E-04	1.99E-02	7.76E-04	3.18E-03	6.36E-02	6.36E-04
		Apricots	Br_{ag}			3.87E-04	1.88E-02	7.32E-04	3.00E-03	6.00E-02	6.00E-04
		Peaches	Br_{ag}			3.38E-04	1.64E-02	6.39E-04	2.62E-03	5.24E-02	5.24E-04
	Other Vegetables	Beans	Br_{ag}			2.86E-04	1.39E-02	5.42E-04	2.22E-03	4.44E-02	4.44E-04
		Brussels sprouts	Br_{ag}			3.90E-04	1.89E-02	7.37E-04	3.02E-03	6.04E-02	6.04E-04
		Cucumbers	Br_{ag}			1.01E-04	4.88E-03	1.90E-04	7.80E-04	1.56E-02	1.56E-04
		Tomatoes	Br_{ag}			1.52E-04	7.38E-03	2.88E-04	1.18E-03	2.36E-02	2.36E-04
		Chili	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Onions	Br_{root}			1.28E-04	5.44E-03	3.83E-04	5.95E-04	2.13E-02	8.50E-05
		Potatoes	Br_{root}			1.28E-04	5.44E-03	3.83E-04	5.95E-04	2.13E-02	8.50E-05
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			1.52E-03	7.34E-02	2.87E-03	1.18E-02	2.35E-01	2.35E-03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	es and drainages) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02	1.38E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02	1.00E-01
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Blue	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Yellow	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Red Speckled	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Sweet Corn	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
	Squash	Pumpkin	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Other Squash	Br_{ag}			2.05E-02	1.19E-03	2.05E-02	7.63E-04	1.60E-03	1.13E-02
	Melons	Watermelon	Br_{ag}			3.75E-02	2.18E-03	3.75E-02	1.40E-03	2.93E-03	2.07E-02
		Cantaloupe	Br_{ag}			3.75E-02	2.18E-03	3.75E-02	1.40E-03	2.93E-03	2.07E-02
	Tree Fruit	Apples	Br_{ag}			3.98E-02	2.31E-03	3.98E-02	1.48E-03	3.10E-03	2.19E-02
		Apricots	Br_{ag}			3.75E-02	2.18E-03	3.75E-02	1.40E-03	2.93E-03	2.07E-02
		Peaches	Br_{ag}			3.28E-02	1.90E-03	3.28E-02	1.22E-03	2.55E-03	1.81E-02
	Other Vegetables	Beans	Br_{ag}			2.78E-02	1.61E-03	2.78E-02	1.03E-03	2.16E-03	1.53E-02
		Brussels sprouts	Br_{ag}			3.78E-02	2.19E-03	3.78E-02	1.41E-03	2.94E-03	2.08E-02
		Cucumbers	Br_{ag}			9.75E-03	5.66E-04	9.75E-03	3.63E-04	7.61E-04	5.38E-03
		Tomatoes	Br_{ag}			1.48E-02	8.56E-04	1.48E-02	5.49E-04	1.15E-03	8.14E-03
		Chili	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Onions	Br_{root}			4.25E-03	3.06E-03	5.10E-03	6.80E-04	1.87E-03	8.50E-03
		Potatoes	Br_{root}			4.25E-03	3.06E-03	5.10E-03	6.80E-04	1.87E-03	8.50E-03
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			1.47E-01	8.52E-03	1.47E-01	5.47E-03	1.15E-02	8.11E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--	--	--
	Corn	White	$PRG_{p-ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc
Metal-Specific Toxicity Parameters	Slope Factor		SF_f	Cancer slope factor for metals	(mg/kg-day)-1	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E-05	2.00E-04	5.00E-03	3.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	8.58E-04	8.50E-03	5.50E-03	9.70E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.00E-04	4.00E-03	3.00E-03	9.00E-01
Plant-Specific Bioconcentration Factors for Metals	Corn	White	Br_{ag}	Plant-soil bioconcentration factor - above or below ground. Calculated using the bioconcentration factors for metals in above-ground and below-ground plants and dry weight to wet weight conversion factors based on percent moisture.	mg/kg-fresh plant per mg/kg dry soil	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Blue	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Yellow	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Red Speckled	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Sweet Corn	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03
	Squash	Pumpkin	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Other Squash	Br_{ag}			7.04E-05	6.97E-04	4.51E-04	7.95E-03
	Melons	Watermelon	Br_{ag}			1.29E-04	1.28E-03	8.25E-04	1.46E-02
		Cantaloupe	Br_{ag}			1.29E-04	1.28E-03	8.25E-04	1.46E-02
	Tree Fruit	Apples	Br_{ag}			1.36E-04	1.35E-03	8.75E-04	1.54E-02
		Apricots	Br_{ag}			1.29E-04	1.28E-03	8.25E-04	1.46E-02
		Peaches	Br_{ag}			1.12E-04	1.11E-03	7.21E-04	1.27E-02
	Other Vegetables	Beans	Br_{ag}			9.52E-05	9.44E-04	6.11E-04	1.08E-02
		Brussels sprouts	Br_{ag}			1.30E-04	1.28E-03	8.31E-04	1.46E-02
		Cucumbers	Br_{ag}			3.35E-05	3.32E-04	2.15E-04	3.78E-03
		Tomatoes	Br_{ag}			5.06E-05	5.02E-04	3.25E-04	5.72E-03
		Chili	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Onions	Br_{root}			3.40E-05	3.40E-04	2.55E-04	7.65E-02
		Potatoes	Br_{root}			3.40E-05	3.40E-04	2.55E-04	7.65E-02
	Herbs and Medicinal:	Navajo Tea	Br_{ag}			5.04E-04	4.99E-03	3.23E-03	5.70E-02
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	--	--	--	--
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{TR \times AT_c}{(SF_f \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--
		Blue				--	--	--	--
		Yellow				--	--	--	--
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				--	--	--	--
	Melons	Watermelon				--	--	--	--
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Custom					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	**3.22E+04**	**6.58E+00**	**8.91E+00**	**3.29E+03**	**6.75E+01**	**6.30E-01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	3.91E+06	2.65E+02	8.32E+02	1.31E+05	1.04E+04	1.76E+01
		Blue				3.91E+06	2.65E+02	8.32E+02	1.31E+05	1.04E+04	1.76E+01
		Yellow				7.81E+06	5.31E+02	1.66E+03	2.63E+05	2.08E+04	3.52E+01
		Red Speckled				1.30E+07	8.84E+02	2.77E+03	4.38E+05	3.47E+04	5.86E+01
		Sweet Corn				1.95E+07	1.33E+03	4.16E+03	6.57E+05	5.20E+04	8.80E+01
	Squash	Pumpkin				2.38E+07	1.37E+03	4.77E+03	6.78E+05	6.83E+04	8.87E+01
		Other Squash				6.14E+06	3.54E+02	1.23E+03	1.76E+05	1.76E+04	2.30E+01
	Melons	Watermelon				5.76E+06	3.13E+02	1.13E+03	1.55E+05	1.70E+04	2.01E+01
		Cantaloupe				5.76E+06	3.13E+02	1.13E+03	1.55E+05	1.70E+04	2.01E+01
	Tree Fruit	Apples				4.76E+06	2.90E+02	9.75E+02	1.44E+05	1.33E+04	1.89E+01
		Apricots				5.05E+06	3.07E+02	1.03E+03	1.52E+05	1.41E+04	2.00E+01
		Peaches				5.62E+06	3.50E+02	1.16E+03	1.73E+05	1.55E+04	2.29E+01
	Other Vegetables	Beans				3.48E+05	8.87E+01	9.97E+01	4.42E+04	7.17E+02	1.00E+01
		Brussels sprouts				1.34E+07	7.70E+02	2.68E+03	3.81E+05	3.83E+04	4.99E+01
		Cucumbers				4.83E+07	2.95E+03	9.91E+03	1.46E+06	1.35E+05	1.93E+02
		Tomatoes				4.72E+06	1.04E+03	1.33E+03	5.16E+05	9.86E+03	1.04E+02
		Chili				1.48E+06	3.07E+02	4.12E+02	1.53E+05	3.11E+03	2.95E+01
		Onions				6.22E+07	1.43E+03	3.66E+03	1.38E+06	8.44E+04	1.71E+02
		Potatoes				3.57E+07	1.37E+03	3.19E+03	1.28E+06	5.61E+04	1.68E+02
	Herbs and Medicinal:	Navajo Tea				3.95E+04	9.75E+00	1.13E+01	4.86E+03	8.17E+01	1.07E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Custom					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	**8.58E+04**	**1.76E+01**	**2.38E+01**	**8.77E+03**	**1.80E+02**	**1.68E+00**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	1.04E+07	7.07E+02	2.22E+03	3.51E+05	2.77E+04	4.69E+01
		Blue				1.04E+07	7.07E+02	2.22E+03	3.51E+05	2.77E+04	4.69E+01
		Yellow				2.08E+07	1.41E+03	4.44E+03	7.01E+05	5.55E+04	9.38E+01
		Red Speckled				3.47E+07	2.36E+03	7.40E+03	1.17E+06	9.25E+04	1.56E+02
		Sweet Corn				5.21E+07	3.54E+03	1.11E+04	1.75E+06	1.39E+05	2.35E+02
	Squash	Pumpkin				6.35E+07	3.65E+03	1.27E+04	1.81E+06	1.82E+05	2.36E+02
		Other Squash				1.64E+07	9.45E+02	3.28E+03	4.68E+05	4.69E+04	6.13E+01
	Melons	Watermelon				1.54E+07	8.35E+02	3.01E+03	4.13E+05	4.54E+04	5.37E+01
		Cantaloupe				1.54E+07	8.35E+02	3.01E+03	4.13E+05	4.54E+04	5.37E+01
	Tree Fruit	Apples				1.27E+07	7.72E+02	2.60E+03	3.83E+05	3.54E+04	5.04E+01
		Apricots				1.35E+07	8.19E+02	2.76E+03	4.06E+05	3.76E+04	5.35E+01
		Peaches				1.50E+07	9.34E+02	3.10E+03	4.63E+05	4.14E+04	6.11E+01
	Other Vegetables	Beans				9.28E+05	2.37E+02	2.66E+02	1.18E+05	1.91E+03	2.68E+01
		Brussels sprouts				3.56E+07	2.05E+03	7.14E+03	1.02E+06	1.02E+05	1.33E+02
		Cucumbers				1.29E+08	7.87E+03	2.64E+04	3.90E+06	3.59E+05	5.14E+02
		Tomatoes				1.26E+07	2.77E+03	3.54E+03	1.38E+06	2.63E+04	2.76E+02
		Chili				3.95E+06	8.20E+02	1.10E+03	4.08E+05	8.28E+03	7.87E+01
		Onions				1.66E+08	3.82E+03	9.75E+03	3.68E+06	2.25E+05	4.56E+02
		Potatoes				9.52E+07	3.66E+03	8.52E+03	3.40E+06	1.50E+05	4.47E+02
	Herbs and Medicinal:	Navajo Tea				1.05E+05	2.60E+01	3.01E+01	1.29E+04	2.18E+02	2.85E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	**4.68E+04**	**6.26E+00**	**8.90E+01**	**2.25E+04**	**8.31E+01**	**7.03E+00**	**1.73E+01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	5.08E+06	3.08E+02	2.22E+03	2.73E+06	2.13E+03	4.13E+02	4.43E+02
		Blue				5.08E+06	3.08E+02	2.22E+03	2.73E+06	2.13E+03	4.13E+02	4.43E+02
		Yellow				1.02E+07	6.16E+02	4.44E+03	5.47E+06	4.25E+03	8.25E+02	8.86E+02
		Red Speckled				1.69E+07	1.03E+03	7.40E+03	9.11E+06	7.08E+03	1.38E+03	1.48E+03
		Sweet Corn				2.54E+07	1.54E+03	1.11E+04	1.37E+07	1.06E+04	2.06E+03	2.21E+03
	Squash	Pumpkin				3.01E+07	1.62E+03	1.11E+04	1.67E+07	1.07E+04	2.20E+03	2.22E+03
		Other Squash				7.75E+06	4.18E+02	2.88E+03	4.29E+06	2.76E+03	5.70E+02	5.76E+02
	Melons	Watermelon				7.19E+06	3.72E+02	2.52E+03	4.03E+06	2.42E+03	5.09E+02	5.04E+02
		Cantaloupe				7.19E+06	3.72E+02	2.52E+03	4.03E+06	2.42E+03	5.09E+02	5.04E+02
	Tree Fruit	Apples				6.07E+06	3.40E+02	2.38E+03	3.33E+06	2.28E+03	4.61E+02	4.75E+02
		Apricots				6.44E+06	3.61E+02	2.52E+03	3.54E+06	2.42E+03	4.89E+02	5.03E+02
		Peaches				7.20E+06	4.10E+02	2.88E+03	3.94E+06	2.76E+03	5.55E+02	5.76E+02
	Other Vegetables	Beans				5.13E+05	7.87E+01	1.53E+03	2.44E+05	1.39E+03	8.60E+01	2.89E+02
		Brussels sprouts				1.69E+07	9.09E+02	6.26E+03	9.35E+06	6.01E+03	1.24E+03	1.25E+03
		Cucumbers				6.17E+07	3.47E+03	2.42E+04	3.38E+07	2.32E+04	4.69E+03	4.84E+03
		Tomatoes				6.90E+06	9.63E+02	1.49E+04	3.31E+06	1.38E+04	1.08E+03	2.87E+03
		Chili				2.16E+06	2.90E+02	4.18E+03	1.04E+06	3.87E+03	3.29E+02	8.07E+02
		Onions				2.96E+07	4.11E+03	1.78E+04	3.64E+07	5.23E+04	9.00E+02	9.11E+03
		Potatoes				2.40E+07	3.53E+03	1.77E+04	2.25E+07	5.10E+04	8.69E+02	8.92E+03
	Herbs and Medicinal:	Navajo Tea				5.82E+04	8.74E+00	1.61E+02	2.77E+04	1.46E+02	9.61E+00	3.05E+01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	**1.25E+05**	**1.67E+01**	**2.37E+02**	**6.00E+04**	**2.21E+02**	**1.87E+01**	**4.61E+01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	1.35E+07	8.22E+02	5.92E+03	7.29E+06	5.67E+03	1.10E+03	1.18E+03
		Blue				1.35E+07	8.22E+02	5.92E+03	7.29E+06	5.67E+03	1.10E+03	1.18E+03
		Yellow				2.71E+07	1.64E+03	1.18E+04	1.46E+07	1.13E+04	2.20E+03	2.36E+03
		Red Speckled				4.51E+07	2.74E+03	1.97E+04	2.43E+07	1.89E+04	3.67E+03	3.94E+03
		Sweet Corn				6.77E+07	4.11E+03	2.96E+04	3.65E+07	2.83E+04	5.50E+03	5.90E+03
	Squash	Pumpkin				8.01E+07	4.31E+03	2.97E+04	4.44E+07	2.85E+04	5.87E+03	5.93E+03
		Other Squash				2.07E+07	1.12E+03	7.69E+03	1.15E+07	7.37E+03	1.52E+03	1.54E+03
	Melons	Watermelon				1.92E+07	9.91E+02	6.73E+03	1.07E+07	6.46E+03	1.36E+03	1.35E+03
		Cantaloupe				1.92E+07	9.91E+02	6.73E+03	1.07E+07	6.46E+03	1.36E+03	1.35E+03
	Tree Fruit	Apples				1.62E+07	9.08E+02	6.34E+03	8.89E+06	6.08E+03	1.23E+03	1.27E+03
		Apricots				1.72E+07	9.62E+02	6.72E+03	9.43E+06	6.44E+03	1.30E+03	1.34E+03
		Peaches				1.92E+07	1.09E+03	7.69E+03	1.05E+07	7.37E+03	1.48E+03	1.54E+03
	Other Vegetables	Beans				1.37E+06	2.10E+02	4.09E+03	6.50E+05	3.70E+03	2.29E+02	7.71E+02
		Brussels sprouts				4.50E+07	2.43E+03	1.67E+04	2.49E+07	1.60E+04	3.30E+03	3.34E+03
		Cucumbers				1.65E+08	9.24E+03	6.46E+04	9.02E+07	6.19E+04	1.25E+04	1.29E+04
		Tomatoes				1.84E+07	2.57E+03	3.98E+04	8.81E+06	3.67E+04	2.89E+03	7.65E+03
		Chili				5.75E+06	7.73E+02	1.12E+04	2.76E+06	1.03E+04	8.78E+02	2.15E+03
		Onions				7.90E+07	1.10E+04	4.73E+04	9.72E+07	1.39E+05	2.40E+03	2.43E+04
		Potatoes				6.40E+07	9.41E+03	4.71E+04	5.99E+07	1.36E+05	2.32E+03	2.38E+04
	Herbs and Medicinal:	Navajo Tea				1.55E+05	2.33E+01	4.29E+02	7.38E+04	3.90E+02	2.56E+01	8.13E+01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	5.44E+02	1.05E+02	2.89E+01	3.60E-01	5.58E+00	1.53E+02	2.08E+03
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	4.05E+04	5.26E+03	7.98E+02	8.69E+01	4.37E+02	1.55E+04	6.77E+04
		Blue				4.05E+04	5.26E+03	7.98E+02	8.69E+01	4.37E+02	1.55E+04	6.77E+04
		Yellow				8.09E+04	1.05E+04	1.60E+03	1.74E+02	8.74E+02	3.09E+04	1.35E+05
		Red Speckled				1.35E+05	1.75E+04	2.66E+03	2.90E+02	1.46E+03	5.16E+04	2.26E+05
		Sweet Corn				2.02E+05	2.63E+04	3.99E+03	4.35E+02	2.18E+03	7.73E+04	3.39E+05
	Squash	Pumpkin				2.23E+05	2.76E+04	4.02E+03	7.24E+02	2.43E+03	9.01E+04	3.42E+05
		Other Squash				5.77E+04	7.15E+03	1.04E+03	1.85E+02	6.27E+02	2.33E+04	8.87E+04
	Melons	Watermelon				5.21E+04	6.35E+03	9.13E+02	2.03E+02	5.69E+02	2.15E+04	7.78E+04
		Cantaloupe				5.21E+04	6.35E+03	9.13E+02	2.03E+02	5.69E+02	2.15E+04	7.78E+04
	Tree Fruit	Apples				4.62E+04	5.81E+03	8.57E+02	1.28E+02	5.01E+02	1.83E+04	7.29E+04
		Apricots				4.90E+04	6.16E+03	9.09E+02	1.36E+02	5.32E+02	1.94E+04	7.73E+04
		Peaches				5.53E+04	7.01E+03	1.04E+03	1.44E+02	6.00E+02	2.18E+04	8.84E+04
	Other Vegetables	Beans				6.28E+03	1.32E+03	4.66E+02	3.72E+00	6.38E+01	1.69E+03	3.60E+04
		Brussels sprouts				1.25E+05	1.55E+04	2.26E+03	4.04E+02	1.36E+03	5.06E+04	1.93E+05
		Cucumbers				4.70E+05	5.92E+04	8.74E+03	1.29E+03	5.10E+03	1.86E+05	7.43E+05
		Tomatoes				8.17E+04	1.62E+04	4.78E+03	5.20E+01	8.34E+02	2.26E+04	3.79E+05
		Chili				2.52E+04	4.89E+03	1.36E+03	1.65E+01	2.58E+02	7.05E+03	1.09E+05
		Onions				2.44E+05	2.41E+04	5.51E+03	7.23E+02	4.34E+03	1.35E+05	3.71E+04
		Potatoes				2.13E+05	2.28E+04	5.44E+03	3.88E+02	3.44E+03	1.02E+05	3.70E+04
	Herbs and Medicinal:	Navajo Tea				7.07E+02	1.47E+02	4.96E+01	4.25E-01	7.19E+00	1.91E+02	3.86E+03
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Outputs	Parameter		Symbol	Description	Units	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	1.45E+03	2.80E+02	7.71E+01	9.59E-01	1.49E+01	4.08E+02	5.54E+03
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	1.08E+05	1.40E+04	2.13E+03	2.32E+02	1.16E+03	4.12E+04	1.81E+05
		Blue				1.08E+05	1.40E+04	2.13E+03	2.32E+02	1.16E+03	4.12E+04	1.81E+05
		Yellow				2.16E+05	2.80E+04	4.25E+03	4.64E+02	2.33E+03	8.25E+04	3.61E+05
		Red Speckled				3.60E+05	4.67E+04	7.09E+03	7.73E+02	3.88E+03	1.37E+05	6.02E+05
		Sweet Corn				5.40E+05	7.01E+04	1.06E+04	1.16E+03	5.82E+03	2.06E+05	9.03E+05
	Squash	Pumpkin				5.95E+05	7.36E+04	1.07E+04	1.93E+03	6.47E+03	2.40E+05	9.13E+05
		Other Squash				1.54E+05	1.91E+04	2.78E+03	4.92E+02	1.67E+03	6.20E+04	2.36E+05
	Melons	Watermelon				1.39E+05	1.69E+04	2.43E+03	5.41E+02	1.52E+03	5.72E+04	2.08E+05
		Cantaloupe				1.39E+05	1.69E+04	2.43E+03	5.41E+02	1.52E+03	5.72E+04	2.08E+05
	Tree Fruit	Apples				1.23E+05	1.55E+04	2.29E+03	3.41E+02	1.34E+03	4.88E+04	1.95E+05
		Apricots				1.31E+05	1.64E+04	2.42E+03	3.63E+02	1.42E+03	5.18E+04	2.06E+05
		Peaches				1.48E+05	1.87E+04	2.77E+03	3.85E+02	1.60E+03	5.80E+04	2.36E+05
	Other Vegetables	Beans				1.67E+04	3.53E+03	1.24E+03	9.92E+00	1.70E+02	4.50E+03	9.61E+04
		Brussels sprouts				3.34E+05	4.14E+04	6.03E+03	1.08E+03	3.64E+03	1.35E+05	5.14E+05
		Cucumbers				1.25E+06	1.58E+05	2.33E+04	3.44E+03	1.36E+04	4.96E+05	1.98E+06
		Tomatoes				2.18E+05	4.32E+04	1.27E+04	1.39E+02	2.22E+03	6.03E+04	1.01E+06
		Chili				6.71E+04	1.30E+04	3.62E+03	4.41E+01	6.87E+02	1.88E+04	2.90E+05
		Onions				6.50E+05	6.42E+04	1.47E+04	1.93E+03	1.16E+04	3.59E+05	9.89E+04
		Potatoes				5.68E+05	6.07E+04	1.45E+04	1.04E+03	9.19E+03	2.72E+05	9.88E+04
	Herbs and Medicinal:	Navajo Tea				1.89E+03	3.92E+02	1.32E+02	1.13E+00	1.92E+01	5.10E+02	1.03E+04
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Kee'da'whíí tééh (full-time Navajo residential)					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	3.22E+04	6.58E+00	8.91E+00	3.29E+03	6.75E+01	6.30E-01
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	3.91E+06	2.65E+02	8.32E+02	1.31E+05	1.04E+04	1.76E+01
		Blue				3.91E+06	2.65E+02	8.32E+02	1.31E+05	1.04E+04	1.76E+01
		Yellow				7.81E+06	5.31E+02	1.66E+03	2.63E+05	2.08E+04	3.52E+01
		Red Speckled				1.30E+07	8.84E+02	2.77E+03	4.38E+05	3.47E+04	5.86E+01
		Sweet Corn				1.95E+07	1.33E+03	4.16E+03	6.57E+05	5.20E+04	8.80E+01
	Squash	Pumpkin				2.38E+07	1.37E+03	4.77E+03	6.78E+05	6.83E+04	8.87E+01
		Other Squash				6.14E+06	3.54E+02	1.23E+03	1.76E+05	1.76E+04	2.30E+01
	Melons	Watermelon				5.76E+06	3.13E+02	1.13E+03	1.55E+05	1.70E+04	2.01E+01
		Cantaloupe				5.76E+06	3.13E+02	1.13E+03	1.55E+05	1.70E+04	2.01E+01
	Tree Fruit	Apples				4.76E+06	2.90E+02	9.75E+02	1.44E+05	1.33E+04	1.89E+01
		Apricots				5.05E+06	3.07E+02	1.03E+03	1.52E+05	1.41E+04	2.00E+01
		Peaches				5.62E+06	3.50E+02	1.16E+03	1.73E+05	1.55E+04	2.29E+01
	Other Vegetables	Beans				3.48E+05	8.87E+01	9.97E+01	4.42E+04	7.17E+02	1.00E+01
		Brussels sprouts				1.34E+07	7.70E+02	2.68E+03	3.81E+05	3.83E+04	4.99E+01
		Cucumbers				4.83E+07	2.95E+03	9.91E+03	1.46E+06	1.35E+05	1.93E+02
		Tomatoes				4.72E+06	1.04E+03	1.33E+03	5.16E+05	9.86E+03	1.04E+02
		Chili				1.48E+06	3.07E+02	4.12E+02	1.53E+05	3.11E+03	2.95E+01
		Onions				6.22E+07	1.43E+03	3.66E+03	1.38E+06	8.44E+04	1.71E+02
		Potatoes				3.57E+07	1.37E+03	3.19E+03	1.28E+06	5.61E+04	1.68E+02
	Herbs and Medicinal:	Navajo Tea				3.95E+04	9.75E+00	1.13E+01	4.86E+03	8.17E+01	1.07E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kee'da'whíí tééh (full-time Navajo residential)					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	8.58E+04	1.76E+01	2.38E+01	8.77E+03	1.80E+02	1.68E+00
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	1.04E+07	7.07E+02	2.22E+03	3.51E+05	2.77E+04	4.69E+01
		Blue				1.04E+07	7.07E+02	2.22E+03	3.51E+05	2.77E+04	4.69E+01
		Yellow				2.08E+07	1.41E+03	4.44E+03	7.01E+05	5.55E+04	9.38E+01
		Red Speckled				3.47E+07	2.36E+03	7.40E+03	1.17E+06	9.25E+04	1.56E+02
		Sweet Corn				5.21E+07	3.54E+03	1.11E+04	1.75E+06	1.39E+05	2.35E+02
	Squash	Pumpkin				6.35E+07	3.65E+03	1.27E+04	1.81E+06	1.82E+05	2.36E+02
		Other Squash				1.64E+07	9.45E+02	3.28E+03	4.68E+05	4.69E+04	6.13E+01
	Melons	Watermelon				1.54E+07	8.35E+02	3.01E+03	4.13E+05	4.54E+04	5.37E+01
		Cantaloupe				1.54E+07	8.35E+02	3.01E+03	4.13E+05	4.54E+04	5.37E+01
	Tree Fruit	Apples				1.27E+07	7.72E+02	2.60E+03	3.83E+05	3.54E+04	5.04E+01
		Apricots				1.35E+07	8.19E+02	2.76E+03	4.06E+05	3.76E+04	5.35E+01
		Peaches				1.50E+07	9.34E+02	3.10E+03	4.63E+05	4.14E+04	6.11E+01
	Other Vegetables	Beans				9.28E+05	2.37E+02	2.66E+02	1.18E+05	1.91E+03	2.68E+01
		Brussels sprouts				3.56E+07	2.05E+03	7.14E+03	1.02E+06	1.02E+05	1.33E+02
		Cucumbers				1.29E+08	7.87E+03	2.64E+04	3.90E+06	3.59E+05	5.14E+02
		Tomatoes				1.26E+07	2.77E+03	3.54E+03	1.38E+06	2.63E+04	2.76E+02
		Chili				3.95E+06	8.20E+02	1.10E+03	4.08E+05	8.28E+03	7.87E+01
		Onions				1.66E+08	3.82E+03	9.75E+03	3.68E+06	2.25E+05	4.56E+02
		Potatoes				9.52E+07	3.66E+03	8.52E+03	3.40E+06	1.50E+05	4.47E+02
	Herbs and Medicinal:	Navajo Tea				1.05E+05	2.60E+01	3.01E+01	1.29E+04	2.18E+02	2.85E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	**4.68E+04**	**6.26E+00**	**8.90E+01**	**2.25E+04**	**8.31E+01**	**7.03E+00**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	5.08E+06	3.08E+02	2.22E+03	2.73E+06	2.13E+03	4.13E+02
		Blue				5.08E+06	3.08E+02	2.22E+03	2.73E+06	2.13E+03	4.13E+02
		Yellow				1.02E+07	6.16E+02	4.44E+03	5.47E+06	4.25E+03	8.25E+02
		Red Speckled				1.69E+07	1.03E+03	7.40E+03	9.11E+06	7.08E+03	1.38E+03
		Sweet Corn				2.54E+07	1.54E+03	1.11E+04	1.37E+07	1.06E+04	2.06E+03
	Squash	Pumpkin				3.01E+07	1.62E+03	1.11E+04	1.67E+07	1.07E+04	2.20E+03
		Other Squash				7.75E+06	4.18E+02	2.88E+03	4.29E+06	2.76E+03	5.70E+02
	Melons	Watermelon				7.19E+06	3.72E+02	2.52E+03	4.03E+06	2.42E+03	5.09E+02
		Cantaloupe				7.19E+06	3.72E+02	2.52E+03	4.03E+06	2.42E+03	5.09E+02
	Tree Fruit	Apples				6.07E+06	3.40E+02	2.38E+03	3.33E+06	2.28E+03	4.61E+02
		Apricots				6.44E+06	3.61E+02	2.52E+03	3.54E+06	2.42E+03	4.89E+02
		Peaches				7.20E+06	4.10E+02	2.88E+03	3.94E+06	2.76E+03	5.55E+02
	Other Vegetables	Beans				5.13E+05	7.87E+01	1.53E+03	2.44E+05	1.39E+03	8.60E+01
		Brussels sprouts				1.69E+07	9.09E+02	6.26E+03	9.35E+06	6.01E+03	1.24E+03
		Cucumbers				6.17E+07	3.47E+03	2.42E+04	3.38E+07	2.32E+04	4.69E+03
		Tomatoes				6.90E+06	9.63E+02	1.49E+04	3.31E+06	1.38E+04	1.08E+03
		Chili				2.16E+06	2.90E+02	4.18E+03	1.04E+06	3.87E+03	3.29E+02
		Onions				2.96E+07	4.11E+03	1.78E+04	3.64E+07	5.23E+04	9.00E+02
		Potatoes				2.40E+07	3.53E+03	1.77E+04	2.25E+07	5.10E+04	8.69E+02
	Herbs and Medicinal:	Navajo Tea				5.82E+04	8.74E+00	1.61E+02	2.77E+04	1.46E+02	9.61E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	**1.25E+05**	**1.67E+01**	**2.37E+02**	**6.00E+04**	**2.21E+02**	**1.87E+01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	1.35E+07	8.22E+02	5.92E+03	7.29E+06	5.67E+03	1.10E+03
		Blue				1.35E+07	8.22E+02	5.92E+03	7.29E+06	5.67E+03	1.10E+03
		Yellow				2.71E+07	1.64E+03	1.18E+04	1.46E+07	1.13E+04	2.20E+03
		Red Speckled				4.51E+07	2.74E+03	1.97E+04	2.43E+07	1.89E+04	3.67E+03
		Sweet Corn				6.77E+07	4.11E+03	2.96E+04	3.65E+07	2.83E+04	5.50E+03
	Squash	Pumpkin				8.01E+07	4.31E+03	2.97E+04	4.44E+07	2.85E+04	5.87E+03
		Other Squash				2.07E+07	1.12E+03	7.69E+03	1.15E+07	7.37E+03	1.52E+03
	Melons	Watermelon				1.92E+07	9.91E+02	6.73E+03	1.07E+07	6.46E+03	1.36E+03
		Cantaloupe				1.92E+07	9.91E+02	6.73E+03	1.07E+07	6.46E+03	1.36E+03
	Tree Fruit	Apples				1.62E+07	9.08E+02	6.34E+03	8.89E+06	6.08E+03	1.23E+03
		Apricots				1.72E+07	9.62E+02	6.72E+03	9.43E+06	6.44E+03	1.30E+03
		Peaches				1.92E+07	1.09E+03	7.69E+03	1.05E+07	7.37E+03	1.48E+03
	Other Vegetables	Beans				1.37E+06	2.10E+02	4.09E+03	6.50E+05	3.70E+03	2.29E+02
		Brussels sprouts				4.50E+07	2.43E+03	1.67E+04	2.49E+07	1.60E+04	3.30E+03
		Cucumbers				1.65E+08	9.24E+03	6.46E+04	9.02E+07	6.19E+04	1.25E+04
		Tomatoes				1.84E+07	2.57E+03	3.98E+04	8.81E+06	3.67E+04	2.89E+03
		Chili				5.75E+06	7.73E+02	1.12E+04	2.76E+06	1.03E+04	8.78E+02
		Onions				7.90E+07	1.10E+04	4.73E+04	9.72E+07	1.39E+05	2.40E+03
		Potatoes				6.40E+07	9.41E+03	4.71E+04	5.99E+07	1.36E+05	2.32E+03
	Herbs and Medicinal:	Navajo Tea				1.55E+05	2.33E+01	4.29E+02	7.38E+04	3.90E+02	2.56E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	1.73E+01	5.44E+02	1.05E+02	2.89E+01	3.60E-01	5.58E+00
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	4.43E+02	4.05E+04	5.26E+03	7.98E+02	8.69E+01	4.37E+02
		Blue				4.43E+02	4.05E+04	5.26E+03	7.98E+02	8.69E+01	4.37E+02
		Yellow				8.86E+02	8.09E+04	1.05E+04	1.60E+03	1.74E+02	8.74E+02
		Red Speckled				1.48E+03	1.35E+05	1.75E+04	2.66E+03	2.90E+02	1.46E+03
		Sweet Corn				2.21E+03	2.02E+05	2.63E+04	3.99E+03	4.35E+02	2.18E+03
	Squash	Pumpkin				2.22E+03	2.23E+05	2.76E+04	4.02E+03	7.24E+02	2.43E+03
		Other Squash				5.76E+02	5.77E+04	7.15E+03	1.04E+03	1.85E+02	6.27E+02
	Melons	Watermelon				5.04E+02	5.21E+04	6.35E+03	9.13E+02	2.03E+02	5.69E+02
		Cantaloupe				5.04E+02	5.21E+04	6.35E+03	9.13E+02	2.03E+02	5.69E+02
	Tree Fruit	Apples				4.75E+02	4.62E+04	5.81E+03	8.57E+02	1.28E+02	5.01E+02
		Apricots				5.03E+02	4.90E+04	6.16E+03	9.09E+02	1.36E+02	5.32E+02
		Peaches				5.76E+02	5.53E+04	7.01E+03	1.04E+03	1.44E+02	6.00E+02
	Other Vegetables	Beans				2.89E+02	6.28E+03	1.32E+03	4.66E+02	3.72E+00	6.38E+01
		Brussels sprouts				1.25E+03	1.25E+05	1.55E+04	2.26E+03	4.04E+02	1.36E+03
		Cucumbers				4.84E+03	4.70E+05	5.92E+04	8.74E+03	1.29E+03	5.10E+03
		Tomatoes				2.87E+03	8.17E+04	1.62E+04	4.78E+03	5.20E+01	8.34E+02
		Chili				8.07E+02	2.52E+04	4.89E+03	1.36E+03	1.65E+01	2.58E+02
		Onions				9.11E+03	2.44E+05	2.41E+04	5.51E+03	7.23E+02	4.34E+03
		Potatoes				8.92E+03	2.13E+05	2.28E+04	5.44E+03	3.88E+02	3.44E+03
	Herbs and Medicinal:	Navajo Tea				3.05E+01	7.07E+02	1.47E+02	4.96E+01	4.25E-01	7.19E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	4.61E+01	1.45E+03	2.80E+02	7.71E+01	9.59E-01	1.49E+01
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	1.18E+03	1.08E+05	1.40E+04	2.13E+03	2.32E+02	1.16E+03
		Blue				1.18E+03	1.08E+05	1.40E+04	2.13E+03	2.32E+02	1.16E+03
		Yellow				2.36E+03	2.16E+05	2.80E+04	4.25E+03	4.64E+02	2.33E+03
		Red Speckled				3.94E+03	3.60E+05	4.67E+04	7.09E+03	7.73E+02	3.88E+03
		Sweet Corn				5.90E+03	5.40E+05	7.01E+04	1.06E+04	1.16E+03	5.82E+03
	Squash	Pumpkin				5.93E+03	5.95E+05	7.36E+04	1.07E+04	1.93E+03	6.47E+03
		Other Squash				1.54E+03	1.54E+05	1.91E+04	2.78E+03	4.92E+02	1.67E+03
	Melons	Watermelon				1.35E+03	1.39E+05	1.69E+04	2.43E+03	5.41E+02	1.52E+03
		Cantaloupe				1.35E+03	1.39E+05	1.69E+04	2.43E+03	5.41E+02	1.52E+03
	Tree Fruit	Apples				1.27E+03	1.23E+05	1.55E+04	2.29E+03	3.41E+02	1.34E+03
		Apricots				1.34E+03	1.31E+05	1.64E+04	2.42E+03	3.63E+02	1.42E+03
		Peaches				1.54E+03	1.48E+05	1.87E+04	2.77E+03	3.85E+02	1.60E+03
	Other Vegetables	Beans				7.71E+02	1.67E+04	3.53E+03	1.24E+03	9.92E+00	1.70E+02
		Brussels sprouts				3.34E+03	3.34E+05	4.14E+04	6.03E+03	1.08E+03	3.64E+03
		Cucumbers				1.29E+04	1.25E+06	1.58E+05	2.33E+04	3.44E+03	1.36E+04
		Tomatoes				7.65E+03	2.18E+05	4.32E+04	1.27E+04	1.39E+02	2.22E+03
		Chili				2.15E+03	6.71E+04	1.30E+04	3.62E+03	4.41E+01	6.87E+02
		Onions				2.43E+04	6.50E+05	6.42E+04	1.47E+04	1.93E+03	1.16E+04
		Potatoes				2.38E+04	5.68E+05	6.07E+04	1.45E+04	1.04E+03	9.19E+03
	Herbs and Medicinal:	Navajo Tea				8.13E+01	1.89E+03	3.92E+02	1.32E+02	1.13E+00	1.92E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Kǫǫh bí łíí naka					
						Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	1.53E+02	2.08E+03	9.14E+04	2.02E+01	2.57E+01	1.01E+04
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	1.55E+04	6.77E+04	--	--	--	--
		Blue				1.55E+04	6.77E+04	--	--	--	--
		Yellow				3.09E+04	1.35E+05	1.07E+07	7.30E+02	2.29E+03	3.62E+05
		Red Speckled				5.16E+04	2.26E+05	--	--	--	--
		Sweet Corn				7.73E+04	3.39E+05	--	--	--	--
	Squash	Pumpkin				9.01E+04	3.42E+05	2.62E+07	1.50E+03	5.24E+03	7.46E+05
		Other Squash				2.33E+04	8.87E+04	1.69E+07	9.74E+02	3.39E+03	4.83E+05
	Melons	Watermelon				2.15E+04	7.78E+04	--	--	--	--
		Cantaloupe				2.15E+04	7.78E+04	1.58E+07	8.61E+02	3.10E+03	4.26E+05
	Tree Fruit	Apples				1.83E+04	7.29E+04	1.31E+07	7.97E+02	2.68E+03	3.95E+05
		Apricots				1.94E+04	7.73E+04	1.39E+07	8.45E+02	2.84E+03	4.18E+05
		Peaches				2.18E+04	8.84E+04	--	--	--	--
	Other Vegetables	Beans				1.69E+03	3.60E+04	--	--	--	--
		Brussels sprouts				5.06E+04	1.93E+05	--	--	--	--
		Cucumbers				1.86E+05	7.43E+05	--	--	--	--
		Tomatoes				2.26E+04	3.79E+05	--	--	--	--
		Chili				7.05E+03	1.09E+05	--	--	--	--
		Onions				1.35E+05	3.71E+04	--	--	--	--
		Potatoes				1.02E+05	3.70E+04	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.91E+02	3.86E+03	9.49E+04	2.34E+01	2.71E+01	1.17E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kǫǫh bí łíí naka					
						Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	4.08E+02	5.54E+03	2.44E+05	5.40E+01	6.85E+01	2.69E+04
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	4.12E+04	1.81E+05	--	--	--	--
		Blue				4.12E+04	1.81E+05	--	--	--	--
		Yellow				8.25E+04	3.61E+05	2.86E+07	1.95E+03	6.10E+03	9.64E+05
		Red Speckled				1.37E+05	6.02E+05	--	--	--	--
		Sweet Corn				2.06E+05	9.03E+05	--	--	--	--
	Squash	Pumpkin				2.40E+05	9.13E+05	6.98E+07	4.01E+03	1.40E+04	1.99E+06
		Other Squash				6.20E+04	2.36E+05	4.50E+07	2.60E+03	9.03E+03	1.29E+06
	Melons	Watermelon				5.72E+04	2.08E+05	--	--	--	--
		Cantaloupe				5.72E+04	2.08E+05	4.22E+07	2.30E+03	8.27E+03	1.14E+06
	Tree Fruit	Apples				4.88E+04	1.95E+05	3.49E+07	2.12E+03	7.15E+03	1.05E+06
		Apricots				5.18E+04	2.06E+05	3.70E+07	2.25E+03	7.58E+03	1.12E+06
		Peaches				5.80E+04	2.36E+05	--	--	--	--
	Other Vegetables	Beans				4.50E+03	9.61E+04	--	--	--	--
		Brussels sprouts				1.35E+05	5.14E+05	--	--	--	--
		Cucumbers				4.96E+05	1.98E+06	--	--	--	--
		Tomatoes				6.03E+04	1.01E+06	--	--	--	--
		Chili				1.88E+04	2.90E+05	--	--	--	--
		Onions				3.59E+05	9.89E+04	--	--	--	--
		Potatoes				2.72E+05	9.88E+04	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				5.10E+02	1.03E+04	2.53E+05	6.24E+01	7.22E+01	3.11E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	I (sheep camp) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	1.91E+02	2.03E+00	1.34E+05	1.88E+01	2.94E+02	6.40E+04
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.86E+04	4.84E+01	1.40E+07	8.47E+02	6.10E+03	7.52E+06
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				7.52E+04	9.75E+01	3.31E+07	1.78E+03	1.22E+04	1.83E+07
		Other Squash				4.83E+04	6.32E+01	2.13E+07	1.15E+03	7.93E+03	1.18E+07
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				4.68E+04	5.54E+01	1.98E+07	1.02E+03	6.94E+03	1.11E+07
	Tree Fruit	Apples				3.65E+04	5.20E+01	1.67E+07	9.36E+02	6.54E+03	9.16E+06
		Apricots				3.88E+04	5.51E+01	1.77E+07	9.92E+02	6.93E+03	9.73E+06
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.96E+02	2.57E+00	1.40E+05	2.10E+01	3.86E+02	6.64E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	I (sheep camp) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	5.08E+02	5.42E+00	3.57E+05	5.00E+01	7.84E+02	1.71E+05
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				7.63E+04	1.29E+02	3.72E+07	2.26E+03	1.63E+04	2.01E+07
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				2.00E+05	2.60E+02	8.82E+07	4.74E+03	3.26E+04	4.89E+07
		Other Squash				1.29E+05	1.68E+02	5.69E+07	3.07E+03	2.11E+04	3.15E+07
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				1.25E+05	1.48E+02	5.28E+07	2.73E+03	1.85E+04	2.96E+07
	Tree Fruit	Apples				9.75E+04	1.39E+02	4.45E+07	2.50E+03	1.74E+04	2.44E+07
		Apricots				1.03E+05	1.47E+02	4.73E+07	2.65E+03	1.85E+04	2.59E+07
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				5.23E+02	6.84E+00	3.72E+05	5.60E+01	1.03E+03	1.77E+05
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	2.71E+02	2.10E+01	5.64E+01	1.59E+03	3.16E+02	9.38E+01
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				5.84E+03	1.13E+03	1.22E+03	1.11E+05	1.45E+04	2.19E+03
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				1.17E+04	2.42E+03	2.45E+03	2.45E+05	3.04E+04	4.42E+03
		Other Squash				7.60E+03	1.57E+03	1.58E+03	1.59E+05	1.97E+04	2.86E+03
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				6.66E+03	1.40E+03	1.39E+03	1.43E+05	1.75E+04	2.51E+03
	Tree Fruit	Apples				6.27E+03	1.27E+03	1.31E+03	1.27E+05	1.60E+04	2.36E+03
		Apricots				6.64E+03	1.34E+03	1.38E+03	1.35E+05	1.69E+04	2.50E+03
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.51E+02	2.31E+01	7.32E+01	1.70E+03	3.53E+02	1.19E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	7.22E+02	5.61E+01	1.50E+02	4.23E+03	8.42E+02	2.50E+02
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				1.56E+04	3.03E+03	3.25E+03	2.97E+05	3.85E+04	5.85E+03
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				3.13E+04	6.46E+03	6.52E+03	6.54E+05	8.10E+04	1.18E+04
		Other Squash				2.03E+04	4.18E+03	4.22E+03	4.23E+05	5.24E+04	7.63E+03
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				1.78E+04	3.73E+03	3.70E+03	3.82E+05	4.66E+04	6.69E+03
	Tree Fruit	Apples				1.67E+04	3.38E+03	3.48E+03	3.39E+05	4.26E+04	6.29E+03
		Apricots				1.77E+04	3.59E+03	3.69E+03	3.59E+05	4.52E+04	6.66E+03
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				9.37E+02	6.15E+01	1.95E+02	4.53E+03	9.40E+02	3.17E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Noncancer Child PRG for Spe: Aluminum	Antimony
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	1.01E+00	1.62E+01	4.38E+02	7.44E+03	2.37E+05	5.85E+01
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.39E+02	1.20E+03	4.25E+04	1.86E+05	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				7.96E+02	2.67E+03	9.91E+04	3.76E+05	--	--
		Other Squash				5.07E+02	1.73E+03	6.40E+04	2.44E+05	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				5.58E+02	1.56E+03	5.90E+04	2.14E+05	--	--
	Tree Fruit	Apples				3.52E+02	1.38E+03	5.04E+04	2.01E+05	--	--
		Apricots				3.74E+02	1.46E+03	5.34E+04	2.13E+05	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.02E+00	1.73E+01	4.59E+02	9.26E+03	2.37E+05	5.85E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Noncancer Adult PRG for Spe: Aluminum	Antimony
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	2.68E+00	4.31E+01	1.17E+03	1.98E+04	1.05E+05	2.60E+01
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				6.38E+02	3.20E+03	1.13E+05	4.97E+05	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				2.12E+03	7.12E+03	2.64E+05	1.00E+06	--	--
		Other Squash				1.35E+03	4.60E+03	1.71E+05	6.50E+05	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				1.49E+03	4.17E+03	1.57E+05	5.71E+05	--	--
	Tree Fruit	Apples				9.37E+02	3.68E+03	1.34E+05	5.35E+05	--	--
		Apricots				9.97E+02	3.90E+03	1.42E+05	5.67E+05	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.72E+00	4.60E+01	1.22E+03	2.47E+04	1.05E+05	2.60E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Specific Metals - Kǫǫ eí nahaazáh (easy access open space)					
						Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	6.77E+01	2.91E+04	4.90E+02	6.42E+00	3.49E+05	5.25E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				6.77E+01	2.91E+04	4.90E+02	6.42E+00	3.49E+05	5.25E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Specific Metals - Kǫǫ eí nahaazáh (easy access open space)					
						Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	3.01E+01	1.29E+04	2.18E+02	2.85E+00	1.55E+05	2.33E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.01E+01	1.29E+04	2.18E+02	2.85E+00	1.55E+05	2.33E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	9.66E+02	1.66E+05	8.78E+02	5.77E+01	1.83E+02	4.24E+03
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				9.66E+02	1.66E+05	8.78E+02	5.77E+01	1.83E+02	4.24E+03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	4.29E+02	7.38E+04	3.90E+02	2.56E+01	8.13E+01	1.89E+03
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				4.29E+02	7.38E+04	3.90E+02	2.56E+01	8.13E+01	1.89E+03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	8.82E+02	2.98E+02	2.55E+00	4.31E+01	1.15E+03	2.32E+04
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				8.82E+02	2.98E+02	2.55E+00	4.31E+01	1.15E+03	2.32E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	3.92E+02	1.32E+02	1.13E+00	1.92E+01	5.10E+02	1.03E+04
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.92E+02	1.32E+02	1.13E+00	1.92E+01	5.10E+02	1.03E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Kǫǫ ei doo nahaazáh dah (difficult access op					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	4.75E+05	1.17E+02	1.35E+02	5.83E+04	9.80E+02	1.28E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				4.75E+05	1.17E+02	1.35E+02	5.83E+04	9.80E+02	1.28E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kǫǫ ei doo nahaazáh dah (difficult access op					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	1.27E+06	3.12E+02	3.61E+02	1.55E+05	2.61E+03	3.42E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.27E+06	3.12E+02	3.61E+02	1.55E+05	2.61E+03	3.42E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	6.98E+05	1.05E+02	1.93E+03	3.32E+05	1.76E+03	1.15E+02
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				6.98E+05	1.05E+02	1.93E+03	3.32E+05	1.76E+03	1.15E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	1.86E+06	2.80E+02	5.15E+03	8.86E+05	4.68E+03	3.08E+02
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.86E+06	2.80E+02	5.15E+03	8.86E+05	4.68E+03	3.08E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	3.66E+02	8.49E+03	1.76E+03	5.95E+02	5.10E+00	8.63E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.66E+02	8.49E+03	1.76E+03	5.95E+02	5.10E+00	8.63E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	9.76E+02	2.26E+04	4.70E+03	1.59E+03	1.36E+01	2.30E+02
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				9.76E+02	2.26E+04	4.70E+03	1.59E+03	1.36E+01	2.30E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Noncancer Child PRG for Specific Metals - Chíí dah wiih le Aluminum	Antimony	Arsenic	Barium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	2.30E+03	4.63E+04	9.46E+04	2.31E+01	2.70E+01	1.15E+04
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	1.07E+08	7.30E+03	2.29E+04	3.62E+06
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	1.35E+08	7.79E+03	2.71E+04	3.86E+06
	Melons	Watermelon				--	--	7.92E+07	4.30E+03	1.55E+04	2.13E+06
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.30E+03	4.63E+04	9.49E+04	2.34E+01	2.71E+01	1.17E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Noncancer Adult PRG for Specific Metals - Chíí dah wiih le Aluminum	Antimony	Arsenic	Barium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	6.12E+03	1.24E+05	2.52E+05	6.17E+01	7.19E+01	3.07E+04
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	2.86E+08	1.95E+04	6.10E+04	9.64E+06
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	3.60E+08	2.08E+04	7.22E+04	1.03E+07
	Melons	Watermelon				--	--	2.11E+08	1.15E+04	4.14E+04	5.68E+06
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				6.12E+03	1.24E+05	2.53E+05	6.24E+01	7.22E+01	3.11E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ezh (washes and drainages) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	**1.96E+02**	**2.52E+00**	**1.39E+05**	**2.08E+01**	**3.77E+02**	**6.63E+04**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.86E+05	4.84E+02	1.40E+08	8.47E+03	6.10E+04	7.52E+07
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				3.87E+05	5.05E+02	1.71E+08	9.21E+03	6.34E+04	9.45E+07
	Melons	Watermelon				2.34E+05	2.77E+02	9.89E+07	5.11E+03	3.47E+04	5.54E+07
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.96E+02	2.57E+00	1.40E+05	2.10E+01	3.86E+02	6.64E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	ezh (washes and drainages) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	**5.22E+02**	**6.71E+00**	**3.71E+05**	**5.55E+01**	**1.01E+03**	**1.77E+05**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				7.63E+05	1.29E+03	3.72E+08	2.26E+04	1.63E+05	2.01E+08
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				1.03E+06	1.35E+03	4.55E+08	2.45E+04	1.69E+05	2.52E+08
	Melons	Watermelon				6.24E+05	7.39E+02	2.64E+08	1.36E+04	9.25E+04	1.48E+08
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				5.23E+02	6.84E+00	3.72E+05	5.60E+01	1.03E+03	1.77E+05
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	3.44E+02	2.29E+01	7.16E+01	1.69E+03	3.50E+02	1.17E+02
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				5.84E+04	1.13E+04	1.22E+04	1.11E+06	1.45E+05	2.19E+04
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				6.08E+04	1.25E+04	1.27E+04	1.27E+06	1.57E+05	2.29E+04
	Melons	Watermelon				3.33E+04	7.00E+03	6.94E+03	7.16E+05	8.73E+04	1.25E+04
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.51E+02	2.31E+01	7.32E+01	1.70E+03	3.53E+02	1.19E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	9.16E+02	6.11E+01	1.91E+02	4.50E+03	9.32E+02	3.11E+02
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				1.56E+05	3.03E+04	3.25E+04	2.97E+06	3.85E+05	5.85E+04
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				1.62E+05	3.34E+04	3.38E+04	3.38E+06	4.19E+05	6.11E+04
	Melons	Watermelon				8.88E+04	1.87E+04	1.85E+04	1.91E+06	2.33E+05	3.35E+04
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				9.37E+02	6.15E+01	1.95E+02	4.53E+03	9.40E+02	3.17E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	**1.02E+00**	**1.72E+01**	**4.58E+02**	**9.10E+03**
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-c} \times BW_c \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--
		Blue				--	--	--	--
		Yellow				2.39E+03	1.20E+04	4.25E+05	1.86E+06
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				4.06E+03	1.38E+04	5.12E+05	1.95E+06
	Melons	Watermelon				2.79E+03	7.82E+03	2.95E+05	1.07E+06
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.02E+00	1.73E+01	4.59E+02	9.26E+03
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce by Adult Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		PRG_{p-ing}	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	mg/kg	**2.72E+00**	**4.58E+01**	**1.22E+03**	**2.43E+04**
	Corn	White	$PRG_{p-ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{THQ \times AT_{nc-a} \times BW_a \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--
		Blue				--	--	--	--
		Yellow				6.38E+03	3.20E+04	1.13E+06	4.97E+06
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				1.08E+04	3.68E+04	1.36E+06	5.20E+06
	Melons	Watermelon				7.44E+03	2.08E+04	7.87E+05	2.85E+06
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.72E+00	4.60E+01	1.22E+03	2.47E+04
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Custom					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**3.22E+04**	**6.58E+00**	**8.91E+00**	**3.29E+03**	**6.75E+01**	**6.30E-01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	3.91E+06	2.65E+02	8.32E+02	1.31E+05	1.04E+04	1.76E+01
		Blue				3.91E+06	2.65E+02	8.32E+02	1.31E+05	1.04E+04	1.76E+01
		Yellow				7.81E+06	5.31E+02	1.66E+03	2.63E+05	2.08E+04	3.52E+01
		Red Speckled				1.30E+07	8.84E+02	2.77E+03	4.38E+05	3.47E+04	5.86E+01
		Sweet Corn				1.95E+07	1.33E+03	4.16E+03	6.57E+05	5.20E+04	8.80E+01
	Squash	Pumpkin				2.38E+07	1.37E+03	4.77E+03	6.78E+05	6.83E+04	8.87E+01
		Other Squash				6.14E+06	3.54E+02	1.23E+03	1.76E+05	1.76E+04	2.30E+01
	Melons	Watermelon				5.76E+06	3.13E+02	1.13E+03	1.55E+05	1.70E+04	2.01E+01
		Cantaloupe				5.76E+06	3.13E+02	1.13E+03	1.55E+05	1.70E+04	2.01E+01
	Tree Fruit	Apples				4.76E+06	2.90E+02	9.75E+02	1.44E+05	1.33E+04	1.89E+01
		Apricots				5.05E+06	3.07E+02	1.03E+03	1.52E+05	1.41E+04	2.00E+01
		Peaches				5.62E+06	3.50E+02	1.16E+03	1.73E+05	1.55E+04	2.29E+01
	Other Vegetables	Beans				3.48E+05	8.87E+01	9.97E+01	4.42E+04	7.17E+02	1.00E+01
		Brussels sprouts				1.34E+07	7.70E+02	2.68E+03	3.81E+05	3.83E+04	4.99E+01
		Cucumbers				4.83E+07	2.95E+03	9.91E+03	1.46E+06	1.35E+05	1.93E+02
		Tomatoes				4.72E+06	1.04E+03	1.33E+03	5.16E+05	9.86E+03	1.04E+02
		Chili				1.48E+06	3.07E+02	4.12E+02	1.53E+05	3.11E+03	2.95E+01
		Onions				6.22E+07	1.43E+03	3.66E+03	1.38E+06	8.44E+04	1.71E+02
		Potatoes				3.57E+07	1.37E+03	3.19E+03	1.28E+06	5.61E+04	1.68E+02
	Herbs and Medicinal:	Navajo Tea				3.95E+04	9.75E+00	1.13E+01	4.86E+03	8.17E+01	1.07E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE		
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	--	--	--	75	75	75
	Decay Constant		λ		1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	--	--	--	1.00	2.59	1.02
Transfer Factors for Radionuclides	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	--	--	3.00E-01	1.20E-03	2.40E-03
		Blue				--	--	--	3.00E-01	1.20E-03	2.40E-03
		Yellow				--	--	--	3.00E-01	1.20E-03	2.40E-03
		Red Speckled				--	--	--	3.00E-01	1.20E-03	2.40E-03
		Sweet Corn				--	--	--	3.00E-01	1.20E-03	2.40E-03
	Squash	Pumpkin				--	--	--	3.00E-01	1.50E-02	1.70E-02
		Other Squash				--	--	--	3.00E-01	1.50E-02	1.70E-02
	Melons	Watermelon				--	--	--	3.00E-01	1.00E-02	1.00E-02
		Cantaloupe				--	--	--	3.00E-01	1.00E-02	1.00E-02
	Tree Fruit	Apples				--	--	--	3.00E-01	1.00E-02	1.00E-02
		Apricots				--	--	--	3.00E-01	1.00E-02	1.00E-02
		Peaches				--	--	--	3.00E-01	1.00E-02	1.00E-02
	Other Vegetables	Beans				--	--	--	3.00E-01	5.30E-03	1.40E-02
		Brussels sprouts				--	--	--	1.30E+00	8.00E-02	9.10E-02
		Cucumbers				--	--	--	3.00E-01	1.50E-02	1.70E-02
		Tomatoes				--	--	--	3.00E-01	1.50E-02	1.70E-02
		Chili				--	--	--	3.00E-01	1.50E-02	1.70E-02
		Onions				--	--	--	3.00E-01	1.50E-02	7.00E-02
		Potatoes				--	--	--	3.00E-01	1.50E-03	1.10E-02
	Herbs and Medicinal:	Navajo Tea				--	--	--	1.30E+00	8.00E-02	4.20E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	4.68E+04	6.26E+00	8.90E+01	2.25E+04	8.31E+01	7.03E+00	1.73E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	5.08E+06	3.08E+02	2.22E+03	2.73E+06	2.13E+03	4.13E+02	4.43E+02
		Blue				5.08E+06	3.08E+02	2.22E+03	2.73E+06	2.13E+03	4.13E+02	4.43E+02
		Yellow				1.02E+07	6.16E+02	4.44E+03	5.47E+06	4.25E+03	8.25E+02	8.86E+02
		Red Speckled				1.69E+07	1.03E+03	7.40E+03	9.11E+06	7.08E+03	1.38E+03	1.48E+03
		Sweet Corn				2.54E+07	1.54E+03	1.11E+04	1.37E+07	1.06E+04	2.06E+03	2.21E+03
	Squash	Pumpkin				3.01E+07	1.62E+03	1.11E+04	1.67E+07	1.07E+04	2.20E+03	2.22E+03
		Other Squash				7.75E+06	4.18E+02	2.88E+03	4.29E+06	2.76E+03	5.70E+02	5.76E+02
	Melons	Watermelon				7.19E+06	3.72E+02	2.52E+03	4.03E+06	2.42E+03	5.09E+02	5.04E+02
		Cantaloupe				7.19E+06	3.72E+02	2.52E+03	4.03E+06	2.42E+03	5.09E+02	5.04E+02
	Tree Fruit	Apples				6.07E+06	3.40E+02	2.38E+03	3.33E+06	2.28E+03	4.61E+02	4.75E+02
		Apricots				6.44E+06	3.61E+02	2.52E+03	3.54E+06	2.42E+03	4.89E+02	5.03E+02
		Peaches				7.20E+06	4.10E+02	2.88E+03	3.94E+06	2.76E+03	5.55E+02	5.76E+02
	Other Vegetables	Beans				5.13E+05	7.87E+01	1.53E+03	2.44E+05	1.39E+03	8.60E+01	2.89E+02
		Brussels sprouts				1.69E+07	9.09E+02	6.26E+03	9.35E+06	6.01E+03	1.24E+03	1.25E+03
		Cucumbers				6.17E+07	3.47E+03	2.42E+04	3.38E+07	2.32E+04	4.69E+03	4.84E+03
		Tomatoes				6.90E+06	9.63E+02	1.49E+04	3.31E+06	1.38E+04	1.08E+03	2.87E+03
		Chili				2.16E+06	2.90E+02	4.18E+03	1.04E+06	3.87E+03	3.29E+02	8.07E+02
		Onions				2.96E+07	4.11E+03	1.78E+04	3.64E+07	5.23E+04	9.00E+02	9.11E+03
		Potatoes				2.40E+07	3.53E+03	1.77E+04	2.25E+07	5.10E+04	8.69E+02	8.92E+03
	Herbs and Medicinal:	Navajo Tea				5.82E+04	8.74E+00	1.61E+02	2.77E+04	1.46E+02	9.61E+00	3.05E+01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Inputs	Parameter		Symbol	Description	Units	Radionuclides			TFs for Secular Equilibrium Radionuclides			
						Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	75	75	--	--	--	75
	Decay Constant		λ		1/Year	9.19E-06	2.82E-06	1.55E-10	--	--	--	5.54E-10
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	1.00	1.00	1.00	--	--	--	1.00
Transfer Factors for Radionuclides	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	6.40E-04	1.50E-02	1.50E-02	--	--	--	3.00E-01
		Blue				6.40E-04	1.50E-02	1.50E-02	--	--	--	3.00E-01
		Yellow				6.40E-04	1.50E-02	1.50E-02	--	--	--	3.00E-01
		Red Speckled				6.40E-04	1.50E-02	1.50E-02	--	--	--	3.00E-01
		Sweet Corn				6.40E-04	1.50E-02	1.50E-02	--	--	--	3.00E-01
	Squash	Pumpkin				7.80E-04	1.50E-02	1.50E-02	--	--	--	3.00E-01
		Other Squash				7.80E-04	1.50E-02	1.50E-02	--	--	--	3.00E-01
	Melons	Watermelon				5.00E-04	1.00E-03	1.00E-03	--	--	--	3.00E-01
		Cantaloupe				5.00E-04	1.00E-03	1.00E-03	--	--	--	3.00E-01
	Tree Fruit	Apples				5.00E-04	1.00E-03	1.00E-03	--	--	--	3.00E-01
		Apricots				5.00E-04	1.00E-03	1.00E-03	--	--	--	3.00E-01
		Peaches				5.00E-04	1.00E-03	1.00E-03	--	--	--	3.00E-01
	Other Vegetables	Beans				5.30E-04	2.20E-03	2.20E-03	--	--	--	3.00E-01
		Brussels sprouts				1.20E-03	2.00E-02	2.00E-02	--	--	--	1.30E+00
		Cucumbers				7.80E-04	1.50E-02	1.50E-02	--	--	--	3.00E-01
		Tomatoes				7.80E-04	1.50E-02	1.50E-02	--	--	--	3.00E-01
		Chili				7.80E-04	1.50E-02	1.50E-02	--	--	--	3.00E-01
		Onions				8.00E-04	8.40E-03	8.40E-03	--	--	--	3.00E-01
		Potatoes				2.00E-04	5.00E-03	5.00E-03	--	--	--	3.00E-01
	Herbs and Medicinal:	Navajo Tea				1.20E-03	7.10E-02	7.10E-02	--	--	--	1.30E+00
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	5.44E+02	1.05E+02	2.89E+01	3.60E-01	5.58E+00	1.53E+02	2.08E+03
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	4.05E+04	5.26E+03	7.98E+02	8.69E+01	4.37E+02	1.55E+04	6.77E+04
		Blue				4.05E+04	5.26E+03	7.98E+02	8.69E+01	4.37E+02	1.55E+04	6.77E+04
		Yellow				8.09E+04	1.05E+04	1.60E+03	1.74E+02	8.74E+02	3.09E+04	1.35E+05
		Red Speckled				1.35E+05	1.75E+04	2.66E+03	2.90E+02	1.46E+03	5.16E+04	2.26E+05
		Sweet Corn				2.02E+05	2.63E+04	3.99E+03	4.35E+02	2.18E+03	7.73E+04	3.39E+05
	Squash	Pumpkin				2.23E+05	2.76E+04	4.02E+03	7.24E+02	2.43E+03	9.01E+04	3.42E+05
		Other Squash				5.77E+04	7.15E+03	1.04E+03	1.85E+02	6.27E+02	2.33E+04	8.87E+04
	Melons	Watermelon				5.21E+04	6.35E+03	9.13E+02	2.03E+02	5.69E+02	2.15E+04	7.78E+04
		Cantaloupe				5.21E+04	6.35E+03	9.13E+02	2.03E+02	5.69E+02	2.15E+04	7.78E+04
	Tree Fruit	Apples				4.62E+04	5.81E+03	8.57E+02	1.28E+02	5.01E+02	1.83E+04	7.29E+04
		Apricots				4.90E+04	6.16E+03	9.09E+02	1.36E+02	5.32E+02	1.94E+04	7.73E+04
		Peaches				5.53E+04	7.01E+03	1.04E+03	1.44E+02	6.00E+02	2.18E+04	8.84E+04
	Other Vegetables	Beans				6.28E+03	1.32E+03	4.66E+02	3.72E+00	6.38E+01	1.69E+03	3.60E+04
		Brussels sprouts				1.25E+05	1.55E+04	2.26E+03	4.04E+02	1.36E+03	5.06E+04	1.93E+05
		Cucumbers				4.70E+05	5.92E+04	8.74E+03	1.29E+03	5.10E+03	1.86E+05	7.43E+05
		Tomatoes				8.17E+04	1.62E+04	4.78E+03	5.20E+01	8.34E+02	2.26E+04	3.79E+05
		Chili				2.52E+04	4.89E+03	1.36E+03	1.65E+01	2.58E+02	7.05E+03	1.09E+05
		Onions				2.44E+05	2.41E+04	5.51E+03	7.23E+02	4.34E+03	1.35E+05	3.71E+04
		Potatoes				2.13E+05	2.28E+04	5.44E+03	3.88E+02	3.44E+03	1.02E+05	3.70E+04
	Herbs and Medicinal:	Navajo Tea				7.07E+02	1.47E+02	4.96E+01	4.25E-01	7.19E+00	1.91E+02	3.86E+03
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Inputs	Parameter		Symbol	Description	Units	TFs for non-SE Radioniculides					TFs for Secular Equilibrium	
						Pb-210	Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	75	75	75	75	--	--
	Decay Constant		λ		1/Year	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10	--	--
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	2.59	1.02	1.00	1.00	1.00	--	--
Transfer Factors for Radionuclides	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	2.40E-03	6.40E-04	1.50E-02	1.50E-02	--	--
		Blue				1.20E-03	2.40E-03	6.40E-04	1.50E-02	1.50E-02	--	--
		Yellow				1.20E-03	2.40E-03	6.40E-04	1.50E-02	1.50E-02	--	--
		Red Speckled				1.20E-03	2.40E-03	6.40E-04	1.50E-02	1.50E-02	--	--
		Sweet Corn				1.20E-03	2.40E-03	6.40E-04	1.50E-02	1.50E-02	--	--
	Squash	Pumpkin				1.50E-02	1.70E-02	7.80E-04	1.50E-02	1.50E-02	--	--
		Other Squash				1.50E-02	1.70E-02	7.80E-04	1.50E-02	1.50E-02	--	--
	Melons	Watermelon				1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--
		Cantaloupe				1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--
	Tree Fruit	Apples				1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--
		Apricots				1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--
		Peaches				1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--
	Other Vegetables	Beans				5.30E-03	1.40E-02	5.30E-04	2.20E-03	2.20E-03	--	--
		Brussels sprouts				8.00E-02	9.10E-02	1.20E-03	2.00E-02	2.00E-02	--	--
		Cucumbers				1.50E-02	1.70E-02	7.80E-04	1.50E-02	1.50E-02	--	--
		Tomatoes				1.50E-02	1.70E-02	7.80E-04	1.50E-02	1.50E-02	--	--
		Chili				1.50E-02	1.70E-02	7.80E-04	1.50E-02	1.50E-02	--	--
		Onions				1.50E-02	7.00E-02	8.00E-04	8.40E-03	8.40E-03	--	--
		Potatoes				1.50E-03	1.10E-02	2.00E-04	5.00E-03	5.00E-03	--	--
	Herbs and Medicinal:	Navajo Tea				8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02	--	--
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Kee'da'whíí téél (full-time Navajo residential)					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	3.22E+04	6.58E+00	8.91E+00	3.29E+03	6.75E+01	6.30E-01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	3.91E+06	2.65E+02	8.32E+02	1.31E+05	1.04E+04	1.76E+01
		Blue				3.91E+06	2.65E+02	8.32E+02	1.31E+05	1.04E+04	1.76E+01
		Yellow				7.81E+06	5.31E+02	1.66E+03	2.63E+05	2.08E+04	3.52E+01
		Red Speckled				1.30E+07	8.84E+02	2.77E+03	4.38E+05	3.47E+04	5.86E+01
		Sweet Corn				1.95E+07	1.33E+03	4.16E+03	6.57E+05	5.20E+04	8.80E+01
	Squash	Pumpkin				2.38E+07	1.37E+03	4.77E+03	6.78E+05	6.83E+04	8.87E+01
		Other Squash				6.14E+06	3.54E+02	1.23E+03	1.76E+05	1.76E+04	2.30E+01
	Melons	Watermelon				5.76E+06	3.13E+02	1.13E+03	1.55E+05	1.70E+04	2.01E+01
		Cantaloupe				5.76E+06	3.13E+02	1.13E+03	1.55E+05	1.70E+04	2.01E+01
	Tree Fruit	Apples				4.76E+06	2.90E+02	9.75E+02	1.44E+05	1.33E+04	1.89E+01
		Apricots				5.05E+06	3.07E+02	1.03E+03	1.52E+05	1.41E+04	2.00E+01
		Peaches				5.62E+06	3.50E+02	1.16E+03	1.73E+05	1.55E+04	2.29E+01
	Other Vegetables	Beans				3.48E+05	8.87E+01	9.97E+01	4.42E+04	7.17E+02	1.00E+01
		Brussels sprouts				1.34E+07	7.70E+02	2.68E+03	3.81E+05	3.83E+04	4.99E+01
		Cucumbers				4.83E+07	2.95E+03	9.91E+03	1.46E+06	1.35E+05	1.93E+02
		Tomatoes				4.72E+06	1.04E+03	1.33E+03	5.16E+05	9.86E+03	1.04E+02
		Chili				1.48E+06	3.07E+02	4.12E+02	1.53E+05	3.11E+03	2.95E+01
		Onions				6.22E+07	1.43E+03	3.66E+03	1.38E+06	8.44E+04	1.71E+02
		Potatoes				3.57E+07	1.37E+03	3.19E+03	1.28E+06	5.61E+04	1.68E+02
	Herbs and Medicinal:	Navajo Tea				3.95E+04	9.75E+00	1.13E+01	4.86E+03	8.17E+01	1.07E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	Radionuclides	TFs for non-SE Radioniculides				
						Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	--	75	75	75	75	75
	Decay Constant		λ		1/Year	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	--	1.00	2.59	1.02	1.00	1.00
Transfer Factors for Radionuclides	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	3.00E-01	1.20E-03	2.40E-03	6.40E-04	1.50E-02
		Blue				--	3.00E-01	1.20E-03	2.40E-03	6.40E-04	1.50E-02
		Yellow				--	3.00E-01	1.20E-03	2.40E-03	6.40E-04	1.50E-02
		Red Speckled				--	3.00E-01	1.20E-03	2.40E-03	6.40E-04	1.50E-02
		Sweet Corn				--	3.00E-01	1.20E-03	2.40E-03	6.40E-04	1.50E-02
	Squash	Pumpkin				--	3.00E-01	1.50E-02	1.70E-02	7.80E-04	1.50E-02
		Other Squash				--	3.00E-01	1.50E-02	1.70E-02	7.80E-04	1.50E-02
	Melons	Watermelon				--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
		Cantaloupe				--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
	Tree Fruit	Apples				--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
		Apricots				--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
		Peaches				--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
	Other Vegetables	Beans				--	3.00E-01	5.30E-03	1.40E-02	5.30E-04	2.20E-03
		Brussels sprouts				--	1.30E+00	8.00E-02	9.10E-02	1.20E-03	2.00E-02
		Cucumbers				--	3.00E-01	1.50E-02	1.70E-02	7.80E-04	1.50E-02
		Tomatoes				--	3.00E-01	1.50E-02	1.70E-02	7.80E-04	1.50E-02
		Chili				--	3.00E-01	1.50E-02	1.70E-02	7.80E-04	1.50E-02
		Onions				--	3.00E-01	1.50E-02	7.00E-02	8.00E-04	8.40E-03
		Potatoes				--	3.00E-01	1.50E-03	1.10E-02	2.00E-04	5.00E-03
	Herbs and Medicinal:	Navajo Tea				--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**4.68E+04**	**6.26E+00**	**8.90E+01**	**2.25E+04**	**8.31E+01**	**7.03E+00**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	5.08E+06	3.08E+02	2.22E+03	2.73E+06	2.13E+03	4.13E+02
		Blue				5.08E+06	3.08E+02	2.22E+03	2.73E+06	2.13E+03	4.13E+02
		Yellow				1.02E+07	6.16E+02	4.44E+03	5.47E+06	4.25E+03	8.25E+02
		Red Speckled				1.69E+07	1.03E+03	7.40E+03	9.11E+06	7.08E+03	1.38E+03
		Sweet Corn				2.54E+07	1.54E+03	1.11E+04	1.37E+07	1.06E+04	2.06E+03
	Squash	Pumpkin				3.01E+07	1.62E+03	1.11E+04	1.67E+07	1.07E+04	2.20E+03
		Other Squash				7.75E+06	4.18E+02	2.88E+03	4.29E+06	2.76E+03	5.70E+02
	Melons	Watermelon				7.19E+06	3.72E+02	2.52E+03	4.03E+06	2.42E+03	5.09E+02
		Cantaloupe				7.19E+06	3.72E+02	2.52E+03	4.03E+06	2.42E+03	5.09E+02
	Tree Fruit	Apples				6.07E+06	3.40E+02	2.38E+03	3.33E+06	2.28E+03	4.61E+02
		Apricots				6.44E+06	3.61E+02	2.52E+03	3.54E+06	2.42E+03	4.89E+02
		Peaches				7.20E+06	4.10E+02	2.88E+03	3.94E+06	2.76E+03	5.55E+02
	Other Vegetables	Beans				5.13E+05	7.87E+01	1.53E+03	2.44E+05	1.39E+03	8.60E+01
		Brussels sprouts				1.69E+07	9.09E+02	6.26E+03	9.35E+06	6.01E+03	1.24E+03
		Cucumbers				6.17E+07	3.47E+03	2.42E+04	3.38E+07	2.32E+04	4.69E+03
		Tomatoes				6.90E+06	9.63E+02	1.49E+04	3.31E+06	1.38E+04	1.08E+03
		Chili				2.16E+06	2.90E+02	4.18E+03	1.04E+06	3.87E+03	3.29E+02
		Onions				2.96E+07	4.11E+03	1.78E+04	3.64E+07	5.23E+04	9.00E+02
		Potatoes				2.40E+07	3.53E+03	1.77E+04	2.25E+07	5.10E+04	8.69E+02
	Herbs and Medicinal:	Navajo Tea				5.82E+04	8.74E+00	1.61E+02	2.77E+04	1.46E+02	9.61E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	U-238	TFs for Secular Equilibrium Radionuclides: Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	--	--	--	75	75
	Decay Constant		λ		1/Year	1.55E-10	--	--	--	5.54E-10	3.12E-02
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	1.00	--	--	--	1.00	2.59
Transfer Factors for Radionuclides	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.50E-02	--	--	--	3.00E-01	1.20E-03
		Blue				1.50E-02	--	--	--	3.00E-01	1.20E-03
		Yellow				1.50E-02	--	--	--	3.00E-01	1.20E-03
		Red Speckled				1.50E-02	--	--	--	3.00E-01	1.20E-03
		Sweet Corn				1.50E-02	--	--	--	3.00E-01	1.20E-03
	Squash	Pumpkin				1.50E-02	--	--	--	3.00E-01	1.50E-02
		Other Squash				1.50E-02	--	--	--	3.00E-01	1.50E-02
	Melons	Watermelon				1.00E-03	--	--	--	3.00E-01	1.00E-02
		Cantaloupe				1.00E-03	--	--	--	3.00E-01	1.00E-02
	Tree Fruit	Apples				1.00E-03	--	--	--	3.00E-01	1.00E-02
		Apricots				1.00E-03	--	--	--	3.00E-01	1.00E-02
		Peaches				1.00E-03	--	--	--	3.00E-01	1.00E-02
	Other Vegetables	Beans				2.20E-03	--	--	--	3.00E-01	5.30E-03
		Brussels sprouts				2.00E-02	--	--	--	1.30E+00	8.00E-02
		Cucumbers				1.50E-02	--	--	--	3.00E-01	1.50E-02
		Tomatoes				1.50E-02	--	--	--	3.00E-01	1.50E-02
		Chili				1.50E-02	--	--	--	3.00E-01	1.50E-02
		Onions				8.40E-03	--	--	--	3.00E-01	1.50E-02
		Potatoes				5.00E-03	--	--	--	3.00E-01	1.50E-03
	Herbs and Medicinal:	Navajo Tea				7.10E-02	--	--	--	1.30E+00	8.00E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**1.73E+01**	**5.44E+02**	**1.05E+02**	**2.89E+01**	**3.60E-01**	**5.58E+00**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	4.43E+02	4.05E+04	5.26E+03	7.98E+02	8.69E+01	4.37E+02
		Blue				4.43E+02	4.05E+04	5.26E+03	7.98E+02	8.69E+01	4.37E+02
		Yellow				8.86E+02	8.09E+04	1.05E+04	1.60E+03	1.74E+02	8.74E+02
		Red Speckled				1.48E+03	1.35E+05	1.75E+04	2.66E+03	2.90E+02	1.46E+03
		Sweet Corn				2.21E+03	2.02E+05	2.63E+04	3.99E+03	4.35E+02	2.18E+03
	Squash	Pumpkin				2.22E+03	2.23E+05	2.76E+04	4.02E+03	7.24E+02	2.43E+03
		Other Squash				5.76E+02	5.77E+04	7.15E+03	1.04E+03	1.85E+02	6.27E+02
	Melons	Watermelon				5.04E+02	5.21E+04	6.35E+03	9.13E+02	2.03E+02	5.69E+02
		Cantaloupe				5.04E+02	5.21E+04	6.35E+03	9.13E+02	2.03E+02	5.69E+02
	Tree Fruit	Apples				4.75E+02	4.62E+04	5.81E+03	8.57E+02	1.28E+02	5.01E+02
		Apricots				5.03E+02	4.90E+04	6.16E+03	9.09E+02	1.36E+02	5.32E+02
		Peaches				5.76E+02	5.53E+04	7.01E+03	1.04E+03	1.44E+02	6.00E+02
	Other Vegetables	Beans				2.89E+02	6.28E+03	1.32E+03	4.66E+02	3.72E+00	6.38E+01
		Brussels sprouts				1.25E+03	1.25E+05	1.55E+04	2.26E+03	4.04E+02	1.36E+03
		Cucumbers				4.84E+03	4.70E+05	5.92E+04	8.74E+03	1.29E+03	5.10E+03
		Tomatoes				2.87E+03	8.17E+04	1.62E+04	4.78E+03	5.20E+01	8.34E+02
		Chili				8.07E+02	2.52E+04	4.89E+03	1.36E+03	1.65E+01	2.58E+02
		Onions				9.11E+03	2.44E+05	2.41E+04	5.51E+03	7.23E+02	4.34E+03
		Potatoes				8.92E+03	2.13E+05	2.28E+04	5.44E+03	3.88E+02	3.44E+03
	Herbs and Medicinal:	Navajo Tea				3.05E+01	7.07E+02	1.47E+02	4.96E+01	4.25E-01	7.19E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	TFs for non-SE Radionuclides: Ra-226	Th-230	U-234	U-238	TFs for Secular Equilibrium I: Ra-226 in SE	U-238 in SE
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	75	75	75	--	--
	Decay Constant		λ		1/Year	4.33E-04	9.19E-06	2.82E-06	1.55E-10	--	--
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	1.02	1.00	1.00	1.00	--	--
Transfer Factors for Radionuclides	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	2.40E-03	6.40E-04	1.50E-02	1.50E-02	--	--
		Blue				2.40E-03	6.40E-04	1.50E-02	1.50E-02	--	--
		Yellow				2.40E-03	6.40E-04	1.50E-02	1.50E-02	--	--
		Red Speckled				2.40E-03	6.40E-04	1.50E-02	1.50E-02	--	--
		Sweet Corn				2.40E-03	6.40E-04	1.50E-02	1.50E-02	--	--
	Squash	Pumpkin				1.70E-02	7.80E-04	1.50E-02	1.50E-02	--	--
		Other Squash				1.70E-02	7.80E-04	1.50E-02	1.50E-02	--	--
	Melons	Watermelon				1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--
		Cantaloupe				1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--
	Tree Fruit	Apples				1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--
		Apricots				1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--
		Peaches				1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--
	Other Vegetables	Beans				1.40E-02	5.30E-04	2.20E-03	2.20E-03	--	--
		Brussels sprouts				9.10E-02	1.20E-03	2.00E-02	2.00E-02	--	--
		Cucumbers				1.70E-02	7.80E-04	1.50E-02	1.50E-02	--	--
		Tomatoes				1.70E-02	7.80E-04	1.50E-02	1.50E-02	--	--
		Chili				1.70E-02	7.80E-04	1.50E-02	1.50E-02	--	--
		Onions				7.00E-02	8.00E-04	8.40E-03	8.40E-03	--	--
		Potatoes				1.10E-02	2.00E-04	5.00E-03	5.00E-03	--	--
	Herbs and Medicinal:	Navajo Tea				4.20E-01	1.20E-03	7.10E-02	7.10E-02	--	--
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Noncancer PRG for Specific Metals - Kọ ei nahaazáh (eas Aluminum	Antimony	Arsenic	Barium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**1.53E+02**	**2.08E+03**	**9.14E+04**	**2.02E+01**	**2.57E+01**	**1.01E+04**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	1.55E+04	6.77E+04	--	--	--	--
		Blue				1.55E+04	6.77E+04	--	--	--	--
		Yellow				3.09E+04	1.35E+05	1.07E+07	7.30E+02	2.29E+03	3.62E+05
		Red Speckled				5.16E+04	2.26E+05	--	--	--	--
		Sweet Corn				7.73E+04	3.39E+05	--	--	--	--
	Squash	Pumpkin				9.01E+04	3.42E+05	2.62E+07	1.50E+03	5.24E+03	7.46E+05
		Other Squash				2.33E+04	8.87E+04	1.69E+07	9.74E+02	3.39E+03	4.83E+05
	Melons	Watermelon				2.15E+04	7.78E+04	--	--	--	--
		Cantaloupe				2.15E+04	7.78E+04	1.58E+07	8.61E+02	3.10E+03	4.26E+05
	Tree Fruit	Apples				1.83E+04	7.29E+04	1.31E+07	7.97E+02	2.68E+03	3.95E+05
		Apricots				1.94E+04	7.73E+04	1.39E+07	8.45E+02	2.84E+03	4.18E+05
		Peaches				2.18E+04	8.84E+04	--	--	--	--
	Other Vegetables	Beans				1.69E+03	3.60E+04	--	--	--	--
		Brussels sprouts				5.06E+04	1.93E+05	--	--	--	--
		Cucumbers				1.86E+05	7.43E+05	--	--	--	--
		Tomatoes				2.26E+04	3.79E+05	--	--	--	--
		Chili				7.05E+03	1.09E+05	--	--	--	--
		Onions				1.35E+05	3.71E+04	--	--	--	--
		Potatoes				1.02E+05	3.70E+04	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.91E+02	3.86E+03	9.49E+04	2.34E+01	2.71E+01	1.17E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	Radionuclides Th-232 in SE	TFs for non-SE Radioniculides K-40	Pb-210	Ra-226	Th-230	U-234
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	--	75	75	75	75	75
	Decay Constant		λ		1/Year	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	--	1.00	2.59	1.02	1.00	1.00
Transfer Factors for Radionuclides	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	3.00E-01	1.20E-03	2.40E-03	6.40E-04	1.50E-02
		Blue				--	3.00E-01	1.20E-03	2.40E-03	6.40E-04	1.50E-02
		Yellow				--	3.00E-01	1.20E-03	2.40E-03	6.40E-04	1.50E-02
		Red Speckled				--	3.00E-01	1.20E-03	2.40E-03	6.40E-04	1.50E-02
		Sweet Corn				--	3.00E-01	1.20E-03	2.40E-03	6.40E-04	1.50E-02
	Squash	Pumpkin				--	3.00E-01	1.50E-02	1.70E-02	7.80E-04	1.50E-02
		Other Squash				--	3.00E-01	1.50E-02	1.70E-02	7.80E-04	1.50E-02
	Melons	Watermelon				--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
		Cantaloupe				--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
	Tree Fruit	Apples				--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
		Apricots				--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
		Peaches				--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
	Other Vegetables	Beans				--	3.00E-01	5.30E-03	1.40E-02	5.30E-04	2.20E-03
		Brussels sprouts				--	1.30E+00	8.00E-02	9.10E-02	1.20E-03	2.00E-02
		Cucumbers				--	3.00E-01	1.50E-02	1.70E-02	7.80E-04	1.50E-02
		Tomatoes				--	3.00E-01	1.50E-02	1.70E-02	7.80E-04	1.50E-02
		Chili				--	3.00E-01	1.50E-02	1.70E-02	7.80E-04	1.50E-02
		Onions				--	3.00E-01	1.50E-02	7.00E-02	8.00E-04	8.40E-03
		Potatoes				--	3.00E-01	1.50E-03	1.10E-02	2.00E-04	5.00E-03
	Herbs and Medicinal:	Navajo Tea				--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	y access open space) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**1.91E+02**	**2.03E+00**	**1.34E+05**	**1.88E+01**	**2.94E+02**	**6.40E+04**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.86E+04	4.84E+01	1.40E+07	8.47E+02	6.10E+03	7.52E+06
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				7.52E+04	9.75E+01	3.31E+07	1.78E+03	1.22E+04	1.83E+07
		Other Squash				4.83E+04	6.32E+01	2.13E+07	1.15E+03	7.93E+03	1.18E+07
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				4.68E+04	5.54E+01	1.98E+07	1.02E+03	6.94E+03	1.11E+07
	Tree Fruit	Apples				3.65E+04	5.20E+01	1.67E+07	9.36E+02	6.54E+03	9.16E+06
		Apricots				3.88E+04	5.51E+01	1.77E+07	9.92E+02	6.93E+03	9.73E+06
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.96E+02	2.57E+00	1.40E+05	2.10E+01	3.86E+02	6.64E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units		TFs for Secular Equilibrium Radionuclides				
						U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	--	--	--	75	75
	Decay Constant		λ		1/Year	1.55E-10	--	--	--	5.54E-10	3.12E-02
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	1.00	--	--	--	1.00	2.59
Transfer Factors for Radionuclides	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.50E-02	--	--	--	3.00E-01	1.20E-03
		Blue				1.50E-02	--	--	--	3.00E-01	1.20E-03
		Yellow				1.50E-02	--	--	--	3.00E-01	1.20E-03
		Red Speckled				1.50E-02	--	--	--	3.00E-01	1.20E-03
		Sweet Corn				1.50E-02	--	--	--	3.00E-01	1.20E-03
	Squash	Pumpkin				1.50E-02	--	--	--	3.00E-01	1.50E-02
		Other Squash				1.50E-02	--	--	--	3.00E-01	1.50E-02
	Melons	Watermelon				1.00E-03	--	--	--	3.00E-01	1.00E-02
		Cantaloupe				1.00E-03	--	--	--	3.00E-01	1.00E-02
	Tree Fruit	Apples				1.00E-03	--	--	--	3.00E-01	1.00E-02
		Apricots				1.00E-03	--	--	--	3.00E-01	1.00E-02
		Peaches				1.00E-03	--	--	--	3.00E-01	1.00E-02
	Other Vegetables	Beans				2.20E-03	--	--	--	3.00E-01	5.30E-03
		Brussels sprouts				2.00E-02	--	--	--	1.30E+00	8.00E-02
		Cucumbers				1.50E-02	--	--	--	3.00E-01	1.50E-02
		Tomatoes				1.50E-02	--	--	--	3.00E-01	1.50E-02
		Chili				1.50E-02	--	--	--	3.00E-01	1.50E-02
		Onions				8.40E-03	--	--	--	3.00E-01	1.50E-02
		Potatoes				5.00E-03	--	--	--	3.00E-01	1.50E-03
	Herbs and Medicinal:	Navajo Tea				7.10E-02	--	--	--	1.30E+00	8.00E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	2.71E+02	2.10E+01	5.64E+01	1.59E+03	3.16E+02	9.38E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				5.84E+03	1.13E+03	1.22E+03	1.11E+05	1.45E+04	2.19E+03
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				1.17E+04	2.42E+03	2.45E+03	2.45E+05	3.04E+04	4.42E+03
		Other Squash				7.60E+03	1.57E+03	1.58E+03	1.59E+05	1.97E+04	2.86E+03
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				6.66E+03	1.40E+03	1.39E+03	1.43E+05	1.75E+04	2.51E+03
	Tree Fruit	Apples				6.27E+03	1.27E+03	1.31E+03	1.27E+05	1.60E+04	2.36E+03
		Apricots				6.64E+03	1.34E+03	1.38E+03	1.35E+05	1.69E+04	2.50E+03
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.51E+02	2.31E+01	7.32E+01	1.70E+03	3.53E+02	1.19E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	TFs for non-SE Radionicuclides Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	75	75	75
	Decay Constant		λ		1/Year	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	1.02	1.00	1.00	1.00
Transfer Factors for Radionuclides	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	2.40E-03	6.40E-04	1.50E-02	1.50E-02
		Blue				2.40E-03	6.40E-04	1.50E-02	1.50E-02
		Yellow				2.40E-03	6.40E-04	1.50E-02	1.50E-02
		Red Speckled				2.40E-03	6.40E-04	1.50E-02	1.50E-02
		Sweet Corn				2.40E-03	6.40E-04	1.50E-02	1.50E-02
	Squash	Pumpkin				1.70E-02	7.80E-04	1.50E-02	1.50E-02
		Other Squash				1.70E-02	7.80E-04	1.50E-02	1.50E-02
	Melons	Watermelon				1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Cantaloupe				1.00E-02	5.00E-04	1.00E-03	1.00E-03
	Tree Fruit	Apples				1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Apricots				1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Peaches				1.00E-02	5.00E-04	1.00E-03	1.00E-03
	Other Vegetables	Beans				1.40E-02	5.30E-04	2.20E-03	2.20E-03
		Brussels sprouts				9.10E-02	1.20E-03	2.00E-02	2.00E-02
		Cucumbers				1.70E-02	7.80E-04	1.50E-02	1.50E-02
		Tomatoes				1.70E-02	7.80E-04	1.50E-02	1.50E-02
		Chili				1.70E-02	7.80E-04	1.50E-02	1.50E-02
		Onions				7.00E-02	8.00E-04	8.40E-03	8.40E-03
		Potatoes				1.10E-02	2.00E-04	5.00E-03	5.00E-03
	Herbs and Medicinal:	Navajo Tea				4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Noncancer PRG for Specific I Aluminum	Noncancer PRG for Specific I Antimony
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**1.01E+00**	**1.62E+01**	**4.38E+02**	**7.44E+03**	**1.05E+05**	**2.60E+01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.39E+02	1.20E+03	4.25E+04	1.86E+05	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				7.96E+02	2.67E+03	9.91E+04	3.76E+05	--	--
		Other Squash				5.07E+02	1.73E+03	6.40E+04	2.44E+05	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				5.58E+02	1.56E+03	5.90E+04	2.14E+05	--	--
	Tree Fruit	Apples				3.52E+02	1.38E+03	5.04E+04	2.01E+05	--	--
		Apricots				3.74E+02	1.46E+03	5.34E+04	2.13E+05	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.02E+00	1.73E+01	4.59E+02	9.26E+03	1.05E+05	2.60E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Metals - Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	3.01E+01	1.29E+04	2.18E+02	2.85E+00	1.55E+05	2.33E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.01E+01	1.29E+04	2.18E+02	2.85E+00	1.55E+05	2.33E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	4.29E+02	7.38E+04	3.90E+02	2.56E+01	8.13E+01	1.89E+03
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				4.29E+02	7.38E+04	3.90E+02	2.56E+01	8.13E+01	1.89E+03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	3.92E+02	1.32E+02	1.13E+00	1.92E+01	5.10E+02	1.03E+04
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.92E+02	1.32E+02	1.13E+00	1.92E+01	5.10E+02	1.03E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open spa					
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	4.75E+05	1.17E+02	1.35E+02	5.83E+04	9.80E+02	1.28E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				4.75E+05	1.17E+02	1.35E+02	5.83E+04	9.80E+02	1.28E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ice) Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**6.98E+05**	**1.05E+02**	**1.93E+03**	**3.32E+05**	**1.76E+03**	**1.15E+02**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				6.98E+05	1.05E+02	1.93E+03	3.32E+05	1.76E+03	1.15E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	3.66E+02	8.49E+03	1.76E+03	5.95E+02	5.10E+00	8.63E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.66E+02	8.49E+03	1.76E+03	5.95E+02	5.10E+00	8.63E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units			Noncancer PRG for Specific Metals - Chíí dah wiih łeezh (w			
						Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**2.30E+03**	**4.63E+04**	**9.46E+04**	**2.31E+01**	**2.70E+01**	**1.15E+04**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	1.07E+08	7.30E+03	2.29E+04	3.62E+06
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	1.35E+08	7.79E+03	2.71E+04	3.86E+06
	Melons	Watermelon				--	--	7.92E+07	4.30E+03	1.55E+04	2.13E+06
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.30E+03	4.63E+04	9.49E+04	2.34E+01	2.71E+01	1.17E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ashes and drainages) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**1.96E+02**	**2.52E+00**	**1.39E+05**	**2.08E+01**	**3.77E+02**	**6.63E+04**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.86E+05	4.84E+02	1.40E+08	8.47E+03	6.10E+04	7.52E+07
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				3.87E+05	5.05E+02	1.71E+08	9.21E+03	6.34E+04	9.45E+07
	Melons	Watermelon				2.34E+05	2.77E+02	9.89E+07	5.11E+03	3.47E+04	5.54E+07
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.96E+02	2.57E+00	1.40E+05	2.10E+01	3.86E+02	6.64E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**3.44E+02**	**2.29E+01**	**7.16E+01**	**1.69E+03**	**3.50E+02**	**1.17E+02**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				5.84E+04	1.13E+04	1.22E+04	1.11E+06	1.45E+05	2.19E+04
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				6.08E+04	1.25E+04	1.27E+04	1.27E+06	1.57E+05	2.29E+04
	Melons	Watermelon				3.33E+04	7.00E+03	6.94E+03	7.16E+05	8.73E+04	1.25E+04
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.51E+02	2.31E+01	7.32E+01	1.70E+03	3.53E+02	1.19E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	1.02E+00	1.72E+01	4.58E+02	9.10E+03
	Corn	White	$PRG_{p\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. The minimum of the PRGs for child and adult receptors.	mg/kg	--	--	--	--
		Blue				--	--	--	--
		Yellow				2.39E+03	1.20E+04	4.25E+05	1.86E+06
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				4.06E+03	1.38E+04	5.12E+05	1.95E+06
	Melons	Watermelon				2.79E+03	7.82E+03	2.95E+05	1.07E+06
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.02E+00	1.73E+01	4.59E+02	9.26E+03
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides - Custom			PRGs for non-SE Rad		
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226
Preliminary Remediation Goals - Direct Consumption of Produce, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{produce}(i)}}$	pCi/g	**5.61E-03**	**5.17E-03**	**1.12E-02**	**6.50E-01**	**1.88E-02**	**4.32E-02**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	6.07E-02	5.60E-02	1.21E-01	7.03E+00	2.04E-01	4.68E-01
		Blue				6.07E-02	5.60E-02	1.21E-01	7.03E+00	2.04E-01	4.68E-01
		Yellow				1.21E-01	1.12E-01	2.43E-01	1.41E+01	4.07E-01	9.35E-01
		Red Speckled				2.02E-01	1.87E-01	4.05E-01	2.34E+01	6.79E-01	1.56E+00
		Sweet Corn				3.04E-01	2.80E-01	6.07E-01	3.51E+01	1.02E+00	2.34E+00
	Squash	Pumpkin				3.04E-01	2.80E-01	6.07E-01	3.51E+01	1.02E+00	2.34E+00
		Other Squash				7.59E-02	7.00E-02	1.52E-01	8.78E+00	2.55E-01	5.84E-01
	Melons	Watermelon				1.21E-01	1.12E-01	2.43E-01	1.41E+01	4.07E-01	9.35E-01
		Cantaloupe				1.21E-01	1.12E-01	2.43E-01	1.41E+01	4.07E-01	9.35E-01
	Tree Fruit	Apples				1.21E-01	1.12E-01	2.43E-01	1.41E+01	4.07E-01	9.35E-01
		Apricots				1.21E-01	1.12E-01	2.43E-01	1.41E+01	4.07E-01	9.35E-01
		Peaches				1.21E-01	1.12E-01	2.43E-01	1.41E+01	4.07E-01	9.35E-01
	Other Vegetables	Beans				6.07E-02	5.60E-02	1.21E-01	7.03E+00	2.04E-01	4.68E-01
		Brussels sprouts				3.04E-01	2.80E-01	6.07E-01	3.51E+01	1.02E+00	2.34E+00
		Cucumbers				3.04E-01	2.80E-01	6.07E-01	3.51E+01	1.02E+00	2.34E+00
		Tomatoes				3.04E-01	2.80E-01	6.07E-01	3.51E+01	1.02E+00	2.34E+00
		Chili				1.21E-01	1.12E-01	2.43E-01	1.41E+01	4.07E-01	9.35E-01
		Onions				3.04E-01	2.80E-01	6.07E-01	3.51E+01	1.02E+00	2.34E+00
		Potatoes				3.04E-01	2.80E-01	6.07E-01	3.51E+01	1.02E+00	2.34E+00
	Herbs and Medicinal:	Navajo Tea				3.34E-02	3.08E-02	6.68E-02	3.86E+00	1.12E-01	2.57E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Parameter			Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides - Custom			PRGs for non-SE Rad		
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226
Preliminary Remediation Goals - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**2.46E-01**	**2.32E-01**	**1.53E-01**	**1.32E+00**	**1.90E+00**	**5.12E-01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	4.72E+01	3.02E+01	5.23E+01	2.34E+01	3.92E+02	1.87E+02
		Blue				4.72E+01	3.02E+01	5.23E+01	2.34E+01	3.92E+02	1.87E+02
		Yellow				9.44E+01	6.03E+01	1.05E+02	4.68E+01	7.84E+02	3.73E+02
		Red Speckled				1.57E+02	1.01E+02	1.74E+02	7.80E+01	1.31E+03	6.22E+02
		Sweet Corn				2.36E+02	1.51E+02	2.62E+02	1.17E+02	1.96E+03	9.34E+02
	Squash	Pumpkin				4.22E+01	3.84E+01	4.12E+01	1.17E+02	1.75E+02	1.39E+02
		Other Squash				1.06E+01	9.59E+00	1.03E+01	2.93E+01	4.38E+01	3.48E+01
	Melons	Watermelon				2.54E+01	2.50E+01	2.78E+01	4.68E+01	1.05E+02	9.45E+01
		Cantaloupe				2.54E+01	2.50E+01	2.78E+01	4.68E+01	1.05E+02	9.45E+01
	Tree Fruit	Apples				2.48E+01	2.44E+01	2.75E+01	4.68E+01	1.04E+02	9.35E+01
		Apricots				2.49E+01	2.45E+01	2.75E+01	4.68E+01	1.04E+02	9.36E+01
		Peaches				2.49E+01	2.45E+01	2.75E+01	4.68E+01	1.04E+02	9.36E+01
	Other Vegetables	Beans				6.83E+00	6.44E+00	7.16E+00	2.30E+01	5.12E+01	2.50E+01
		Brussels sprouts				7.53E+00	7.35E+00	7.78E+00	2.70E+01	3.29E+01	2.61E+01
		Cucumbers				4.23E+01	3.85E+01	4.13E+01	1.17E+02	1.75E+02	1.39E+02
		Tomatoes				3.41E+01	3.11E+01	3.69E+01	1.16E+02	1.57E+02	1.27E+02
		Chili				1.30E+01	1.18E+01	1.44E+01	4.65E+01	6.12E+01	4.94E+01
		Onions				1.76E+01	1.71E+01	1.03E+01	1.17E+02	1.75E+02	3.39E+01
		Potatoes				7.67E+01	7.21E+01	6.37E+01	1.17E+02	1.54E+03	2.12E+02
	Herbs and Medicinal:	Navajo Tea				3.12E-01	2.97E-01	1.77E-01	2.92E+00	2.79E+00	5.89E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ionuclides - Custom			PRGs for Secular Equilibrium Radionuclides - Kee'da'whíí tééh (full-time Navajo residential)			PRGs for r
						Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40
Preliminary Remediation Goals - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{produce}(i)}}$	pCi/g	1.87E-01	2.33E-01	2.57E-01	5.61E-03	5.17E-03	1.12E-02	6.50E-01
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	2.02E+00	2.52E+00	2.77E+00	6.07E-02	5.60E-02	1.21E-01	7.03E+00
		Blue				2.02E+00	2.52E+00	2.77E+00	6.07E-02	5.60E-02	1.21E-01	7.03E+00
		Yellow				4.04E+00	5.03E+00	5.55E+00	1.21E-01	1.12E-01	2.43E-01	1.41E+01
		Red Speckled				6.73E+00	8.39E+00	9.25E+00	2.02E-01	1.87E-01	4.05E-01	2.34E+01
		Sweet Corn				1.01E+01	1.26E+01	1.39E+01	3.04E-01	2.80E-01	6.07E-01	3.51E+01
	Squash	Pumpkin				1.01E+01	1.26E+01	1.39E+01	3.04E-01	2.80E-01	6.07E-01	3.51E+01
		Other Squash				2.52E+00	3.15E+00	3.47E+00	7.59E-02	7.00E-02	1.52E-01	8.78E+00
	Melons	Watermelon				4.04E+00	5.03E+00	5.55E+00	1.21E-01	1.12E-01	2.43E-01	1.41E+01
		Cantaloupe				4.04E+00	5.03E+00	5.55E+00	1.21E-01	1.12E-01	2.43E-01	1.41E+01
	Tree Fruit	Apples				4.04E+00	5.03E+00	5.55E+00	1.21E-01	1.12E-01	2.43E-01	1.41E+01
		Apricots				4.04E+00	5.03E+00	5.55E+00	1.21E-01	1.12E-01	2.43E-01	1.41E+01
		Peaches				4.04E+00	5.03E+00	5.55E+00	1.21E-01	1.12E-01	2.43E-01	1.41E+01
	Other Vegetables	Beans				2.02E+00	2.52E+00	2.77E+00	6.07E-02	5.60E-02	1.21E-01	7.03E+00
		Brussels sprouts				1.01E+01	1.26E+01	1.39E+01	3.04E-01	2.80E-01	6.07E-01	3.51E+01
		Cucumbers				1.01E+01	1.26E+01	1.39E+01	3.04E-01	2.80E-01	6.07E-01	3.51E+01
		Tomatoes				1.01E+01	1.26E+01	1.39E+01	3.04E-01	2.80E-01	6.07E-01	3.51E+01
		Chili				4.04E+00	5.03E+00	5.55E+00	1.21E-01	1.12E-01	2.43E-01	1.41E+01
		Onions				1.01E+01	1.26E+01	1.39E+01	3.04E-01	2.80E-01	6.07E-01	3.51E+01
		Potatoes				1.01E+01	1.26E+01	1.39E+01	3.04E-01	2.80E-01	6.07E-01	3.51E+01
	Herbs and Medicinal:	Navajo Tea				1.11E+00	1.38E+00	1.53E+00	3.34E-02	3.08E-02	6.68E-02	3.86E+00
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Parameter			Symbol	Description	Units	ionuclides - Custom			PRGs for Secular Equilibrium Radionuclides - Kee'da'whíí tééh (full-time			PRGs for r
						Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40
Preliminary Remediation Goals - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	3.44E+01	9.50E+00	1.05E+01	2.46E-01	2.32E-01	1.53E-01	1.32E+00
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	2.57E+03	1.66E+02	1.83E+02	4.72E+01	3.02E+01	5.23E+01	2.34E+01
		Blue				2.57E+03	1.66E+02	1.83E+02	4.72E+01	3.02E+01	5.23E+01	2.34E+01
		Yellow				5.15E+03	3.32E+02	3.66E+02	9.44E+01	6.03E+01	1.05E+02	4.68E+01
		Red Speckled				8.58E+03	5.54E+02	6.11E+02	1.57E+02	1.01E+02	1.74E+02	7.80E+01
		Sweet Corn				1.29E+04	8.31E+02	9.16E+02	2.36E+02	1.51E+02	2.62E+02	1.17E+02
	Squash	Pumpkin				1.21E+04	8.36E+02	9.21E+02	4.22E+01	3.84E+01	4.12E+01	1.17E+02
		Other Squash				3.01E+03	2.09E+02	2.30E+02	1.06E+01	9.59E+00	1.03E+01	2.93E+01
	Melons	Watermelon				7.24E+03	4.76E+03	5.25E+03	2.54E+01	2.50E+01	2.78E+01	4.68E+01
		Cantaloupe				7.24E+03	4.76E+03	5.25E+03	2.54E+01	2.50E+01	2.78E+01	4.68E+01
	Tree Fruit	Apples				6.12E+03	4.34E+03	4.78E+03	2.48E+01	2.44E+01	2.75E+01	4.68E+01
		Apricots				6.22E+03	4.38E+03	4.83E+03	2.49E+01	2.45E+01	2.75E+01	4.68E+01
		Peaches				6.22E+03	4.38E+03	4.83E+03	2.49E+01	2.45E+01	2.75E+01	4.68E+01
	Other Vegetables	Beans				3.65E+02	3.50E+02	3.85E+02	6.83E+00	6.44E+00	7.16E+00	2.30E+01
		Brussels sprouts				7.74E+03	6.26E+02	6.90E+02	7.53E+00	7.35E+00	7.78E+00	2.70E+01
		Cucumbers				1.23E+04	8.37E+02	9.23E+02	4.23E+01	3.85E+01	4.13E+01	1.17E+02
		Tomatoes				3.96E+03	7.50E+02	8.27E+02	3.41E+01	3.11E+01	3.69E+01	1.16E+02
		Chili				1.35E+03	2.92E+02	3.22E+02	1.30E+01	1.18E+01	1.44E+01	4.65E+01
		Onions				1.13E+04	1.48E+03	1.63E+03	1.76E+01	1.71E+01	1.03E+01	1.17E+02
		Potatoes				2.46E+04	2.42E+03	2.66E+03	7.67E+01	7.21E+01	6.37E+01	1.17E+02
	Herbs and Medicinal:	Navajo Tea				4.41E+01	1.46E+01	1.61E+01	3.12E-01	2.97E-01	1.77E-01	2.92E+00
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	non-SE Radionuclides - Kee'da'whíí tééh (full-time Navajo residential)					PRGs for Secular Equ Radionuclides - Kǫǫh bí líí camp)	
						Pb-210	Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE
Preliminary Remediation Goals - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{produce}(i)}}$	pCi/g	1.88E-02	4.32E-02	1.87E-01	2.33E-01	2.57E-01	2.84E-02	2.62E-02
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	2.04E-01	4.68E-01	2.02E+00	2.52E+00	2.77E+00	--	--
		Blue				2.04E-01	4.68E-01	2.02E+00	2.52E+00	2.77E+00	--	--
		Yellow				4.07E-01	9.35E-01	4.04E+00	5.03E+00	5.55E+00	1.67E-01	1.54E-01
		Red Speckled				6.79E-01	1.56E+00	6.73E+00	8.39E+00	9.25E+00	--	--
		Sweet Corn				1.02E+00	2.34E+00	1.01E+01	1.26E+01	1.39E+01	--	--
	Squash	Pumpkin				1.02E+00	2.34E+00	1.01E+01	1.26E+01	1.39E+01	3.34E-01	3.08E-01
		Other Squash				2.55E-01	5.84E-01	2.52E+00	3.15E+00	3.47E+00	2.09E-01	1.92E-01
	Melons	Watermelon				4.07E-01	9.35E-01	4.04E+00	5.03E+00	5.55E+00	--	--
		Cantaloupe				4.07E-01	9.35E-01	4.04E+00	5.03E+00	5.55E+00	3.34E-01	3.08E-01
	Tree Fruit	Apples				4.07E-01	9.35E-01	4.04E+00	5.03E+00	5.55E+00	3.34E-01	3.08E-01
		Apricots				4.07E-01	9.35E-01	4.04E+00	5.03E+00	5.55E+00	3.34E-01	3.08E-01
		Peaches				4.07E-01	9.35E-01	4.04E+00	5.03E+00	5.55E+00	--	--
	Other Vegetables	Beans				2.04E-01	4.68E-01	2.02E+00	2.52E+00	2.77E+00	--	--
		Brussels sprouts				1.02E+00	2.34E+00	1.01E+01	1.26E+01	1.39E+01	--	--
		Cucumbers				1.02E+00	2.34E+00	1.01E+01	1.26E+01	1.39E+01	--	--
		Tomatoes				1.02E+00	2.34E+00	1.01E+01	1.26E+01	1.39E+01	--	--
		Chili				4.07E-01	9.35E-01	4.04E+00	5.03E+00	5.55E+00	--	--
		Onions				1.02E+00	2.34E+00	1.01E+01	1.26E+01	1.39E+01	--	--
		Potatoes				1.02E+00	2.34E+00	1.01E+01	1.26E+01	1.39E+01	--	--
	Herbs and Medicinal:	Navajo Tea				1.12E-01	2.57E-01	1.11E+00	1.38E+00	1.53E+00	8.01E-02	7.39E-02
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Parameter			Symbol	Description	Units	non-SE Radionuclides - Kee'da'whíí tééh (full-time Navajo residential)					PRGs for Secular Equ Radionuclides - Kǫǫh bí líí	
						Pb-210	Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE
Preliminary Remediation Goals - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	1.90E+00	5.12E-01	3.44E+01	9.50E+00	1.05E+01	6.94E-01	6.58E-01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	3.92E+02	1.87E+02	2.57E+03	1.66E+02	1.83E+02	--	--
		Blue				3.92E+02	1.87E+02	2.57E+03	1.66E+02	1.83E+02	--	--
		Yellow				7.84E+02	3.73E+02	5.15E+03	3.32E+02	3.66E+02	1.30E+02	8.29E+01
		Red Speckled				1.31E+03	6.22E+02	8.58E+03	5.54E+02	6.11E+02	--	--
		Sweet Corn				1.96E+03	9.34E+02	1.29E+04	8.31E+02	9.16E+02	--	--
	Squash	Pumpkin				1.75E+02	1.39E+02	1.21E+04	8.36E+02	9.21E+02	4.65E+01	4.22E+01
		Other Squash				4.38E+01	3.48E+01	3.01E+03	2.09E+02	2.30E+02	2.90E+01	2.64E+01
	Melons	Watermelon				1.05E+02	9.45E+01	7.24E+03	4.76E+03	5.25E+03	--	--
		Cantaloupe				1.05E+02	9.45E+01	7.24E+03	4.76E+03	5.25E+03	6.97E+01	6.87E+01
	Tree Fruit	Apples				1.04E+02	9.35E+01	6.12E+03	4.34E+03	4.78E+03	6.83E+01	6.72E+01
		Apricots				1.04E+02	9.36E+01	6.22E+03	4.38E+03	4.83E+03	6.84E+01	6.74E+01
		Peaches				1.04E+02	9.36E+01	6.22E+03	4.38E+03	4.83E+03	--	--
	Other Vegetables	Beans				5.12E+01	2.50E+01	3.65E+02	3.50E+02	3.85E+02	--	--
		Brussels sprouts				3.29E+01	2.61E+01	7.74E+03	6.26E+02	6.90E+02	--	--
		Cucumbers				1.75E+02	1.39E+02	1.23E+04	8.37E+02	9.23E+02	--	--
		Tomatoes				1.57E+02	1.27E+02	3.96E+03	7.50E+02	8.27E+02	--	--
		Chili				6.12E+01	4.94E+01	1.35E+03	2.92E+02	3.22E+02	--	--
		Onions				1.75E+02	3.39E+01	1.13E+04	1.48E+03	1.63E+03	--	--
		Potatoes				1.54E+03	2.12E+02	2.46E+04	2.42E+03	2.66E+03	--	--
	Herbs and Medicinal:	Navajo Tea				2.79E+00	5.89E-01	4.41E+01	1.46E+01	1.61E+01	7.49E-01	7.14E-01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ilibrium nakaí (sheep	PRGs for non-SE Radionuclides - Kọọh bí líí nakaí (sheep can				
						Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234
Preliminary Remediation Goals - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{produce}(i)}}$	pCi/g	5.68E-02	3.28E+00	9.52E-02	2.19E-01	9.44E-01	1.18E+00
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				3.34E-01	1.93E+01	5.60E-01	1.29E+00	5.55E+00	6.92E+00
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				6.68E-01	3.86E+01	1.12E+00	2.57E+00	1.11E+01	1.38E+01
		Other Squash				4.18E-01	2.42E+01	7.00E-01	1.61E+00	6.94E+00	8.65E+00
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				6.68E-01	3.86E+01	1.12E+00	2.57E+00	1.11E+01	1.38E+01
	Tree Fruit	Apples				6.68E-01	3.86E+01	1.12E+00	2.57E+00	1.11E+01	1.38E+01
		Apricots				6.68E-01	3.86E+01	1.12E+00	2.57E+00	1.11E+01	1.38E+01
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.60E-01	9.28E+00	2.69E-01	6.17E-01	2.67E+00	3.32E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Parameter			Symbol	Description	Units	ilibrium nakaí (sheep	PRGs for non-SE Radionuclides - Kọọh bí líí nakaí (sheep can				
						Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234
Preliminary Remediation Goals - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	4.07E-01	4.96E+00	5.74E+00	1.35E+00	1.00E+02	2.95E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				1.44E+02	6.44E+01	1.08E+03	5.13E+02	7.08E+03	4.57E+02
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				4.53E+01	1.29E+02	1.93E+02	1.53E+02	1.33E+04	9.19E+02
		Other Squash				2.83E+01	8.05E+01	1.20E+02	9.58E+01	8.29E+03	5.74E+02
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				7.64E+01	1.29E+02	2.88E+02	2.60E+02	1.99E+04	1.31E+04
	Tree Fruit	Apples				7.55E+01	1.29E+02	2.85E+02	2.57E+02	1.68E+04	1.19E+04
		Apricots				7.56E+01	1.29E+02	2.86E+02	2.57E+02	1.71E+04	1.20E+04
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				4.25E-01	7.01E+00	6.69E+00	1.41E+00	1.06E+02	3.50E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	np)	PRGs for Secular Equilibrium Radionuclides - Kọọ eí nahaazáh (easy access open space)			PRGs for non-SE Radio	
						U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210
Preliminary Remediation Goals - Direct Consumption of Produce, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{produce}(i)}}$	pCi/g	**1.30E+00**	**2.00E-01**	**1.85E-01**	**4.01E-01**	**2.32E+01**	**6.72E-01**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				7.63E+00	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				1.53E+01	--	--	--	--	--
		Other Squash				9.54E+00	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				1.53E+01	--	--	--	--	--
	Tree Fruit	Apples				1.53E+01	--	--	--	--	--
		Apricots				1.53E+01	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.66E+00	2.00E-01	1.85E-01	4.01E-01	2.32E+01	6.72E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

	Parameter		Symbol	Description	Units	np)	PRGs for Secular Equilibrium Radionuclides - Kọọ eí nahaazáh (easy			PRGs for non-SE Radio	
						U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210
Preliminary Remediation Goals - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**3.26E+01**	**1.87E+00**	**1.78E+00**	**1.06E+00**	**1.75E+01**	**1.67E+01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				5.04E+02	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				1.01E+03	--	--	--	--	--
		Other Squash				6.33E+02	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				1.44E+04	--	--	--	--	--
	Tree Fruit	Apples				1.32E+04	--	--	--	--	--
		Apricots				1.33E+04	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.86E+01	1.87E+00	1.78E+00	1.06E+00	1.75E+01	1.67E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	nuclides - Kǫǫ eí nahaazáh (easy access open space)				PRGs for Secular Equ Radionuclides - Kǫǫ eí doo (difficult access open	
						Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE
Preliminary Remediation Goals - Direct Consumption of Produce, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{produce}(i)}}$	pCi/g	**1.54E+00**	**6.66E+00**	**8.30E+00**	**9.16E+00**	**4.01E-01**	**3.69E-01**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.54E+00	6.66E+00	8.30E+00	9.16E+00	4.01E-01	3.69E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Parameter			Symbol	Description	Units	nuclides - Kǫǫ eí nahaazáh (easy access open space)				PRGs for Secular Equ Radionuclides - Kǫǫ eí doo	
						Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE
Preliminary Remediation Goals - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**3.53E+00**	**2.65E+02**	**8.74E+01**	**9.64E+01**	**3.75E+00**	**3.57E+00**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.53E+00	2.65E+02	8.74E+01	9.64E+01	3.75E+00	3.57E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	librium nahaazáh dah space)	PRGs for non-SE Radionuclides - Kǫǫ eí doo nahaazáh dah (difficult acces				
						Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234
Preliminary Remediation Goals - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{produce}(i)}}$	pCi/g	8.02E-01	4.64E+01	1.34E+00	3.09E+00	1.33E+01	1.66E+01
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Rocky Mountain Juniper				--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--
		Mormon tea				--	--	--	--	--	--
		Wild parsley				--	--	--	--	--	--
		Corn tassels				--	--	--	--	--	--
		Other Confidential Plants				--	--	--	--	--	--
						8.02E-01	4.64E+01	1.34E+00	3.09E+00	1.33E+01	1.66E+01

Parameter			Symbol	Description	Units	librium nahaazáh dah	PRGs for non-SE Radionuclides - Kǫǫ eí doo nahaazáh dah (difficult acces				
						Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234
Preliminary Remediation Goals - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	2.12E+00	3.50E+01	3.35E+01	7.06E+00	5.29E+02	1.75E+02
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Rocky Mountain Juniper				--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--
		Mormon tea				--	--	--	--	--	--
		Wild parsley				--	--	--	--	--	--
		Corn tassels				--	--	--	--	--	--
		Other Confidential Plants				--	--	--	--	--	--
						2.12E+00	3.50E+01	3.35E+01	7.06E+00	5.29E+02	1.75E+02

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	s open space)	PRGs for Secular Equilibrium Radionuclides - Chíí dah wiih łeezh (washes and drainages)			PRGs for non-SE Radion	
						U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210
Preliminary Remediation Goals - Direct Consumption of Produce, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{produce}(i)}}$	pCi/g	**1.83E+01**	**7.01E-02**	**6.46E-02**	**1.40E-01**	**8.11E+00**	**2.35E-01**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	1.67E+00	1.54E+00	3.34E+00	1.93E+02	5.60E+00
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	1.67E+00	1.54E+00	3.34E+00	1.93E+02	5.60E+00
	Melons	Watermelon				--	1.67E+00	1.54E+00	3.34E+00	1.93E+02	5.60E+00
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.83E+01	8.01E-02	7.39E-02	1.60E-01	9.28E+00	2.69E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Parameter			Symbol	Description	Units	s open space)	PRGs for Secular Equilibrium Radionuclides - Chíí dah wiih łeezh			PRGs for non-SE Radion	
						U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210
Preliminary Remediation Goals - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**1.93E+02**	**7.45E-01**	**7.09E-01**	**4.23E-01**	**6.78E+00**	**6.61E+00**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	1.30E+03	8.29E+02	1.44E+03	6.44E+02	1.08E+04
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	2.32E+02	2.11E+02	2.27E+02	6.44E+02	9.63E+02
	Melons	Watermelon				--	3.49E+02	3.44E+02	3.82E+02	6.44E+02	1.44E+03
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.93E+02	7.49E-01	7.14E-01	4.25E-01	7.01E+00	6.69E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	uclides - Chíí dah wiih łeezh (washes and drainages) Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Direct Consumption of Produce, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{produce}(i)}}$	pCi/g	**5.39E-01**	**2.33E+00**	**2.90E+00**	**3.20E+00**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--
		Blue				--	--	--	--
		Yellow				1.29E+01	5.55E+01	6.92E+01	7.63E+01
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				1.29E+01	5.55E+01	6.92E+01	7.63E+01
	Melons	Watermelon				1.29E+01	5.55E+01	6.92E+01	7.63E+01
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				6.17E-01	2.67E+00	3.32E+00	3.66E+00
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Parameter			Symbol	Description	Units	uclides - Chíí dah wiih łeezh (washes and drainages) Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**1.41E+00**	**1.05E+02**	**3.44E+01**	**3.80E+01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{Br_{wet} + MLF_{produce}}$	pCi/g	--	--	--	--
		Blue				--	--	--	--
		Yellow				5.13E+03	7.08E+04	4.57E+03	5.04E+03
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				7.66E+02	6.63E+04	4.60E+03	5.07E+03
	Melons	Watermelon				1.30E+03	9.96E+04	6.54E+04	7.21E+04
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.41E+00	1.06E+02	3.50E+01	3.86E+01
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	SE for Ra-226	Transfer Factors for Secular Equilibrium Progeny Radionuclides of Ra-226				
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Transfer Factors for SE Progeny Radionuclides of Ra-226	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Blue				--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Yellow				--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Red Speckled				--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Sweet Corn				--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
	Squash	Pumpkin				--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Other Squash				--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
	Melons	Watermelon				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Cantaloupe				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
	Tree Fruit	Apples				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Apricots				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Peaches				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
	Other Vegetables	Beans				--	1.00E-01	1.00E-01	5.30E-03	5.30E-03	2.70E-04
		Brussels sprouts				--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
		Cucumbers				--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Tomatoes				--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Chili				--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Onions				--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	5.80E-03
		Potatoes				--	1.00E-01	1.00E-01	1.50E-03	1.50E-03	2.70E-03
	Herbs and Medicinal:	Navajo Tea				--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Custom				
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant(i)}}}$	pCi/g	**5.61E-03**	**1.71E+00**	**8.38E+01**	**1.88E-02**	**4.58E+01**	**9.87E-03**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant(i)} = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	6.07E-02	1.85E+01	9.07E+02	2.04E-01	4.95E+02	1.07E-01
		Blue				6.07E-02	1.85E+01	9.07E+02	2.04E-01	4.95E+02	1.07E-01
		Yellow				1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
		Red Speckled				2.02E-01	6.16E+01	3.02E+03	6.79E-01	1.65E+03	3.56E-01
		Sweet Corn				3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
	Squash	Pumpkin				3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
		Other Squash				7.59E-02	2.31E+01	1.13E+03	2.55E-01	6.19E+02	1.34E-01
	Melons	Watermelon				1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
		Cantaloupe				1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
	Tree Fruit	Apples				1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
		Apricots				1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
		Peaches				1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
	Other Vegetables	Beans				6.07E-02	1.85E+01	9.07E+02	2.04E-01	4.95E+02	1.07E-01
		Brussels sprouts				3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
		Cucumbers				3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
		Tomatoes				3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
		Chili				1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
		Onions				3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
		Potatoes				3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
	Herbs and Medicinal:	Navajo Tea				3.34E-02	1.02E+01	4.99E+02	1.12E-01	2.73E+02	5.87E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Ra-226	SE for Ra-226	Transfer Factors for Secular Equilibrium Progeny Radionuclides of Ra-22 Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Transfer Factors for SE Progeny Radionuclides of Ra-226	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Blue				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Yellow				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Red Speckled				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Sweet Corn				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
	Squash	Pumpkin				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Other Squash				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
	Melons	Watermelon				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Cantaloupe				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
	Tree Fruit	Apples				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Apricots				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Peaches				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
	Other Vegetables	Beans				1.40E-02	--	1.00E-01	1.00E-01	5.30E-03	5.30E-03	2.70E-04
		Brussels sprouts				9.10E-02	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
		Cucumbers				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Tomatoes				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Chili				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Onions				7.00E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	5.80E-03
		Potatoes				1.10E-02	--	1.00E-01	1.00E-01	1.50E-03	1.50E-03	2.70E-03
	Herbs and Medicinal:	Navajo Tea				4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	Ra-226	SE for Ra-226	PRGs for Progeny - Kee'da'whii téeh (full-time Navajo resident Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	4.32E-02	5.61E-03	1.71E+00	8.38E+01	1.88E-02	4.58E+01	9.87E-03
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	4.68E-01	6.07E-02	1.85E+01	9.07E+02	2.04E-01	4.95E+02	1.07E-01
		Blue				4.68E-01	6.07E-02	1.85E+01	9.07E+02	2.04E-01	4.95E+02	1.07E-01
		Yellow				9.35E-01	1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
		Red Speckled				1.56E+00	2.02E-01	6.16E+01	3.02E+03	6.79E-01	1.65E+03	3.56E-01
		Sweet Corn				2.34E+00	3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
	Squash	Pumpkin				2.34E+00	3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
		Other Squash				5.84E-01	7.59E-02	2.31E+01	1.13E+03	2.55E-01	6.19E+02	1.34E-01
	Melons	Watermelon				9.35E-01	1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
		Cantaloupe				9.35E-01	1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
	Tree Fruit	Apples				9.35E-01	1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
		Apricots				9.35E-01	1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
		Peaches				9.35E-01	1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
	Other Vegetables	Beans				4.68E-01	6.07E-02	1.85E+01	9.07E+02	2.04E-01	4.95E+02	1.07E-01
		Brussels sprouts				2.34E+00	3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
		Cucumbers				2.34E+00	3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
		Tomatoes				2.34E+00	3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
		Chili				9.35E-01	1.21E-01	3.70E+01	1.81E+03	4.07E-01	9.91E+02	2.14E-01
		Onions				2.34E+00	3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
		Potatoes				2.34E+00	3.04E-01	9.24E+01	4.53E+03	1.02E+00	2.48E+03	5.34E-01
	Herbs and Medicinal:	Navajo Tea				2.57E-01	3.34E-02	1.02E+01	4.99E+02	1.12E-01	2.73E+02	5.87E-02
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	6		Transfer Factors for Secular Equilibrium Progeny Radionuclides of Ra-2				
						Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Transfer Factors for SE Progeny Radionuclides of Ra-226	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Blue				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Yellow				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Red Speckled				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
		Sweet Corn				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03	2.40E-04
	Squash	Pumpkin				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Other Squash				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
	Melons	Watermelon				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Cantaloupe				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
	Tree Fruit	Apples				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Apricots				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Peaches				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
	Other Vegetables	Beans				1.40E-02	--	1.00E-01	1.00E-01	5.30E-03	5.30E-03	2.70E-04
		Brussels sprouts				9.10E-02	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
		Cucumbers				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Tomatoes				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Chili				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	2.00E-04
		Onions				7.00E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02	5.80E-03
		Potatoes				1.10E-02	--	1.00E-01	1.00E-01	1.50E-03	1.50E-03	2.70E-03
	Herbs and Medicinal:	Navajo Tea				4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	tial)		PRGs for Progeny - Kǫǫh bi lii nakai (sheep camp)				
						Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**4.32E-02**	**2.84E-02**	**8.64E+00**	**4.24E+02**	**9.52E-02**	**2.32E+02**	**4.99E-02**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	4.68E-01	--	--	--	--	--	--
		Blue				4.68E-01	--	--	--	--	--	--
		Yellow				9.35E-01	1.67E-01	5.08E+01	2.49E+03	5.60E-01	1.36E+03	2.94E-01
		Red Speckled				1.56E+00	--	--	--	--	--	--
		Sweet Corn				2.34E+00	--	--	--	--	--	--
	Squash	Pumpkin				2.34E+00	3.34E-01	1.02E+02	4.99E+03	1.12E+00	2.73E+03	5.87E-01
		Other Squash				5.84E-01	2.09E-01	6.35E+01	3.12E+03	7.00E-01	1.70E+03	3.67E-01
	Melons	Watermelon				9.35E-01	--	--	--	--	--	--
		Cantaloupe				9.35E-01	3.34E-01	1.02E+02	4.99E+03	1.12E+00	2.73E+03	5.87E-01
	Tree Fruit	Apples				9.35E-01	3.34E-01	1.02E+02	4.99E+03	1.12E+00	2.73E+03	5.87E-01
		Apricots				9.35E-01	3.34E-01	1.02E+02	4.99E+03	1.12E+00	2.73E+03	5.87E-01
		Peaches				9.35E-01	--	--	--	--	--	--
	Other Vegetables	Beans				4.68E-01	--	--	--	--	--	--
		Brussels sprouts				2.34E+00	--	--	--	--	--	--
		Cucumbers				2.34E+00	--	--	--	--	--	--
		Tomatoes				2.34E+00	--	--	--	--	--	--
		Chili				9.35E-01	--	--	--	--	--	--
		Onions				2.34E+00	--	--	--	--	--	--
		Potatoes				2.34E+00	--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.57E-01	8.01E-02	2.44E+01	1.20E+03	2.69E-01	6.54E+02	1.41E-01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	26		Transfer Factors for Secular Equilibrium Progeny Radionu			
						Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214
Transfer Factors for SE Progeny Radionuclides of Ra-226	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03
		Blue				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03
		Yellow				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03
		Red Speckled				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03
		Sweet Corn				2.40E-03	--	1.00E-01	1.00E-01	1.20E-03	1.20E-03
	Squash	Pumpkin				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02
		Other Squash				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02
	Melons	Watermelon				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02
		Cantaloupe				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02
	Tree Fruit	Apples				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02
		Apricots				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02
		Peaches				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02
	Other Vegetables	Beans				1.40E-02	--	1.00E-01	1.00E-01	5.30E-03	5.30E-03
		Brussels sprouts				9.10E-02	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02
		Cucumbers				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02
		Tomatoes				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02
		Chili				1.70E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02
		Onions				7.00E-02	--	1.00E-01	1.00E-01	1.50E-02	1.50E-02
		Potatoes				1.10E-02	--	1.00E-01	1.00E-01	1.50E-03	1.50E-03
	Herbs and Medicinal:	Navajo Tea				4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units			PRGs for Progeny - Kǫǫ ei nahaazáh (easy acc			
						Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant(i)}}}$	pCi/g	**2.19E-01**	**2.00E-01**	**6.10E+01**	**2.99E+03**	**6.72E-01**	**1.64E+03**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				1.29E+00	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				2.57E+00	--	--	--	--	--
		Other Squash				1.61E+00	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				2.57E+00	--	--	--	--	--
	Tree Fruit	Apples				2.57E+00	--	--	--	--	--
		Apricots				2.57E+00	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				6.17E-01	2.00E-01	6.10E+01	2.99E+03	6.72E-01	1.64E+03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Clides of Ra-226		SE for Ra-226	Transfer Factors for Secular Equilibrium Pro		
						Po-210	Ra-226		Bi-210	Bi-214	Pb-210
Transfer Factors for SE Progeny Radionuclides of Ra-226	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	2.40E-04	2.40E-03	--	1.00E-01	1.00E-01	1.20E-03
		Blue				2.40E-04	2.40E-03	--	1.00E-01	1.00E-01	1.20E-03
		Yellow				2.40E-04	2.40E-03	--	1.00E-01	1.00E-01	1.20E-03
		Red Speckled				2.40E-04	2.40E-03	--	1.00E-01	1.00E-01	1.20E-03
		Sweet Corn				2.40E-04	2.40E-03	--	1.00E-01	1.00E-01	1.20E-03
	Squash	Pumpkin				2.00E-04	1.70E-02	--	1.00E-01	1.00E-01	1.50E-02
		Other Squash				2.00E-04	1.70E-02	--	1.00E-01	1.00E-01	1.50E-02
	Melons	Watermelon				2.00E-04	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02
		Cantaloupe				2.00E-04	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02
	Tree Fruit	Apples				2.00E-04	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02
		Apricots				2.00E-04	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02
		Peaches				2.00E-04	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02
	Other Vegetables	Beans				2.70E-04	1.40E-02	--	1.00E-01	1.00E-01	5.30E-03
		Brussels sprouts				7.40E-03	9.10E-02	--	1.00E-01	1.00E-01	8.00E-02
		Cucumbers				2.00E-04	1.70E-02	--	1.00E-01	1.00E-01	1.50E-02
		Tomatoes				2.00E-04	1.70E-02	--	1.00E-01	1.00E-01	1.50E-02
		Chili				2.00E-04	1.70E-02	--	1.00E-01	1.00E-01	1.50E-02
		Onions				5.80E-03	7.00E-02	--	1.00E-01	1.00E-01	1.50E-02
		Potatoes				2.70E-03	1.10E-02	--	1.00E-01	1.00E-01	1.50E-03
	Herbs and Medicinal:	Navajo Tea				7.40E-03	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	ess open space)		SE for Ra-226	PRGs for Progeny - Kọọ ei doo nahaa		
						Po-210	Ra-226		Bi-210	Bi-214	Pb-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**3.52E-01**	**1.54E+00**	**4.01E-01**	**1.22E+02**	**5.99E+03**	**1.34E+00**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.52E-01	1.54E+00	4.01E-01	1.22E+02	5.99E+03	1.34E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Progeny Radionuclides of Ra-226				Transfer Factors for Secular	
						Pb-214	Po-210	Ra-226	SE for Ra-226	Bi-210	Bi-214
Transfer Factors for SE Progeny Radionuclides of Ra-226	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	2.40E-04	2.40E-03	--	1.00E-01	1.00E-01
		Blue				1.20E-03	2.40E-04	2.40E-03	--	1.00E-01	1.00E-01
		Yellow				1.20E-03	2.40E-04	2.40E-03	--	1.00E-01	1.00E-01
		Red Speckled				1.20E-03	2.40E-04	2.40E-03	--	1.00E-01	1.00E-01
		Sweet Corn				1.20E-03	2.40E-04	2.40E-03	--	1.00E-01	1.00E-01
	Squash	Pumpkin				1.50E-02	2.00E-04	1.70E-02	--	1.00E-01	1.00E-01
		Other Squash				1.50E-02	2.00E-04	1.70E-02	--	1.00E-01	1.00E-01
	Melons	Watermelon				1.00E-02	2.00E-04	1.00E-02	--	1.00E-01	1.00E-01
		Cantaloupe				1.00E-02	2.00E-04	1.00E-02	--	1.00E-01	1.00E-01
	Tree Fruit	Apples				1.00E-02	2.00E-04	1.00E-02	--	1.00E-01	1.00E-01
		Apricots				1.00E-02	2.00E-04	1.00E-02	--	1.00E-01	1.00E-01
		Peaches				1.00E-02	2.00E-04	1.00E-02	--	1.00E-01	1.00E-01
	Other Vegetables	Beans				5.30E-03	2.70E-04	1.40E-02	--	1.00E-01	1.00E-01
		Brussels sprouts				8.00E-02	7.40E-03	9.10E-02	--	1.00E-01	1.00E-01
		Cucumbers				1.50E-02	2.00E-04	1.70E-02	--	1.00E-01	1.00E-01
		Tomatoes				1.50E-02	2.00E-04	1.70E-02	--	1.00E-01	1.00E-01
		Chili				1.50E-02	2.00E-04	1.70E-02	--	1.00E-01	1.00E-01
		Onions				1.50E-02	5.80E-03	7.00E-02	--	1.00E-01	1.00E-01
		Potatoes				1.50E-03	2.70E-03	1.10E-02	--	1.00E-01	1.00E-01
	Herbs and Medicinal:	Navajo Tea				8.00E-02	7.40E-03	4.20E-01	--	1.00E-01	1.00E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	záh dah (difficult access open space)				PRGs for Progeny	
						Pb-214	Po-210	Ra-226	SE for Ra-226	Bi-210	Bi-214
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**3.27E+03**	**7.05E-01**	**3.09E+00**	**7.01E-02**	**2.13E+01**	**1.05E+03**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	1.67E+00	5.08E+02	2.49E+04
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	1.67E+00	5.08E+02	2.49E+04
	Melons	Watermelon				--	--	--	1.67E+00	5.08E+02	2.49E+04
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.27E+03	7.05E-01	3.09E+00	8.01E-02	2.44E+01	1.20E+03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Equilibrium Progeny Radionuclides of Ra-226			
						Pb-210	Pb-214	Po-210	Ra-226
Transfer Factors for SE Progeny Radionuclides of Ra-226	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Blue				1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Yellow				1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Red Speckled				1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Sweet Corn				1.20E-03	1.20E-03	2.40E-04	2.40E-03
	Squash	Pumpkin				1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Other Squash				1.50E-02	1.50E-02	2.00E-04	1.70E-02
	Melons	Watermelon				1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Cantaloupe				1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Tree Fruit	Apples				1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Apricots				1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Peaches				1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Other Vegetables	Beans				5.30E-03	5.30E-03	2.70E-04	1.40E-02
		Brussels sprouts				8.00E-02	8.00E-02	7.40E-03	9.10E-02
		Cucumbers				1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Tomatoes				1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Chili				1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Onions				1.50E-02	1.50E-02	5.80E-03	7.00E-02
		Potatoes				1.50E-03	1.50E-03	2.70E-03	1.10E-02
	Herbs and Medicinal:	Navajo Tea				8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	...r - Chíí dah wiih leezh (washes and drainages)			
						Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**2.35E-01**	**5.72E+02**	**1.23E-01**	**5.39E-01**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--
		Blue				--	--	--	--
		Yellow				5.60E+00	1.36E+04	2.94E+00	1.29E+01
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				5.60E+00	1.36E+04	2.94E+00	1.29E+01
	Melons	Watermelon				5.60E+00	1.36E+04	2.94E+00	1.29E+01
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.69E-01	6.54E+02	1.41E-01	6.17E-01
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Custom				
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**2.46E-01**	**1.63E+01**	**8.01E+02**	**7.32E-01**	**1.78E+03**	**1.54E+00**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	4.72E+01	1.85E+02	9.06E+03	1.51E+02	3.68E+05	2.77E+02
		Blue				4.72E+01	1.85E+02	9.06E+03	1.51E+02	3.68E+05	2.77E+02
		Yellow				9.44E+01	3.69E+02	1.81E+04	3.03E+02	7.37E+05	5.55E+02
		Red Speckled				1.57E+02	6.15E+02	3.02E+04	5.05E+02	1.23E+06	9.25E+02
		Sweet Corn				2.36E+02	9.23E+02	4.53E+04	7.57E+02	1.84E+06	1.39E+03
	Squash	Pumpkin				4.22E+01	9.24E+02	4.53E+04	6.76E+01	1.65E+05	2.07E+03
		Other Squash				1.06E+01	2.31E+02	1.13E+04	1.69E+01	4.11E+04	5.17E+02
	Melons	Watermelon				2.54E+01	3.69E+02	1.81E+04	4.05E+01	9.85E+04	8.28E+02
		Cantaloupe				2.54E+01	3.69E+02	1.81E+04	4.05E+01	9.85E+04	8.28E+02
	Tree Fruit	Apples				2.48E+01	3.69E+02	1.81E+04	4.01E+01	9.75E+04	5.93E+02
		Apricots				2.49E+01	3.69E+02	1.81E+04	4.01E+01	9.76E+04	6.10E+02
		Peaches				2.49E+01	3.69E+02	1.81E+04	4.01E+01	9.76E+04	6.10E+02
	Other Vegetables	Beans				6.83E+00	1.76E+02	8.64E+03	1.98E+01	4.81E+04	2.03E+01
		Brussels sprouts				7.53E+00	9.23E+02	4.53E+04	1.27E+01	3.09E+04	7.12E+01
		Cucumbers				4.23E+01	9.24E+02	4.53E+04	6.77E+01	1.65E+05	2.23E+03
		Tomatoes				3.41E+01	9.08E+02	4.46E+04	6.07E+01	1.48E+05	2.71E+02
		Chili				1.30E+01	3.62E+02	1.77E+04	2.37E+01	5.75E+04	8.83E+01
		Onions				1.76E+01	9.23E+02	4.53E+04	6.74E+01	1.64E+05	9.06E+01
		Potatoes				7.67E+01	9.22E+02	4.52E+04	5.95E+02	1.45E+06	1.84E+02
	Herbs and Medicinal:	Navajo Tea				3.12E-01	8.20E+01	4.02E+03	1.08E+00	2.62E+03	1.87E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	SE for Th-232	Transfer Factors for SE Progeny Radionuclides of Th-232				
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228
Transfer Factors for SE Progeny Radionuclides of Th-232	**Corn**	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-03	1.00E-01	1.20E-03	2.40E-03	2.40E-03
		Blue				--	1.00E-03	1.00E-01	1.20E-03	2.40E-03	2.40E-03
		Yellow				--	1.00E-03	1.00E-01	1.20E-03	2.40E-03	2.40E-03
		Red Speckled				--	1.00E-03	1.00E-01	1.20E-03	2.40E-03	2.40E-03
		Sweet Corn				--	1.00E-03	1.00E-01	1.20E-03	2.40E-03	2.40E-03
	Squash	Pumpkin				--	1.00E-03	1.00E-01	1.50E-02	1.70E-02	1.70E-02
		Other Squash				--	1.00E-03	1.00E-01	1.50E-02	1.70E-02	1.70E-02
	Melons	Watermelon				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Cantaloupe				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
	Tree Fruit	Apples				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Apricots				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Peaches				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
	Other Vegetables	Beans				--	1.00E-03	1.00E-01	5.30E-03	1.40E-02	1.40E-02
		Brussels sprouts				--	1.00E-03	1.00E-01	8.00E-02	9.10E-02	9.10E-02
		Cucumbers				--	1.00E-03	1.00E-01	1.50E-02	1.70E-02	1.70E-02
		Tomatoes				--	1.00E-03	1.00E-01	1.50E-02	1.70E-02	1.70E-02
		Chili				--	1.00E-03	1.00E-01	1.50E-02	1.70E-02	1.70E-02
		Onions				--	1.00E-03	1.00E-01	1.50E-02	7.00E-02	7.00E-02
		Potatoes				--	1.00E-03	1.00E-01	1.50E-03	1.10E-02	1.10E-02
	Herbs and Medicinal:	Navajo Tea				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units		SE for Ra-226	PRGs for Progeny - Kee'da'whíí téél (full-time Navajo resident				
						Ra-226		Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	5.04E-01	2.46E-01	1.63E+01	8.01E+02	7.32E-01	1.78E+03	1.54E+00
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	1.84E+02	4.72E+01	1.85E+02	9.06E+03	1.51E+02	3.68E+05	2.77E+02
		Blue				1.84E+02	4.72E+01	1.85E+02	9.06E+03	1.51E+02	3.68E+05	2.77E+02
		Yellow				3.67E+02	9.44E+01	3.69E+02	1.81E+04	3.03E+02	7.37E+05	5.55E+02
		Red Speckled				6.12E+02	1.57E+02	6.15E+02	3.02E+04	5.05E+02	1.23E+06	9.25E+02
		Sweet Corn				9.19E+02	2.36E+02	9.23E+02	4.53E+04	7.57E+02	1.84E+06	1.39E+03
	Squash	Pumpkin				1.37E+02	4.22E+01	9.24E+02	4.53E+04	6.76E+01	1.65E+05	2.07E+03
		Other Squash				3.43E+01	1.06E+01	2.31E+02	1.13E+04	1.69E+01	4.11E+04	5.17E+02
	Melons	Watermelon				9.30E+01	2.54E+01	3.69E+02	1.81E+04	4.05E+01	9.85E+04	8.28E+02
		Cantaloupe				9.30E+01	2.54E+01	3.69E+02	1.81E+04	4.05E+01	9.85E+04	8.28E+02
	Tree Fruit	Apples				9.20E+01	2.48E+01	3.69E+02	1.81E+04	4.01E+01	9.75E+04	5.93E+02
		Apricots				9.21E+01	2.49E+01	3.69E+02	1.81E+04	4.01E+01	9.76E+04	6.10E+02
		Peaches				9.21E+01	2.49E+01	3.69E+02	1.81E+04	4.01E+01	9.76E+04	6.10E+02
	Other Vegetables	Beans				2.46E+01	6.83E+00	1.76E+02	8.64E+03	1.98E+01	4.81E+04	2.03E+01
		Brussels sprouts				2.57E+01	7.53E+00	9.23E+02	4.53E+04	1.27E+01	3.09E+04	7.12E+01
		Cucumbers				1.37E+02	4.23E+01	9.24E+02	4.53E+04	6.77E+01	1.65E+05	2.23E+03
		Chili				1.25E+02	3.41E+01	9.08E+02	4.46E+04	6.07E+01	1.48E+05	2.71E+02
		Onions				4.86E+01	1.30E+01	3.62E+02	1.77E+04	2.37E+01	5.75E+04	8.83E+01
		Potatoes				3.33E+01	1.76E+01	9.23E+02	4.53E+04	6.74E+01	1.64E+05	9.06E+01
	Herbs and Medicinal:	Navajo Tea				2.09E+02	7.67E+01	9.22E+02	4.52E+04	5.95E+02	1.45E+06	1.84E+02
		Sumac (skunkbush and other)				5.79E-01	3.12E-01	8.20E+01	4.02E+03	1.08E+00	2.62E+03	1.87E+00
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Inputs	Parameter		Symbol	Description	Units			SE for Th-232	Transfer Factors for SE Progeny Radionuclides of Th-232			
						Th-228	Th-232		Ac-228	Bi-212	Pb-212	Ra-224
Transfer Factors for SE Progeny Radionuclides of Th-232	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03	2.40E-03
		Blue				6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03	2.40E-03
		Yellow				6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03	2.40E-03
		Red Speckled				6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03	2.40E-03
		Sweet Corn				6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03	2.40E-03
	Squash	Pumpkin				7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02	1.70E-02
		Other Squash				7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02	1.70E-02
	Melons	Watermelon				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02
		Cantaloupe				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02
	Tree Fruit	Apples				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02
		Apricots				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02
		Peaches				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02
	Other Vegetables	Beans				5.30E-04	5.30E-04	--	1.00E-03	1.00E-01	5.30E-03	1.40E-02
		Brussels sprouts				1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	9.10E-02
		Cucumbers				7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02	1.70E-02
		Chili				7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02	1.70E-02
		Onions				7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02	1.70E-02
		Potatoes				8.00E-04	8.00E-04	--	1.00E-03	1.00E-01	1.50E-02	7.00E-02
	Herbs and Medicinal:	Navajo Tea				2.00E-04	2.00E-04	--	1.00E-03	1.00E-01	1.50E-03	1.10E-02
		Sumac (skunkbush and other)				1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ial)		PRGs for Progeny - Kọọh bí líí nakaí (sheep camp)				
						Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**5.04E-01**	**6.94E-01**	**7.96E+01**	**3.90E+03**	**2.22E+00**	**5.39E+03**	**4.41E+00**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	1.84E+02	--	--	--	--	--	--
		Blue				1.84E+02	--	--	--	--	--	--
		Yellow				3.67E+02	1.30E+02	5.08E+02	2.49E+04	4.16E+02	1.01E+06	7.63E+02
		Red Speckled				6.12E+02	--	--	--	--	--	--
		Sweet Corn				9.19E+02	--	--	--	--	--	--
	Squash	Pumpkin				1.37E+02	4.65E+01	1.02E+03	4.98E+04	7.44E+01	1.81E+05	2.28E+03
		Other Squash				3.43E+01	2.90E+01	6.35E+02	3.12E+04	4.65E+01	1.13E+05	1.42E+03
	Melons	Watermelon				9.30E+01	--	--	--	--	--	--
		Cantaloupe				9.30E+01	6.97E+01	1.02E+03	4.98E+04	1.11E+02	2.71E+05	2.28E+03
	Tree Fruit	Apples				9.20E+01	6.83E+01	1.02E+03	4.98E+04	1.10E+02	2.68E+05	1.63E+03
		Apricots				9.21E+01	6.84E+01	1.02E+03	4.98E+04	1.10E+02	2.68E+05	1.68E+03
		Peaches				9.21E+01	--	--	--	--	--	--
	Other Vegetables	Beans				2.46E+01	--	--	--	--	--	--
		Brussels sprouts				2.57E+01	--	--	--	--	--	--
		Cucumbers				1.37E+02	--	--	--	--	--	--
		Chili				1.25E+02	--	--	--	--	--	--
		Onions				4.86E+01	--	--	--	--	--	--
		Potatoes				3.33E+01	--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.09E+02	--	--	--	--	--	--
		Sumac (skunkbush and other)				5.79E-01	7.49E-01	1.97E+02	9.65E+03	2.58E+00	6.29E+03	4.49E+00
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Inputs	Parameter		Symbol	Description	Units					Transfer Factors for SE Progeny Radionucl		
						Ra-228	Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212
Transfer Factors for SE Progeny Radionuclides of Th-232	**Corn**	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	2.40E-03	6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03
		Blue				2.40E-03	6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03
		Yellow				2.40E-03	6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03
		Red Speckled				2.40E-03	6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03
		Sweet Corn				2.40E-03	6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03
	Squash	Pumpkin				1.70E-02	7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02
		Other Squash				1.70E-02	7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02
	Melons	Watermelon				1.00E-02	5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
		Cantaloupe				1.00E-02	5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
	Tree Fruit	Apples				1.00E-02	5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
		Apricots				1.00E-02	5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
		Peaches				1.00E-02	5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
	Other Vegetables	Beans				1.40E-02	5.30E-04	5.30E-04	--	1.00E-03	1.00E-01	5.30E-03
		Brussels sprouts				9.10E-02	1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02
		Cucumbers				1.70E-02	7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02
		Chili				1.70E-02	7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02
		Onions				1.70E-02	7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02
		Potatoes				7.00E-02	8.00E-04	8.00E-04	--	1.00E-03	1.00E-01	1.50E-02
	Herbs and Medicinal:	Navajo Tea				1.10E-02	2.00E-04	2.00E-04	--	1.00E-03	1.00E-01	1.50E-03
		Sumac (skunkbush and other)				4.20E-01	1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units			PRGs for Progeny - Kǫǫ ei nahaazáh (easy acc			
						Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	1.33E+00	1.87E+00	4.92E+02	2.41E+04	6.46E+00	1.57E+04
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				5.05E+02	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				1.51E+02	--	--	--	--	--
		Other Squash				9.42E+01	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				2.56E+02	--	--	--	--	--
	Tree Fruit	Apples				2.53E+02	--	--	--	--	--
		Apricots				2.53E+02	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.39E+00	1.87E+00	4.92E+02	2.41E+04	6.46E+00	1.57E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	ides of Th-232					Transfer Facto
						Ra-224	Ra-228	Th-228	Th-232	SE for Th-232	Ac-228
Transfer Factors for SE Progeny Radionuclides of Th-232	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	2.40E-03	2.40E-03	6.40E-04	6.40E-04	--	1.00E-03
		Blue				2.40E-03	2.40E-03	6.40E-04	6.40E-04	--	1.00E-03
		Yellow				2.40E-03	2.40E-03	6.40E-04	6.40E-04	--	1.00E-03
		Red Speckled				2.40E-03	2.40E-03	6.40E-04	6.40E-04	--	1.00E-03
		Sweet Corn				2.40E-03	2.40E-03	6.40E-04	6.40E-04	--	1.00E-03
	Squash	Pumpkin				1.70E-02	1.70E-02	7.80E-04	7.80E-04	--	1.00E-03
		Other Squash				1.70E-02	1.70E-02	7.80E-04	7.80E-04	--	1.00E-03
	Melons	Watermelon				1.00E-02	1.00E-02	5.00E-04	5.00E-04	--	1.00E-03
		Cantaloupe				1.00E-02	1.00E-02	5.00E-04	5.00E-04	--	1.00E-03
	Tree Fruit	Apples				1.00E-02	1.00E-02	5.00E-04	5.00E-04	--	1.00E-03
		Apricots				1.00E-02	1.00E-02	5.00E-04	5.00E-04	--	1.00E-03
		Peaches				1.00E-02	1.00E-02	5.00E-04	5.00E-04	--	1.00E-03
	Other Vegetables	Beans				1.40E-02	1.40E-02	5.30E-04	5.30E-04	--	1.00E-03
		Brussels sprouts				9.10E-02	9.10E-02	1.20E-03	1.20E-03	--	1.00E-03
		Cucumbers				1.70E-02	1.70E-02	7.80E-04	7.80E-04	--	1.00E-03
		Tomatoes				1.70E-02	1.70E-02	7.80E-04	7.80E-04	--	1.00E-03
		Chili				1.70E-02	1.70E-02	7.80E-04	7.80E-04	--	1.00E-03
		Onions				7.00E-02	7.00E-02	8.00E-04	8.00E-04	--	1.00E-03
		Potatoes				1.10E-02	1.10E-02	2.00E-04	2.00E-04	--	1.00E-03
	Herbs and Medicinal:	Navajo Tea				4.20E-01	4.20E-01	1.20E-03	1.20E-03	--	1.00E-03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ess open space) Po-210	ess open space) Ra-226	SE for Ra-226	PRGs for Progeny - Kọọ eí doo nahaa Bi-210	PRGs for Progeny - Kọọ eí doo nahaa Bi-214	PRGs for Progeny - Kọọ eí doo nahaa Pb-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**1.12E+01**	**3.47E+00**	**3.75E+00**	**9.84E+02**	**4.83E+04**	**1.29E+01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.12E+01	3.47E+00	3.75E+00	9.84E+02	4.83E+04	1.29E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	rs for SE Progeny Radionuclides of Th-232 Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Transfer Factors for SE Progeny Radionuclides of Th-232	**Corn**	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.00E-01	1.20E-03	2.40E-03	2.40E-03	6.40E-04	6.40E-04
		Blue				1.00E-01	1.20E-03	2.40E-03	2.40E-03	6.40E-04	6.40E-04
		Yellow				1.00E-01	1.20E-03	2.40E-03	2.40E-03	6.40E-04	6.40E-04
		Red Speckled				1.00E-01	1.20E-03	2.40E-03	2.40E-03	6.40E-04	6.40E-04
		Sweet Corn				1.00E-01	1.20E-03	2.40E-03	2.40E-03	6.40E-04	6.40E-04
	Squash	Pumpkin				1.00E-01	1.50E-02	1.70E-02	1.70E-02	7.80E-04	7.80E-04
		Other Squash				1.00E-01	1.50E-02	1.70E-02	1.70E-02	7.80E-04	7.80E-04
	Melons	Watermelon				1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Cantaloupe				1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
	Tree Fruit	Apples				1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Apricots				1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Peaches				1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
	Other Vegetables	Beans				1.00E-01	5.30E-03	1.40E-02	1.40E-02	5.30E-04	5.30E-04
		Brussels sprouts				1.00E-01	8.00E-02	9.10E-02	9.10E-02	1.20E-03	1.20E-03
		Cucumbers				1.00E-01	1.50E-02	1.70E-02	1.70E-02	7.80E-04	7.80E-04
		Tomatoes				1.00E-01	1.50E-02	1.70E-02	1.70E-02	7.80E-04	7.80E-04
		Chili				1.00E-01	1.50E-02	1.70E-02	1.70E-02	7.80E-04	7.80E-04
		Onions				1.00E-01	1.50E-02	7.00E-02	7.00E-02	8.00E-04	8.00E-04
		Potatoes				1.00E-01	1.50E-03	1.10E-02	1.10E-02	2.00E-04	2.00E-04
	Herbs and Medicinal:	Navajo Tea				1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	záh dah (difficult access open space)			SE for Ra-226	PRGs for Progeny	
						Pb-214	Po-210	Ra-226		Bi-210	Bi-214
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	3.14E+04	2.24E+01	6.95E+00	7.45E-01	1.76E+02	8.65E+03
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	1.30E+03	5.08E+03	2.49E+05
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	2.32E+02	5.08E+03	2.49E+05
	Melons	Watermelon				--	--	--	3.49E+02	5.08E+03	2.49E+05
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)				3.14E+04	2.24E+01	6.95E+00	7.49E-01	1.97E+02	9.65E+03
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Inputs	Parameter		Symbol	Description	Units	SE for Th-232	Transfer Factors for SE Progeny Radionuclides of Th-232				
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228
Transfer Factors for SE Progeny Radionuclides of Th-232	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-03	1.00E-01	1.20E-03	2.40E-03	2.40E-03
		Blue				--	1.00E-03	1.00E-01	1.20E-03	2.40E-03	2.40E-03
		Yellow				--	1.00E-03	1.00E-01	1.20E-03	2.40E-03	2.40E-03
		Red Speckled				--	1.00E-03	1.00E-01	1.20E-03	2.40E-03	2.40E-03
		Sweet Corn				--	1.00E-03	1.00E-01	1.20E-03	2.40E-03	2.40E-03
	Squash	Pumpkin				--	1.00E-03	1.00E-01	1.50E-02	1.70E-02	1.70E-02
		Other Squash				--	1.00E-03	1.00E-01	1.50E-02	1.70E-02	1.70E-02
	Melons	Watermelon				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Cantaloupe				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
	Tree Fruit	Apples				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Apricots				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Peaches				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
	Other Vegetables	Beans				--	1.00E-03	1.00E-01	5.30E-03	1.40E-02	1.40E-02
		Brussels sprouts				--	1.00E-03	1.00E-01	8.00E-02	9.10E-02	9.10E-02
		Cucumbers				--	1.00E-03	1.00E-01	1.50E-02	1.70E-02	1.70E-02
		Tomatoes				--	1.00E-03	1.00E-01	1.50E-02	1.70E-02	1.70E-02
		Chili				--	1.00E-03	1.00E-01	1.50E-02	1.70E-02	1.70E-02
		Onions				--	1.00E-03	1.00E-01	1.50E-02	7.00E-02	7.00E-02
		Potatoes				--	1.00E-03	1.00E-01	1.50E-03	1.10E-02	1.10E-02
	Herbs and Medicinal:	Navajo Tea				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	? - Chíí dah wiih łeezh (washes and drainages)			
						Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**2.55E+00**	**6.21E+03**	**4.48E+00**	**1.39E+00**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--
		Blue				--	--	--	--
		Yellow				4.16E+03	1.01E+07	7.63E+03	5.05E+03
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				3.72E+02	9.05E+05	1.14E+04	7.54E+02
	Melons	Watermelon				5.57E+02	1.35E+06	1.14E+04	1.28E+03
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--
		Rocky Mountain Juniper				--	--	--	--
		Sagebrush				--	--	--	--
		Mormon tea				--	--	--	--
		Wild parsley				--	--	--	--
		Corn tassels				--	--	--	--
		Other Confidential Plants				--	--	--	--

Inputs	Parameter		Symbol	Description	Units				Transfer Factors for SE Progeny Radionucli		
						Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212
Transfer Factors for SE Progeny Radionuclides of Th-232	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03
		Blue				6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03
		Yellow				6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03
		Red Speckled				6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03
		Sweet Corn				6.40E-04	6.40E-04	--	1.00E-03	1.00E-01	1.20E-03
	Squash	Pumpkin				7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02
		Other Squash				7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02
	Melons	Watermelon				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
		Cantaloupe				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
	Tree Fruit	Apples				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
		Apricots				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
		Peaches				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
	Other Vegetables	Beans				5.30E-04	5.30E-04	--	1.00E-03	1.00E-01	5.30E-03
		Brussels sprouts				1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02
		Cucumbers				7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02
		Tomatoes				7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02
		Chili				7.80E-04	7.80E-04	--	1.00E-03	1.00E-01	1.50E-02
		Onions				8.00E-04	8.00E-04	--	1.00E-03	1.00E-01	1.50E-02
		Potatoes				2.00E-04	2.00E-04	--	1.00E-03	1.00E-01	1.50E-03
	Herbs and Medicinal:	Navajo Tea				1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g
		Blue			
		Yellow			
		Red Speckled			
		Sweet Corn			
	Squash	Pumpkin			
		Other Squash			
	Melons	Watermelon			
		Cantaloupe			
	Tree Fruit	Apples			
		Apricots			
		Peaches			
	Other Vegetables	Beans			
		Brussels sprouts			
		Cucumbers			
		Tomatoes			
		Chili			
		Onions			
		Potatoes			
	Herbs and Medicinal:	Navajo Tea			
		Sumac (skunkbush and other)			
		Rocky Mountain Juniper			
		Sagebrush			
		Mormon tea			
		Wild parsley			
		Corn tassels			
		Other Confidential Plants			

Inputs	Parameter		Symbol	Description	Units	des of Th-232			
						Ra-224	Ra-228	Th-228	Th-232
Transfer Factors for SE Progeny Radionuclides of Th-232	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	2.40E-03	2.40E-03	6.40E-04	6.40E-04
		Blue				2.40E-03	2.40E-03	6.40E-04	6.40E-04
		Yellow				2.40E-03	2.40E-03	6.40E-04	6.40E-04
		Red Speckled				2.40E-03	2.40E-03	6.40E-04	6.40E-04
		Sweet Corn				2.40E-03	2.40E-03	6.40E-04	6.40E-04
	Squash	Pumpkin				1.70E-02	1.70E-02	7.80E-04	7.80E-04
		Other Squash				1.70E-02	1.70E-02	7.80E-04	7.80E-04
	Melons	Watermelon				1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Cantaloupe				1.00E-02	1.00E-02	5.00E-04	5.00E-04
	Tree Fruit	Apples				1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Apricots				1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Peaches				1.00E-02	1.00E-02	5.00E-04	5.00E-04
	Other Vegetables	Beans				1.40E-02	1.40E-02	5.30E-04	5.30E-04
		Brussels sprouts				9.10E-02	9.10E-02	1.20E-03	1.20E-03
		Cucumbers				1.70E-02	1.70E-02	7.80E-04	7.80E-04
		Tomatoes				1.70E-02	1.70E-02	7.80E-04	7.80E-04
		Chili				1.70E-02	1.70E-02	7.80E-04	7.80E-04
		Onions				7.00E-02	7.00E-02	8.00E-04	8.00E-04
		Potatoes				1.10E-02	1.10E-02	2.00E-04	2.00E-04
	Herbs and Medicinal:	Navajo Tea				4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Custom				
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**1.12E-02**	**8.14E+00**	**2.20E+01**	**6.22E-01**	**9.33E-02**	**1.56E-02**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.21E-01	8.80E+01	2.38E+02	6.73E+00	1.01E+00	1.69E-01
		Blue				1.21E-01	8.80E+01	2.38E+02	6.73E+00	1.01E+00	1.69E-01
		Yellow				2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00	3.38E-01
		Red Speckled				4.05E-01	2.93E+02	7.93E+02	2.24E+01	3.37E+00	5.64E-01
		Sweet Corn				6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00	8.46E-01
	Squash	Pumpkin				6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00	8.46E-01
		Other Squash				1.52E-01	1.10E+02	2.97E+02	8.41E+00	1.26E+00	2.12E-01
	Melons	Watermelon				2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00	3.38E-01
		Cantaloupe				2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00	3.38E-01
	Tree Fruit	Apples				2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00	3.38E-01
		Apricots				2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00	3.38E-01
		Peaches				2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00	3.38E-01
	Other Vegetables	Beans				1.21E-01	8.80E+01	2.38E+02	6.73E+00	1.01E+00	1.69E-01
		Brussels sprouts				6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00	8.46E-01
		Cucumbers				6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00	8.46E-01
		Tomatoes				6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00	8.46E-01
		Chili				2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00	3.38E-01
		Onions				6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00	8.46E-01
		Potatoes				6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00	8.46E-01
	Herbs and Medicinal:	Navajo Tea				6.68E-02	4.84E+01	1.31E+02	3.70E+00	5.55E-01	9.31E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Custom				
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**1.53E-01**	**1.42E+03**	**2.10E+02**	**2.42E+01**	**1.09E+00**	**1.82E-01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	5.23E+01	7.69E+04	2.38E+03	5.00E+03	3.97E+02	6.65E+01
		Blue				5.23E+01	7.69E+04	2.38E+03	5.00E+03	3.97E+02	6.65E+01
		Yellow				1.05E+02	1.54E+05	4.75E+03	1.00E+04	7.93E+02	1.33E+02
		Red Speckled				1.74E+02	2.56E+05	7.92E+03	1.67E+04	1.32E+03	2.22E+02
		Sweet Corn				2.62E+02	3.84E+05	1.19E+04	2.50E+04	1.98E+03	3.32E+02
	Squash	Pumpkin				4.12E+01	4.16E+05	1.19E+04	2.24E+03	2.96E+02	4.96E+01
		Other Squash				1.03E+01	1.04E+05	2.97E+03	5.59E+02	7.40E+01	1.24E+01
	Melons	Watermelon				2.78E+01	1.66E+05	4.76E+03	1.34E+03	2.01E+02	3.37E+01
		Cantaloupe				2.78E+01	1.66E+05	4.76E+03	1.34E+03	2.01E+02	3.37E+01
	Tree Fruit	Apples				2.75E+01	1.52E+05	4.75E+03	1.33E+03	1.99E+02	3.33E+01
		Apricots				2.75E+01	1.53E+05	4.75E+03	1.33E+03	1.99E+02	3.33E+01
		Peaches				2.75E+01	1.53E+05	4.75E+03	1.33E+03	1.99E+02	3.33E+01
	Other Vegetables	Beans				7.16E+00	1.47E+04	2.27E+03	6.54E+02	5.31E+01	8.91E+00
		Brussels sprouts				7.78E+00	3.98E+05	1.19E+04	4.20E+02	5.54E+01	9.29E+00
		Cucumbers				4.13E+01	4.23E+05	1.19E+04	2.24E+03	2.96E+02	4.97E+01
		Tomatoes				3.69E+01	1.59E+05	1.17E+04	2.01E+03	2.69E+02	4.51E+01
		Chili				1.44E+01	5.47E+04	4.66E+03	7.82E+02	1.05E+02	1.76E+01
		Onions				1.03E+01	4.01E+05	1.19E+04	2.23E+03	7.20E+01	1.21E+01
		Potatoes				6.37E+01	3.64E+05	1.19E+04	1.97E+04	4.50E+02	7.55E+01
	Herbs and Medicinal:	Navajo Tea				1.77E-01	1.94E+03	1.06E+03	3.56E+01	1.25E+00	2.10E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	Th-228	Th-232	SE for Th-232	PRGs for Progeny - Kee'da'whíí tééh (fu Ac-228	Bi-212	Pb-212	Ra-224
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant(i)}}}$	pCi/g	**1.50E-01**	**1.67E-01**	**1.12E-02**	**8.14E+00**	**2.20E+01**	**6.22E-01**	**9.33E-02**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.62E+00	1.81E+00	1.21E-01	8.80E+01	2.38E+02	6.73E+00	1.01E+00
		Blue				1.62E+00	1.81E+00	1.21E-01	8.80E+01	2.38E+02	6.73E+00	1.01E+00
		Yellow				3.25E+00	3.61E+00	2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00
		Red Speckled				5.41E+00	6.02E+00	4.05E-01	2.93E+02	7.93E+02	2.24E+01	3.37E+00
		Sweet Corn				8.12E+00	9.03E+00	6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00
	Squash	Pumpkin				8.12E+00	9.03E+00	6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00
		Other Squash				2.03E+00	2.26E+00	1.52E-01	1.10E+02	2.97E+02	8.41E+00	1.26E+00
	Melons	Watermelon				3.25E+00	3.61E+00	2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00
		Cantaloupe				3.25E+00	3.61E+00	2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00
	Tree Fruit	Apples				3.25E+00	3.61E+00	2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00
		Apricots				3.25E+00	3.61E+00	2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00
		Peaches				3.25E+00	3.61E+00	2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00
	Other Vegetables	Beans				1.62E+00	1.81E+00	1.21E-01	8.80E+01	2.38E+02	6.73E+00	1.01E+00
		Brussels sprouts				8.12E+00	9.03E+00	6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00
		Cucumbers				8.12E+00	9.03E+00	6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00
		Tomatoes				8.12E+00	9.03E+00	6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00
		Chili				3.25E+00	3.61E+00	2.43E-01	1.76E+02	4.76E+02	1.35E+01	2.02E+00
		Onions				8.12E+00	9.03E+00	6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00
		Potatoes				8.12E+00	9.03E+00	6.07E-01	4.40E+02	1.19E+03	3.37E+01	5.05E+00
	Herbs and Medicinal:	Navajo Tea										
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants				8.93E-01	9.94E-01	6.68E-02	4.84E+01	1.31E+02	3.70E+00	5.55E-01

Outputs	Parameter		Symbol	Description	Units	Th-228	Th-232	SE for Th-232	PRGs for Progeny - Kee'da'whíí tééh (fu Ac-228	Bi-212	Pb-212	Ra-224
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing(i)}}}$	pCi/g	**2.76E+01**	**3.07E+01**	**1.53E-01**	**1.42E+03**	**2.10E+02**	**2.42E+01**	**1.09E+00**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	2.07E+03	2.30E+03	5.23E+01	7.69E+04	2.38E+03	5.00E+03	3.97E+02
		Blue				2.07E+03	2.30E+03	5.23E+01	7.69E+04	2.38E+03	5.00E+03	3.97E+02
		Yellow				4.14E+03	4.60E+03	1.05E+02	1.54E+05	4.75E+03	1.00E+04	7.93E+02
		Red Speckled				6.89E+03	7.67E+03	1.74E+02	2.56E+05	7.92E+03	1.67E+04	1.32E+03
		Sweet Corn				1.03E+04	1.15E+04	2.62E+02	3.84E+05	1.19E+04	2.50E+04	1.98E+03
	Squash	Pumpkin				9.69E+03	1.08E+04	4.12E+01	4.16E+05	1.19E+04	2.24E+03	2.96E+02
		Other Squash				2.42E+03	2.70E+03	1.03E+01	1.04E+05	2.97E+03	5.59E+02	7.40E+01
	Melons	Watermelon				5.82E+03	6.48E+03	2.78E+01	1.66E+05	4.76E+03	1.34E+03	2.01E+02
		Cantaloupe				5.82E+03	6.48E+03	2.78E+01	1.66E+05	4.76E+03	1.34E+03	2.01E+02
	Tree Fruit	Apples				4.92E+03	5.48E+03	2.75E+01	1.52E+05	4.75E+03	1.33E+03	1.99E+02
		Apricots				5.00E+03	5.56E+03	2.75E+01	1.53E+05	4.75E+03	1.33E+03	1.99E+02
		Peaches				5.00E+03	5.56E+03	2.75E+01	1.53E+05	4.75E+03	1.33E+03	1.99E+02
	Other Vegetables	Beans				2.94E+02	3.27E+02	7.16E+00	1.47E+04	2.27E+03	6.54E+02	5.31E+01
		Brussels sprouts				6.22E+03	6.92E+03	7.78E+00	3.98E+05	1.19E+04	4.20E+02	5.54E+01
		Cucumbers				9.90E+03	1.10E+04	4.13E+01	4.23E+05	1.19E+04	2.24E+03	2.96E+02
		Tomatoes				3.18E+03	3.54E+03	3.69E+01	1.59E+05	1.17E+04	2.01E+03	2.69E+02
		Chili				1.08E+03	1.20E+03	1.44E+01	5.47E+04	4.66E+03	7.82E+02	1.05E+02
		Onions				9.05E+03	1.01E+04	1.03E+01	4.01E+05	1.19E+04	2.23E+03	7.20E+01
		Potatoes				1.98E+04	2.20E+04	6.37E+01	3.64E+05	1.19E+04	1.97E+04	4.50E+02
	Herbs and Medicinal:	Navajo Tea										
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants				3.54E+01	3.94E+01	1.77E-01	1.94E+03	1.06E+03	3.56E+01	1.25E+00

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ll-time Navajo residential)				PRGs for Progeny		
						Ra-228	Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant(i)}}}$	pCi/g	1.56E-02	1.50E-01	1.67E-01	5.68E-02	4.11E+01	1.11E+02	3.15E+00
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant(i)} = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.69E-01	1.62E+00	1.81E+00	--	--	--	--
		Blue				1.69E-01	1.62E+00	1.81E+00	--	--	--	--
		Yellow				3.38E-01	3.25E+00	3.61E+00	3.34E-01	2.42E+02	6.54E+02	1.85E+01
		Red Speckled				5.64E-01	5.41E+00	6.02E+00	--	--	--	--
		Sweet Corn				8.46E-01	8.12E+00	9.03E+00	--	--	--	--
	Squash	Pumpkin				8.46E-01	8.12E+00	9.03E+00	6.68E-01	4.84E+02	1.31E+03	3.70E+01
		Other Squash				2.12E-01	2.03E+00	2.26E+00	4.18E-01	3.03E+02	8.18E+02	2.31E+01
	Melons	Watermelon				3.38E-01	3.25E+00	3.61E+00	--	--	--	--
		Cantaloupe				3.38E-01	3.25E+00	3.61E+00	6.68E-01	4.84E+02	1.31E+03	3.70E+01
	Tree Fruit	Apples				3.38E-01	3.25E+00	3.61E+00	6.68E-01	4.84E+02	1.31E+03	3.70E+01
		Apricots				3.38E-01	3.25E+00	3.61E+00	6.68E-01	4.84E+02	1.31E+03	3.70E+01
		Peaches				3.38E-01	3.25E+00	3.61E+00	--	--	--	--
	Other Vegetables	Beans				1.69E-01	1.62E+00	1.81E+00	--	--	--	--
		Brussels sprouts				8.46E-01	8.12E+00	9.03E+00	--	--	--	--
		Cucumbers				8.46E-01	8.12E+00	9.03E+00	--	--	--	--
		Tomatoes				8.46E-01	8.12E+00	9.03E+00	--	--	--	--
		Chili				3.38E-01	3.25E+00	3.61E+00	--	--	--	--
		Onions				8.46E-01	8.12E+00	9.03E+00	--	--	--	--
		Potatoes				8.46E-01	8.12E+00	9.03E+00	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				9.31E-02	8.93E-01	9.94E-01	1.60E-01	1.16E+02	3.14E+02	8.89E+00
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Outputs	Parameter		Symbol	Description	Units	ll-time Navajo residential)				PRGs for Progeny		
						Ra-228	Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing(i)}}}$	pCi/g	1.82E-01	2.76E+01	3.07E+01	4.07E-01	4.30E+03	1.02E+03	7.32E+01
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	6.65E+01	2.07E+03	2.30E+03	--	--	--	--
		Blue				6.65E+01	2.07E+03	2.30E+03	--	--	--	--
		Yellow				1.33E+02	4.14E+03	4.60E+03	1.44E+02	2.11E+05	6.53E+03	1.38E+04
		Red Speckled				2.22E+02	6.89E+03	7.67E+03	--	--	--	--
		Sweet Corn				3.32E+02	1.03E+04	1.15E+04	--	--	--	--
	Squash	Pumpkin				4.96E+01	9.69E+03	1.08E+04	4.53E+01	4.58E+05	1.31E+04	2.46E+03
		Other Squash				1.24E+01	2.42E+03	2.70E+03	2.83E+01	2.86E+05	8.17E+03	1.54E+03
	Melons	Watermelon				3.37E+01	5.82E+03	6.48E+03	--	--	--	--
		Cantaloupe				3.37E+01	5.82E+03	6.48E+03	7.64E+01	4.58E+05	1.31E+04	3.68E+03
	Tree Fruit	Apples				3.33E+01	4.92E+03	5.48E+03	7.55E+01	4.17E+05	1.31E+04	3.64E+03
		Apricots				3.33E+01	5.00E+03	5.56E+03	7.56E+01	4.21E+05	1.31E+04	3.65E+03
		Peaches				3.33E+01	5.00E+03	5.56E+03	--	--	--	--
	Other Vegetables	Beans				8.91E+00	2.94E+02	3.27E+02	--	--	--	--
		Brussels sprouts				9.29E+00	6.22E+03	6.92E+03	--	--	--	--
		Cucumbers				4.97E+01	9.90E+03	1.10E+04	--	--	--	--
		Tomatoes				4.51E+01	3.18E+03	3.54E+03	--	--	--	--
		Chili				1.76E+01	1.08E+03	1.20E+03	--	--	--	--
		Onions				1.21E+01	9.05E+03	1.01E+04	--	--	--	--
		Potatoes				7.55E+01	1.98E+04	2.20E+04	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.10E-01	3.54E+01	3.94E+01	4.25E-01	4.65E+03	2.53E+03	8.54E+01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	y - Kọọh bí líí nakaí (sheep camp) Ra-224	Ra-228	Th-228	Th-232	SE for Th-232	Ac-228
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**4.72E-01**	**7.91E-02**	**7.59E-01**	**8.45E-01**	**4.01E-01**	**2.90E+02**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.78E+00	4.65E-01	4.47E+00	4.97E+00	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				5.55E+00	9.31E-01	8.93E+00	9.94E+00	--	--
		Other Squash				3.47E+00	5.82E-01	5.58E+00	6.21E+00	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				5.55E+00	9.31E-01	8.93E+00	9.94E+00	--	--
	Tree Fruit	Apples				5.55E+00	9.31E-01	8.93E+00	9.94E+00	--	--
		Apricots				5.55E+00	9.31E-01	8.93E+00	9.94E+00	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.33E+00	2.23E-01	2.14E+00	2.39E+00	4.01E-01	2.90E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	y - Kọọh bí líí nakaí (sheep camp) Ra-224	Ra-228	Th-228	Th-232	SE for Th-232	Ac-228
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**2.88E+00**	**4.82E-01**	**8.07E+01**	**8.98E+01**	**1.06E+00**	**1.16E+04**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				1.09E+03	1.83E+02	5.69E+03	6.33E+03	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				3.26E+02	5.46E+01	1.07E+04	1.19E+04	--	--
		Other Squash				2.03E+02	3.41E+01	6.66E+03	7.41E+03	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				5.52E+02	9.25E+01	1.60E+04	1.78E+04	--	--
	Tree Fruit	Apples				5.47E+02	9.16E+01	1.35E+04	1.51E+04	--	--
		Apricots				5.47E+02	9.17E+01	1.37E+04	1.53E+04	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.00E+00	5.03E-01	8.51E+01	9.46E+01	1.06E+00	1.16E+04
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kǫǫ eí nahaazáh (easy access open space)					
						Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**7.85E+02**	**2.22E+01**	**3.33E+00**	**5.58E-01**	**5.36E+00**	**5.96E+00**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)				7.85E+02	2.22E+01	3.33E+00	5.58E-01	5.36E+00	5.96E+00
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kǫǫ eí nahaazáh (easy access open space)					
						Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**6.33E+03**	**2.14E+02**	**7.50E+00**	**1.26E+00**	**2.13E+02**	**2.37E+02**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)				6.33E+03	2.14E+02	7.50E+00	1.26E+00	2.13E+02	2.37E+02
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kọọ ei doo nahaazáh dah (difficult acce				
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	8.02E-01	5.81E+02	1.57E+03	4.44E+01	6.66E+00	1.12E+00
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				8.02E-01	5.81E+02	1.57E+03	4.44E+01	6.66E+00	1.12E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kọọ ei doo nahaazáh dah (difficult acce				
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	2.12E+00	2.32E+04	1.27E+04	4.27E+02	1.50E+01	2.52E+00
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.12E+00	2.32E+04	1.27E+04	4.27E+02	1.50E+01	2.52E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ss open space) Th-228	ss open space) Th-232	SE for Th-232	PRGs for Progeny - Chil Ac-228	PRGs for Progeny - Chil Bi-212	PRGs for Progeny - Chil Pb-212
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**1.07E+01**	**1.19E+01**	**1.40E-01**	**1.02E+02**	**2.75E+02**	**7.77E+00**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	3.34E+00	2.42E+03	6.54E+03	1.85E+02
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	3.34E+00	2.42E+03	6.54E+03	1.85E+02
	Melons	Watermelon				--	--	3.34E+00	2.42E+03	6.54E+03	1.85E+02
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Rocky Mountain Juniper				--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--
		Mormon tea				--	--	--	--	--	--
		Wild parsley				--	--	--	--	--	--
		Corn tassels				--	--	--	--	--	--
		Other Confidential Plants				1.07E+01	1.19E+01	1.60E-01	1.16E+02	3.14E+02	8.89E+00

Outputs	Parameter		Symbol	Description	Units	ss open space) Th-228	ss open space) Th-232	SE for Th-232	PRGs for Progeny - Chil Ac-228	PRGs for Progeny - Chil Bi-212	PRGs for Progeny - Chil Pb-212
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**4.25E+02**	**4.73E+02**	**4.23E-01**	**4.62E+03**	**2.27E+03**	**8.44E+01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	1.44E+03	2.11E+06	6.53E+04	1.38E+05
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	2.27E+02	2.29E+06	6.54E+04	1.23E+04
	Melons	Watermelon				--	--	3.82E+02	2.29E+06	6.54E+04	1.84E+04
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Rocky Mountain Juniper				--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--
		Mormon tea				--	--	--	--	--	--
		Wild parsley				--	--	--	--	--	--
		Corn tassels				--	--	--	--	--	--
		Other Confidential Plants				4.25E+02	4.73E+02	4.25E-01	4.65E+03	2.53E+03	8.54E+01

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	dah wiih leezh (washes and drainages)			
						Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**1.17E+00**	**1.95E-01**	**1.87E+00**	**2.08E+00**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--
		Blue				--	--	--	--
		Yellow				2.78E+01	4.65E+00	4.47E+01	4.97E+01
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				2.78E+01	4.65E+00	4.47E+01	4.97E+01
	Melons	Watermelon				2.78E+01	4.65E+00	4.47E+01	4.97E+01
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.33E+00	2.23E-01	2.14E+00	2.39E+00
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Outputs	Parameter		Symbol	Description	Units	dah wiih leezh (washes and drainages)			
						Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**2.99E+00**	**5.02E-01**	**8.47E+01**	**9.43E+01**
	Corn	White	$PRG_{p\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--
		Blue				--	--	--	--
		Yellow				1.09E+04	1.83E+03	5.69E+04	6.33E+04
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				1.63E+03	2.73E+02	5.33E+04	5.93E+04
	Melons	Watermelon				2.76E+03	4.63E+02	8.00E+04	8.90E+04
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				3.00E+00	5.03E-01	8.51E+01	9.46E+01
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	SE for U-238	Transfer Factors for S				
							Bi-210	Bi-214	Pa-234	Pb-210	Pb-214
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-01	1.00E-01	1.00E-02	1.20E-03	1.20E-03
		Blue				--	1.00E-01	1.00E-01	1.00E-02	1.20E-03	1.20E-03
		Yellow				--	1.00E-01	1.00E-01	1.00E-02	1.20E-03	1.20E-03
		Red Speckled				--	1.00E-01	1.00E-01	1.00E-02	1.20E-03	1.20E-03
		Sweet Corn				--	1.00E-01	1.00E-01	1.00E-02	1.20E-03	1.20E-03
	Squash	Pumpkin				--	1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02
		Other Squash				--	1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02
	Melons	Watermelon				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Cantaloupe				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02
	Tree Fruit	Apples				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Apricots				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Peaches				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02
	Other Vegetables	Beans				--	1.00E-01	1.00E-01	1.00E-02	5.30E-03	5.30E-03
		Brussels sprouts				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02
		Cucumbers				--	1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02
		Tomatoes				--	1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02
		Chili				--	1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02
		Onions				--	1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02
		Potatoes				--	1.00E-01	1.00E-01	1.00E-02	1.50E-03	1.50E-03
	Herbs and Medicinal:	Navajo Tea				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for U-238	PRGs f				
							Bi-210	Bi-214	Pa-234	Pb-210	Pb-214
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**5.17E-03**	**1.71E+00**	**8.38E+01**	**7.40E+00**	**1.88E-02**	**4.58E+01**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	5.60E-02	1.85E+01	9.07E+02	8.01E+01	2.04E-01	4.95E+02
		Blue				5.60E-02	1.85E+01	9.07E+02	8.01E+01	2.04E-01	4.95E+02
		Yellow				1.12E-01	3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02
		Red Speckled				1.87E-01	6.16E+01	3.02E+03	2.67E+02	6.79E-01	1.65E+03
		Sweet Corn				2.80E-01	9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03
	Squash	Pumpkin				2.80E-01	9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03
		Other Squash				7.00E-02	2.31E+01	1.13E+03	1.00E+02	2.55E-01	6.19E+02
	Melons	Watermelon				1.12E-01	3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02
		Cantaloupe				1.12E-01	3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02
	Tree Fruit	Apples				1.12E-01	3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02
		Apricots				1.12E-01	3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02
		Peaches				1.12E-01	3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02
	Other Vegetables	Beans				5.60E-02	1.85E+01	9.07E+02	8.01E+01	2.04E-01	4.95E+02
		Brussels sprouts				2.80E-01	9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03
		Cucumbers				2.80E-01	9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03
		Tomatoes				2.80E-01	9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03
		Chili				1.12E-01	3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02
		Onions				2.80E-01	9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03
		Potatoes				2.80E-01	9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03
	Herbs and Medicinal:	Navajo Tea				3.08E-02	1.02E+01	4.99E+02	4.41E+01	1.12E-01	2.73E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	SE Progeny Radionuclides of U-238						SE for U-238
						Po-210	Ra-226	Th-230	Th-234	U-234	U-238	
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	2.40E-04	2.40E-03	6.40E-04	6.40E-04	1.50E-02	1.50E-02	--
		Blue				2.40E-04	2.40E-03	6.40E-04	6.40E-04	1.50E-02	1.50E-02	--
		Yellow				2.40E-04	2.40E-03	6.40E-04	6.40E-04	1.50E-02	1.50E-02	--
		Red Speckled				2.40E-04	2.40E-03	6.40E-04	6.40E-04	1.50E-02	1.50E-02	--
		Sweet Corn				2.40E-04	2.40E-03	6.40E-04	6.40E-04	1.50E-02	1.50E-02	--
	Squash	Pumpkin				2.00E-04	1.70E-02	7.80E-04	7.80E-04	1.50E-02	1.50E-02	--
		Other Squash				2.00E-04	1.70E-02	7.80E-04	7.80E-04	1.50E-02	1.50E-02	--
	Melons	Watermelon				2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03	--
		Cantaloupe				2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03	--
	Tree Fruit	Apples				2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03	--
		Apricots				2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03	--
		Peaches				2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03	--
	Other Vegetables	Beans				2.70E-04	1.40E-02	5.30E-04	5.30E-04	2.20E-03	2.20E-03	--
		Brussels sprouts				7.40E-03	9.10E-02	1.20E-03	1.20E-03	2.00E-02	2.00E-02	--
		Cucumbers				2.00E-04	1.70E-02	7.80E-04	7.80E-04	1.50E-02	1.50E-02	--
		Tomatoes				2.00E-04	1.70E-02	7.80E-04	7.80E-04	1.50E-02	1.50E-02	--
		Chili				2.00E-04	1.70E-02	7.80E-04	7.80E-04	1.50E-02	1.50E-02	--
		Onions				5.80E-03	7.00E-02	8.00E-04	8.00E-04	8.40E-03	8.40E-03	--
		Potatoes				2.70E-03	1.10E-02	2.00E-04	2.00E-04	5.00E-03	5.00E-03	--
	Herbs and Medicinal:	Navajo Tea				7.40E-03	4.20E-01	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--

Outputs	Parameter		Symbol	Description	Units	or Progeny - Custom						SE for U-238
						Po-210	Ra-226	Th-230	Th-234	U-234	U-238	
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**9.87E-03**	**4.32E-02**	**1.87E-01**	**6.55E-01**	**2.33E-01**	**2.57E-01**	**5.17E-03**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.07E-01	4.68E-01	2.02E+00	7.09E+00	2.52E+00	2.77E+00	5.60E-02
		Blue				1.07E-01	4.68E-01	2.02E+00	7.09E+00	2.52E+00	2.77E+00	5.60E-02
		Yellow				2.14E-01	9.35E-01	4.04E+00	1.42E+01	5.03E+00	5.55E+00	1.12E-01
		Red Speckled				3.56E-01	1.56E+00	6.73E+00	2.36E+01	8.39E+00	9.25E+00	1.87E-01
		Sweet Corn				5.34E-01	2.34E+00	1.01E+01	3.54E+01	1.26E+01	1.39E+01	2.80E-01
	Squash	Pumpkin				5.34E-01	2.34E+00	1.01E+01	3.54E+01	1.26E+01	1.39E+01	2.80E-01
		Other Squash				1.34E-01	5.84E-01	2.52E+00	8.86E+00	3.15E+00	3.47E+00	7.00E-02
	Melons	Watermelon				2.14E-01	9.35E-01	4.04E+00	1.42E+01	5.03E+00	5.55E+00	1.12E-01
		Cantaloupe				2.14E-01	9.35E-01	4.04E+00	1.42E+01	5.03E+00	5.55E+00	1.12E-01
	Tree Fruit	Apples				2.14E-01	9.35E-01	4.04E+00	1.42E+01	5.03E+00	5.55E+00	1.12E-01
		Apricots				2.14E-01	9.35E-01	4.04E+00	1.42E+01	5.03E+00	5.55E+00	1.12E-01
		Peaches				2.14E-01	9.35E-01	4.04E+00	1.42E+01	5.03E+00	5.55E+00	1.12E-01
	Other Vegetables	Beans				1.07E-01	4.68E-01	2.02E+00	7.09E+00	2.52E+00	2.77E+00	5.60E-02
		Brussels sprouts				5.34E-01	2.34E+00	1.01E+01	3.54E+01	1.26E+01	1.39E+01	2.80E-01
		Cucumbers				5.34E-01	2.34E+00	1.01E+01	3.54E+01	1.26E+01	1.39E+01	2.80E-01
		Tomatoes				5.34E-01	2.34E+00	1.01E+01	3.54E+01	1.26E+01	1.39E+01	2.80E-01
		Chili				2.14E-01	9.35E-01	4.04E+00	1.42E+01	5.03E+00	5.55E+00	1.12E-01
		Onions				5.34E-01	2.34E+00	1.01E+01	3.54E+01	1.26E+01	1.39E+01	2.80E-01
		Potatoes				5.34E-01	2.34E+00	1.01E+01	3.54E+01	1.26E+01	1.39E+01	2.80E-01
	Herbs and Medicinal:	Navajo Tea				5.87E-02	2.57E-01	1.11E+00	3.90E+00	1.38E+00	1.53E+00	3.08E-02
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of						
						Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.00E-01	1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Blue				1.00E-01	1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Yellow				1.00E-01	1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Red Speckled				1.00E-01	1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Sweet Corn				1.00E-01	1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
	Squash	Pumpkin				1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Other Squash				1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
	Melons	Watermelon				1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Cantaloupe				1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Tree Fruit	Apples				1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Apricots				1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Peaches				1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Other Vegetables	Beans				1.00E-01	1.00E-01	1.00E-02	5.30E-03	5.30E-03	2.70E-04	1.40E-02
		Brussels sprouts				1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	9.10E-02
		Cucumbers				1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Tomatoes				1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Chili				1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Onions				1.00E-01	1.00E-01	1.00E-02	1.50E-02	1.50E-02	5.80E-03	7.00E-02
		Potatoes				1.00E-01	1.00E-01	1.00E-02	1.50E-03	1.50E-03	2.70E-03	1.10E-02
	Herbs and Medicinal:	Navajo Tea				1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kee'da'whíí téél (full-time Navajo						
						Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**1.71E+00**	**8.38E+01**	**7.40E+00**	**1.88E-02**	**4.58E+01**	**9.87E-03**	**4.32E-02**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.85E+01	9.07E+02	8.01E+01	2.04E-01	4.95E+02	1.07E-01	4.68E-01
		Blue				1.85E+01	9.07E+02	8.01E+01	2.04E-01	4.95E+02	1.07E-01	4.68E-01
		Yellow				3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02	2.14E-01	9.35E-01
		Red Speckled				6.16E+01	3.02E+03	2.67E+02	6.79E-01	1.65E+03	3.56E-01	1.56E+00
		Sweet Corn				9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03	5.34E-01	2.34E+00
	Squash	Pumpkin				9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03	5.34E-01	2.34E+00
		Other Squash				2.31E+01	1.13E+03	1.00E+02	2.55E-01	6.19E+02	1.34E-01	5.84E-01
	Melons	Watermelon				3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02	2.14E-01	9.35E-01
		Cantaloupe				3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02	2.14E-01	9.35E-01
	Tree Fruit	Apples				3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02	2.14E-01	9.35E-01
		Apricots				3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02	2.14E-01	9.35E-01
		Peaches				3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02	2.14E-01	9.35E-01
	Other Vegetables	Beans				1.85E+01	9.07E+02	8.01E+01	2.04E-01	4.95E+02	1.07E-01	4.68E-01
		Brussels sprouts				9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03	5.34E-01	2.34E+00
		Cucumbers				9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03	5.34E-01	2.34E+00
		Tomatoes				9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03	5.34E-01	2.34E+00
		Chili				3.70E+01	1.81E+03	1.60E+02	4.07E-01	9.91E+02	2.14E-01	9.35E-01
		Onions				9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03	5.34E-01	2.34E+00
		Potatoes				9.24E+01	4.53E+03	4.01E+02	1.02E+00	2.48E+03	5.34E-01	2.34E+00
	Herbs and Medicinal:	Navajo Tea				1.02E+01	4.99E+02	4.41E+01	1.12E-01	2.73E+02	5.87E-02	2.57E-01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	f U-238					
						Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Blue				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Yellow				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Red Speckled				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Sweet Corn				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
	Squash	Pumpkin				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Other Squash				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
	Melons	Watermelon				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Cantaloupe				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
	Tree Fruit	Apples				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Apricots				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Peaches				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
	Other Vegetables	Beans				5.30E-04	5.30E-04	2.20E-03	2.20E-03	--	1.00E-01
		Brussels sprouts				1.20E-03	1.20E-03	2.00E-02	2.00E-02	--	1.00E-01
		Cucumbers				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Tomatoes				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Chili				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Onions				8.00E-04	8.00E-04	8.40E-03	8.40E-03	--	1.00E-01
		Potatoes				2.00E-04	2.00E-04	5.00E-03	5.00E-03	--	1.00E-01
	Herbs and Medicinal:	Navajo Tea				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00

Outputs	Parameter		Symbol	Description	Units	residential)					
						Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**1.87E-01**	**6.55E-01**	**2.33E-01**	**2.57E-01**	**2.62E-02**	**8.64E+00**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	2.02E+00	7.09E+00	2.52E+00	2.77E+00	--	--
		Blue				2.02E+00	7.09E+00	2.52E+00	2.77E+00	--	--
		Yellow				4.04E+00	1.42E+01	5.03E+00	5.55E+00	1.54E-01	5.08E+01
		Red Speckled				6.73E+00	2.36E+01	8.39E+00	9.25E+00	--	--
		Sweet Corn				1.01E+01	3.54E+01	1.26E+01	1.39E+01	--	--
	Squash	Pumpkin				1.01E+01	3.54E+01	1.26E+01	1.39E+01	3.08E-01	1.02E+02
		Other Squash				2.52E+00	8.86E+00	3.15E+00	3.47E+00	1.92E-01	6.35E+01
	Melons	Watermelon				4.04E+00	1.42E+01	5.03E+00	5.55E+00	--	--
		Cantaloupe				4.04E+00	1.42E+01	5.03E+00	5.55E+00	3.08E-01	1.02E+02
	Tree Fruit	Apples				4.04E+00	1.42E+01	5.03E+00	5.55E+00	3.08E-01	1.02E+02
		Apricots				4.04E+00	1.42E+01	5.03E+00	5.55E+00	3.08E-01	1.02E+02
		Peaches				4.04E+00	1.42E+01	5.03E+00	5.55E+00	--	--
	Other Vegetables	Beans				2.02E+00	7.09E+00	2.52E+00	2.77E+00	--	--
		Brussels sprouts				1.01E+01	3.54E+01	1.26E+01	1.39E+01	--	--
		Cucumbers				1.01E+01	3.54E+01	1.26E+01	1.39E+01	--	--
		Tomatoes				1.01E+01	3.54E+01	1.26E+01	1.39E+01	--	--
		Chili				4.04E+00	1.42E+01	5.03E+00	5.55E+00	--	--
		Onions				1.01E+01	3.54E+01	1.26E+01	1.39E+01	--	--
		Potatoes				1.01E+01	3.54E+01	1.26E+01	1.39E+01	--	--
	Herbs and Medicinal:	Navajo Tea				1.11E+00	3.90E+00	1.38E+00	1.53E+00	7.39E-02	2.44E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Blue				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Yellow				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Red Speckled				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Sweet Corn				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
	Squash	Pumpkin				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Other Squash				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
	Melons	Watermelon				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Cantaloupe				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Tree Fruit	Apples				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Apricots				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Peaches				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Other Vegetables	Beans				1.00E-01	1.00E-02	5.30E-03	5.30E-03	2.70E-04	1.40E-02
		Brussels sprouts				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	9.10E-02
		Cucumbers				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Tomatoes				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Chili				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Onions				1.00E-01	1.00E-02	1.50E-02	1.50E-02	5.80E-03	7.00E-02
		Potatoes				1.00E-01	1.00E-02	1.50E-03	1.50E-03	2.70E-03	1.10E-02
	Herbs and Medicinal:	Navajo Tea				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kǫǫh bí líí nakaí (sheep can					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**4.24E+02**	**3.74E+01**	**9.52E-02**	**2.32E+02**	**4.99E-02**	**2.19E-01**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.49E+03	2.20E+02	5.60E-01	1.36E+03	2.94E-01	1.29E+00
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				4.99E+03	4.41E+02	1.12E+00	2.73E+03	5.87E-01	2.57E+00
		Other Squash				3.12E+03	2.75E+02	7.00E-01	1.70E+03	3.67E-01	1.61E+00
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				4.99E+03	4.41E+02	1.12E+00	2.73E+03	5.87E-01	2.57E+00
	Tree Fruit	Apples				4.99E+03	4.41E+02	1.12E+00	2.73E+03	5.87E-01	2.57E+00
		Apricots				4.99E+03	4.41E+02	1.12E+00	2.73E+03	5.87E-01	2.57E+00
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.20E+03	1.06E+02	2.69E-01	6.54E+02	1.41E-01	6.17E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	U-238 Th-230	U-238 Th-234	U-238 U-234	U-238 U-238	SE for U-238	Bi-210
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Blue				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Yellow				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Red Speckled				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Sweet Corn				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
	Squash	Pumpkin				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Other Squash				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
	Melons	Watermelon				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Cantaloupe				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
	Tree Fruit	Apples				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Apricots				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Peaches				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
	Other Vegetables	Beans				5.30E-04	5.30E-04	2.20E-03	2.20E-03	--	1.00E-01
		Brussels sprouts				1.20E-03	1.20E-03	2.00E-02	2.00E-02	--	1.00E-01
		Cucumbers				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Tomatoes				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Chili				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Onions				8.00E-04	8.00E-04	8.40E-03	8.40E-03	--	1.00E-01
		Potatoes				2.00E-04	2.00E-04	5.00E-03	5.00E-03	--	1.00E-01
	Herbs and Medicinal:	Navajo Tea				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00

Outputs	Parameter		Symbol	Description	Units	np) Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**9.44E-01**	**3.31E+00**	**1.18E+00**	**1.30E+00**	**1.85E-01**	**6.10E+01**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				5.55E+00	1.95E+01	6.92E+00	7.63E+00	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				1.11E+01	3.90E+01	1.38E+01	1.53E+01	--	--
		Other Squash				6.94E+00	2.44E+01	8.65E+00	9.54E+00	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				1.11E+01	3.90E+01	1.38E+01	1.53E+01	--	--
	Tree Fruit	Apples				1.11E+01	3.90E+01	1.38E+01	1.53E+01	--	--
		Apricots				1.11E+01	3.90E+01	1.38E+01	1.53E+01	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.67E+00	9.36E+00	3.32E+00	3.66E+00	1.85E-01	6.10E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Blue				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Yellow				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Red Speckled				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Sweet Corn				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
	Squash	Pumpkin				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Other Squash				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
	Melons	Watermelon				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Cantaloupe				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Tree Fruit	Apples				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Apricots				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Peaches				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Other Vegetables	Beans				1.00E-01	1.00E-02	5.30E-03	5.30E-03	2.70E-04	1.40E-02
		Brussels sprouts				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	9.10E-02
		Cucumbers				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Tomatoes				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Chili				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Onions				1.00E-01	1.00E-02	1.50E-02	1.50E-02	5.80E-03	7.00E-02
		Potatoes				1.00E-01	1.00E-02	1.50E-03	1.50E-03	2.70E-03	1.10E-02
	Herbs and Medicinal:	Navajo Tea				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kǫǫ eí nahaazáh (easy access op					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**2.99E+03**	**2.64E+02**	**6.72E-01**	**1.64E+03**	**3.52E-01**	**1.54E+00**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.99E+03	2.64E+02	6.72E-01	1.64E+03	3.52E-01	1.54E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	U-238 Th-230	U-238 Th-234	U-238 U-234	U-238 U-238	SE for U-238	Bi-210
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Blue				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Yellow				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Red Speckled				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Sweet Corn				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
	Squash	Pumpkin				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Other Squash				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
	Melons	Watermelon				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Cantaloupe				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
	Tree Fruit	Apples				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Apricots				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Peaches				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
	Other Vegetables	Beans				5.30E-04	5.30E-04	2.20E-03	2.20E-03	--	1.00E-01
		Brussels sprouts				1.20E-03	1.20E-03	2.00E-02	2.00E-02	--	1.00E-01
		Cucumbers				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Tomatoes				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Chili				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Onions				8.00E-04	8.00E-04	8.40E-03	8.40E-03	--	1.00E-01
		Potatoes				2.00E-04	2.00E-04	5.00E-03	5.00E-03	--	1.00E-01
	Herbs and Medicinal:	Navajo Tea				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00

Outputs	Parameter		Symbol	Description	Units	Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**6.66E+00**	**2.34E+01**	**8.30E+00**	**9.16E+00**	**3.69E-01**	**1.22E+02**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				6.66E+00	2.34E+01	8.30E+00	9.16E+00	3.69E-01	1.22E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Blue				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Yellow				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Red Speckled				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Sweet Corn				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
	Squash	Pumpkin				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Other Squash				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
	Melons	Watermelon				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Cantaloupe				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Tree Fruit	Apples				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Apricots				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Peaches				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Other Vegetables	Beans				1.00E-01	1.00E-02	5.30E-03	5.30E-03	2.70E-04	1.40E-02
		Brussels sprouts				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	9.10E-02
		Cucumbers				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Tomatoes				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Chili				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Onions				1.00E-01	1.00E-02	1.50E-02	1.50E-02	5.80E-03	7.00E-02
		Potatoes				1.00E-01	1.00E-02	1.50E-03	1.50E-03	2.70E-03	1.10E-02
	Herbs and Medicinal:	Navajo Tea				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kǫǫ eí doo nahaazáh dah (difficult acce					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**5.99E+03**	**5.29E+02**	**1.34E+00**	**3.27E+03**	**7.05E-01**	**3.09E+00**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				5.99E+03	5.29E+02	1.34E+00	3.27E+03	7.05E-01	3.09E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	U-238				SE for U-238	Bi-210
						Th-230	Th-234	U-234	U-238		
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Blue				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Yellow				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Red Speckled				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
		Sweet Corn				6.40E-04	6.40E-04	1.50E-02	1.50E-02	--	1.00E-01
	Squash	Pumpkin				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Other Squash				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
	Melons	Watermelon				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Cantaloupe				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
	Tree Fruit	Apples				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Apricots				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Peaches				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
	Other Vegetables	Beans				5.30E-04	5.30E-04	2.20E-03	2.20E-03	--	1.00E-01
		Brussels sprouts				1.20E-03	1.20E-03	2.00E-02	2.00E-02	--	1.00E-01
		Cucumbers				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Tomatoes				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Chili				7.80E-04	7.80E-04	1.50E-02	1.50E-02	--	1.00E-01
		Onions				8.00E-04	8.00E-04	8.40E-03	8.40E-03	--	1.00E-01
		Potatoes				2.00E-04	2.00E-04	5.00E-03	5.00E-03	--	1.00E-01
	Herbs and Medicinal:	Navajo Tea				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00

Outputs	Parameter		Symbol	Description	Units	ss open space)				SE for U-238	Bi-210
						Th-230	Th-234	U-234	U-238		
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**1.33E+01**	**4.68E+01**	**1.66E+01**	**1.83E+01**	**6.46E-02**	**2.13E+01**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	1.54E+00	5.08E+02
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	1.54E+00	5.08E+02
	Melons	Watermelon				--	--	--	--	1.54E+00	5.08E+02
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.33E+01	4.68E+01	1.66E+01	1.83E+01	7.39E-02	2.44E+01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Blue				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Yellow				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Red Speckled				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
		Sweet Corn				1.00E-01	1.00E-02	1.20E-03	1.20E-03	2.40E-04	2.40E-03
	Squash	Pumpkin				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Other Squash				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
	Melons	Watermelon				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Cantaloupe				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Tree Fruit	Apples				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Apricots				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Peaches				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
	Other Vegetables	Beans				1.00E-01	1.00E-02	5.30E-03	5.30E-03	2.70E-04	1.40E-02
		Brussels sprouts				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	9.10E-02
		Cucumbers				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Tomatoes				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Chili				1.00E-01	1.00E-02	1.50E-02	1.50E-02	2.00E-04	1.70E-02
		Onions				1.00E-01	1.00E-02	1.50E-02	1.50E-02	5.80E-03	7.00E-02
		Potatoes				1.00E-01	1.00E-02	1.50E-03	1.50E-03	2.70E-03	1.10E-02
	Herbs and Medicinal:	Navajo Tea				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Chíí dah wiih łeezh (washes and dr					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant}(i)}}$	pCi/g	**1.05E+03**	**9.24E+01**	**2.35E-01**	**5.72E+02**	**1.23E-01**	**5.39E-01**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.49E+04	2.20E+03	5.60E+00	1.36E+04	2.94E+00	1.29E+01
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				2.49E+04	2.20E+03	5.60E+00	1.36E+04	2.94E+00	1.29E+01
	Melons	Watermelon				2.49E+04	2.20E+03	5.60E+00	1.36E+04	2.94E+00	1.29E+01
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.20E+03	1.06E+02	2.69E-01	6.54E+02	1.41E-01	6.17E-01
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Inputs	Parameter		Symbol	Description	Units	U-238			
						Th-230	Th-234	U-234	U-238
Transfer Factors for SE Progeny Radionuclides of U-238	Corn	White	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	6.40E-04	6.40E-04	1.50E-02	1.50E-02
		Blue				6.40E-04	6.40E-04	1.50E-02	1.50E-02
		Yellow				6.40E-04	6.40E-04	1.50E-02	1.50E-02
		Red Speckled				6.40E-04	6.40E-04	1.50E-02	1.50E-02
		Sweet Corn				6.40E-04	6.40E-04	1.50E-02	1.50E-02
	Squash	Pumpkin				7.80E-04	7.80E-04	1.50E-02	1.50E-02
		Other Squash				7.80E-04	7.80E-04	1.50E-02	1.50E-02
	Melons	Watermelon				5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Cantaloupe				5.00E-04	5.00E-04	1.00E-03	1.00E-03
	Tree Fruit	Apples				5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Apricots				5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Peaches				5.00E-04	5.00E-04	1.00E-03	1.00E-03
	Other Vegetables	Beans				5.30E-04	5.30E-04	2.20E-03	2.20E-03
		Brussels sprouts				1.20E-03	1.20E-03	2.00E-02	2.00E-02
		Cucumbers				7.80E-04	7.80E-04	1.50E-02	1.50E-02
		Tomatoes				7.80E-04	7.80E-04	1.50E-02	1.50E-02
		Chili				7.80E-04	7.80E-04	1.50E-02	1.50E-02
		Onions				8.00E-04	8.00E-04	8.40E-03	8.40E-03
		Potatoes				2.00E-04	2.00E-04	5.00E-03	5.00E-03
	Herbs and Medicinal:	Navajo Tea				1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							
Fractional Contribution of Progeny for U-238			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	ainages)			
						Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Direct Consumption of Produce, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{p\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{p-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing-plant(i)}}}$	pCi/g	**2.33E+00**	**8.18E+00**	**2.90E+00**	**3.20E+00**
	Corn	White	$PRG_{p\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{p-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	--	--	--	--
		Blue				--	--	--	--
		Yellow				5.55E+01	1.95E+02	6.92E+01	7.63E+01
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				5.55E+01	1.95E+02	6.92E+01	7.63E+01
	Melons	Watermelon				5.55E+01	1.95E+02	6.92E+01	7.63E+01
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.67E+00	9.36E+00	3.32E+00	3.66E+00
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	SE for U-238	PRGs f				
							Bi-210	Bi-214	Pa-234	Pb-210	Pb-214
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**2.32E-01**	**1.63E+01**	**8.01E+02**	**5.03E+02**	**7.32E-01**	**1.78E+03**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	3.02E+01	1.85E+02	9.06E+03	7.90E+03	1.51E+02	3.68E+05
		Blue				3.02E+01	1.85E+02	9.06E+03	7.90E+03	1.51E+02	3.68E+05
		Yellow				6.03E+01	3.69E+02	1.81E+04	1.58E+04	3.03E+02	7.37E+05
		Red Speckled				1.01E+02	6.15E+02	3.02E+04	2.63E+04	5.05E+02	1.23E+06
		Sweet Corn				1.51E+02	9.23E+02	4.53E+04	3.95E+04	7.57E+02	1.84E+06
	Squash	Pumpkin				3.84E+01	9.24E+02	4.53E+04	3.98E+04	6.76E+01	1.65E+05
		Other Squash				9.59E+00	2.31E+02	1.13E+04	9.96E+03	1.69E+01	4.11E+04
	Melons	Watermelon				2.50E+01	3.69E+02	1.81E+04	1.59E+04	4.05E+01	9.85E+04
		Cantaloupe				2.50E+01	3.69E+02	1.81E+04	1.59E+04	4.05E+01	9.85E+04
	Tree Fruit	Apples				2.44E+01	3.69E+02	1.81E+04	1.58E+04	4.01E+01	9.75E+04
		Apricots				2.45E+01	3.69E+02	1.81E+04	1.58E+04	4.01E+01	9.76E+04
		Peaches				2.45E+01	3.69E+02	1.81E+04	1.58E+04	4.01E+01	9.76E+04
	Other Vegetables	Beans				6.44E+00	1.76E+02	8.64E+03	5.34E+03	1.98E+01	4.81E+04
		Brussels sprouts				7.35E+00	9.23E+02	4.53E+04	3.96E+04	1.27E+01	3.09E+04
		Cucumbers				3.85E+01	9.24E+02	4.53E+04	3.99E+04	6.77E+01	1.65E+05
		Tomatoes				3.11E+01	9.08E+02	4.46E+04	3.40E+04	6.07E+01	1.48E+05
		Chili				1.18E+01	3.62E+02	1.77E+04	1.31E+04	2.37E+01	5.75E+04
		Onions				1.71E+01	9.23E+02	4.53E+04	3.97E+04	6.74E+01	1.64E+05
		Potatoes				7.21E+01	9.22E+02	4.52E+04	3.92E+04	5.95E+02	1.45E+06
	Herbs and Medicinal:	Navajo Tea				2.97E-01	8.20E+01	4.02E+03	1.30E+03	1.08E+00	2.62E+03
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	or Progeny - Custom						SE for U-238
						Po-210	Ra-226	Th-230	Th-234	U-234	U-238	
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**1.54E+00**	**5.04E-01**	**3.44E+01**	**1.21E+02**	**9.50E+00**	**1.05E+01**	**2.32E-01**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	2.77E+02	1.84E+02	2.57E+03	9.03E+03	1.66E+02	1.83E+02	3.02E+01
		Blue				2.77E+02	1.84E+02	2.57E+03	9.03E+03	1.66E+02	1.83E+02	3.02E+01
		Yellow				5.55E+02	3.67E+02	5.14E+03	1.81E+04	3.32E+02	3.66E+02	6.03E+01
		Red Speckled				9.25E+02	6.12E+02	8.57E+03	3.01E+04	5.54E+02	6.11E+02	1.01E+02
		Sweet Corn				1.39E+03	9.19E+02	1.29E+04	4.52E+04	8.31E+02	9.16E+02	1.51E+02
	Squash	Pumpkin				2.07E+03	1.37E+02	1.20E+04	4.23E+04	8.36E+02	9.21E+02	3.84E+01
		Other Squash				5.17E+02	3.43E+01	3.01E+03	1.06E+04	2.09E+02	2.30E+02	9.59E+00
	Melons	Watermelon				8.28E+02	9.30E+01	7.24E+03	2.54E+04	4.76E+03	5.25E+03	2.50E+01
		Cantaloupe				8.28E+02	9.30E+01	7.24E+03	2.54E+04	4.76E+03	5.25E+03	2.50E+01
	Tree Fruit	Apples				5.93E+02	9.20E+01	6.12E+03	2.15E+04	4.34E+03	4.78E+03	2.44E+01
		Apricots				6.10E+02	9.21E+01	6.21E+03	2.18E+04	4.38E+03	4.83E+03	2.45E+01
		Peaches				6.10E+02	9.21E+01	6.21E+03	2.18E+04	4.38E+03	4.83E+03	2.45E+01
	Other Vegetables	Beans				2.03E+01	2.46E+01	3.65E+02	1.28E+03	3.49E+02	3.85E+02	6.44E+00
		Brussels sprouts				7.12E+01	2.57E+01	7.74E+03	2.72E+04	6.26E+02	6.90E+02	7.35E+00
		Cucumbers				2.23E+03	1.37E+02	1.23E+04	4.32E+04	8.37E+02	9.23E+02	3.85E+01
		Tomatoes				2.71E+02	1.25E+02	3.96E+03	1.39E+04	7.50E+02	8.27E+02	3.11E+01
		Chili				8.83E+01	4.86E+01	1.35E+03	4.73E+03	2.92E+02	3.22E+02	1.18E+01
		Onions				9.06E+01	3.33E+01	1.13E+04	3.95E+04	1.48E+03	1.63E+03	1.71E+01
		Potatoes				1.84E+02	2.09E+02	2.46E+04	8.64E+04	2.41E+03	2.66E+03	7.21E+01
	Herbs and Medicinal:	Navajo Tea				1.87E+00	5.79E-01	4.41E+01	1.55E+02	1.46E+01	1.61E+01	2.97E-01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kee'da'whíí téél (full-time Navajo						
						Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**1.63E+01**	**8.01E+02**	**5.03E+02**	**7.32E-01**	**1.78E+03**	**1.54E+00**	**5.04E-01**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	1.85E+02	9.06E+03	7.90E+03	1.51E+02	3.68E+05	2.77E+02	1.84E+02
		Blue				1.85E+02	9.06E+03	7.90E+03	1.51E+02	3.68E+05	2.77E+02	1.84E+02
		Yellow				3.69E+02	1.81E+04	1.58E+04	3.03E+02	7.37E+05	5.55E+02	3.67E+02
		Red Speckled				6.15E+02	3.02E+04	2.63E+04	5.05E+02	1.23E+06	9.25E+02	6.12E+02
		Sweet Corn				9.23E+02	4.53E+04	3.95E+04	7.57E+02	1.84E+06	1.39E+03	9.19E+02
	Squash	Pumpkin				9.24E+02	4.53E+04	3.98E+04	6.76E+01	1.65E+05	2.07E+03	1.37E+02
		Other Squash				2.31E+02	1.13E+04	9.96E+03	1.69E+01	4.11E+04	5.17E+02	3.43E+01
	Melons	Watermelon				3.69E+02	1.81E+04	1.59E+04	4.05E+01	9.85E+04	8.28E+02	9.30E+01
		Cantaloupe				3.69E+02	1.81E+04	1.59E+04	4.05E+01	9.85E+04	8.28E+02	9.30E+01
	Tree Fruit	Apples				3.69E+02	1.81E+04	1.58E+04	4.01E+01	9.75E+04	5.93E+02	9.20E+01
		Apricots				3.69E+02	1.81E+04	1.58E+04	4.01E+01	9.76E+04	6.10E+02	9.21E+01
		Peaches				3.69E+02	1.81E+04	1.58E+04	4.01E+01	9.76E+04	6.10E+02	9.21E+01
	Other Vegetables	Beans				1.76E+02	8.64E+03	5.34E+03	1.98E+01	4.81E+04	2.03E+01	2.46E+01
		Brussels sprouts				9.23E+02	4.53E+04	3.96E+04	1.27E+01	3.09E+04	7.12E+01	2.57E+01
		Cucumbers				9.24E+02	4.53E+04	3.99E+04	6.77E+01	1.65E+05	2.23E+03	1.37E+02
		Tomatoes				9.08E+02	4.46E+04	3.40E+04	6.07E+01	1.48E+05	2.71E+02	1.25E+02
		Chili				3.62E+02	1.77E+04	1.31E+04	2.37E+01	5.75E+04	8.83E+01	4.86E+01
		Onions				9.23E+02	4.53E+04	3.97E+04	6.74E+01	1.64E+05	9.06E+01	3.33E+01
		Potatoes				9.22E+02	4.52E+04	3.92E+04	5.95E+02	1.45E+06	1.84E+02	2.09E+02
	Herbs and Medicinal:	Navajo Tea				8.20E+01	4.02E+03	1.30E+03	1.08E+00	2.62E+03	1.87E+00	5.79E-01
		Sumac (skunkbush and other)										
		Rocky Mountain Juniper										
		Sagebrush										
		Mormon tea										
		Wild parsley										
		Corn tassels										
		Other Confidential Plants										

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	residential) Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**3.44E+01**	**1.21E+02**	**9.50E+00**	**1.05E+01**	**6.58E-01**	**7.96E+01**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	2.57E+03	9.03E+03	1.66E+02	1.83E+02	--	--
		Blue				2.57E+03	9.03E+03	1.66E+02	1.83E+02	--	--
		Yellow				5.14E+03	1.81E+04	3.32E+02	3.66E+02	8.29E+01	5.08E+02
		Red Speckled				8.57E+03	3.01E+04	5.54E+02	6.11E+02	--	--
		Sweet Corn				1.29E+04	4.52E+04	8.31E+02	9.16E+02	--	--
	Squash	Pumpkin				1.20E+04	4.23E+04	8.36E+02	9.21E+02	4.22E+01	1.02E+03
		Other Squash				3.01E+03	1.06E+04	2.09E+02	2.30E+02	2.64E+01	6.35E+02
	Melons	Watermelon				7.24E+03	2.54E+04	4.76E+03	5.25E+03	--	--
		Cantaloupe				7.24E+03	2.54E+04	4.76E+03	5.25E+03	6.87E+01	1.02E+03
	Tree Fruit	Apples				6.12E+03	2.15E+04	4.34E+03	4.78E+03	6.72E+01	1.02E+03
		Apricots				6.21E+03	2.18E+04	4.38E+03	4.83E+03	6.74E+01	1.02E+03
		Peaches				6.21E+03	2.18E+04	4.38E+03	4.83E+03	--	--
	Other Vegetables	Beans				3.65E+02	1.28E+03	3.49E+02	3.85E+02	--	--
		Brussels sprouts				7.74E+03	2.72E+04	6.26E+02	6.90E+02	--	--
		Cucumbers				1.23E+04	4.32E+04	8.37E+02	9.23E+02	--	--
		Tomatoes				3.96E+03	1.39E+04	7.50E+02	8.27E+02	--	--
		Chili				1.35E+03	4.73E+03	2.92E+02	3.22E+02	--	--
		Onions				1.13E+04	3.95E+04	1.48E+03	1.63E+03	--	--
		Potatoes				2.46E+04	8.64E+04	2.41E+03	2.66E+03	--	--
	Herbs and Medicinal:	Navajo Tea				4.41E+01	1.55E+02	1.46E+01	1.61E+01	7.14E-01	1.97E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kǫǫh bi łíí nakaí (sheep can					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**3.90E+03**	**2.02E+03**	**2.22E+00**	**5.39E+03**	**4.41E+00**	**1.33E+00**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.49E+04	2.17E+04	4.16E+02	1.01E+06	7.63E+02	5.05E+02
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				4.98E+04	4.38E+04	7.44E+01	1.81E+05	2.28E+03	1.51E+02
		Other Squash				3.12E+04	2.74E+04	4.65E+01	1.13E+05	1.42E+03	9.42E+01
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				4.98E+04	4.38E+04	1.11E+02	2.71E+05	2.28E+03	2.56E+02
	Tree Fruit	Apples				4.98E+04	4.34E+04	1.10E+02	2.68E+05	1.63E+03	2.53E+02
		Apricots				4.98E+04	4.34E+04	1.10E+02	2.68E+05	1.68E+03	2.53E+02
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				9.65E+03	3.11E+03	2.58E+00	6.29E+03	4.49E+00	1.39E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	np) Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**1.00E+02**	**3.52E+02**	**2.95E+01**	**3.26E+01**	**1.78E+00**	**4.92E+02**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				7.07E+03	2.48E+04	4.57E+02	5.04E+02	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				1.33E+04	4.65E+04	9.19E+02	1.01E+03	--	--
		Other Squash				8.28E+03	2.91E+04	5.74E+02	6.33E+02	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				1.99E+04	6.99E+04	1.31E+04	1.44E+04	--	--
	Tree Fruit	Apples				1.68E+04	5.91E+04	1.19E+04	1.32E+04	--	--
		Apricots				1.71E+04	6.00E+04	1.20E+04	1.33E+04	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.06E+02	3.71E+02	3.50E+01	3.86E+01	1.78E+00	4.92E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kọọ eí nahaazáh (easy access op					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**2.41E+04**	**7.77E+03**	**6.46E+00**	**1.57E+04**	**1.12E+01**	**3.47E+00**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.41E+04	7.77E+03	6.46E+00	1.57E+04	1.12E+01	3.47E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	(in pore space) Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Consumption		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	2.64E+02	9.28E+02	8.74E+01	9.64E+01	3.57E+00	9.84E+02
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				2.64E+02	9.28E+02	8.74E+01	9.64E+01	3.57E+00	9.84E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kọọ ei doo nahaazáh dah (difficult acce					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**4.83E+04**	**1.55E+04**	**1.29E+01**	**3.14E+04**	**2.24E+01**	**6.95E+00**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	--	--
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	--	--
	Melons	Watermelon				--	--	--	--	--	--
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				4.83E+04	1.55E+04	1.29E+01	3.14E+04	2.24E+01	6.95E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ss open space) Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**5.29E+02**	**1.86E+03**	**1.75E+02**	**1.93E+02**	**7.09E-01**	**1.76E+02**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				--	--	--	--	8.29E+02	5.08E+03
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				--	--	--	--	2.11E+02	5.08E+03
	Melons	Watermelon				--	--	--	--	3.44E+02	5.08E+03
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				5.29E+02	1.86E+03	1.75E+02	1.93E+02	7.14E-01	1.97E+02
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Chíí dah wiih łeezh (washes and dr					
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**8.65E+03**	**2.98E+03**	**2.55E+00**	**6.21E+03**	**4.48E+00**	**1.39E+00**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Blue				--	--	--	--	--	--
		Yellow				2.49E+05	2.17E+05	4.16E+03	1.01E+07	7.63E+03	5.05E+03
		Red Speckled				--	--	--	--	--	--
		Sweet Corn				--	--	--	--	--	--
	Squash	Pumpkin				--	--	--	--	--	--
		Other Squash				2.49E+05	2.19E+05	3.72E+02	9.05E+05	1.14E+04	7.54E+02
	Melons	Watermelon				2.49E+05	2.19E+05	5.57E+02	1.35E+06	1.14E+04	1.28E+03
		Cantaloupe				--	--	--	--	--	--
	Tree Fruit	Apples				--	--	--	--	--	--
		Apricots				--	--	--	--	--	--
		Peaches				--	--	--	--	--	--
	Other Vegetables	Beans				--	--	--	--	--	--
		Brussels sprouts				--	--	--	--	--	--
		Cucumbers				--	--	--	--	--	--
		Tomatoes				--	--	--	--	--	--
		Chili				--	--	--	--	--	--
		Onions				--	--	--	--	--	--
		Potatoes				--	--	--	--	--	--
	Herbs and Medicinal:	Navajo Tea				9.65E+03	3.11E+03	2.58E+00	6.29E+03	4.49E+00	1.39E+00
		Sumac (skunkbush and other)									
		Rocky Mountain Juniper									
		Sagebrush									
		Mormon tea									
		Wild parsley									
		Corn tassels									
		Other Confidential Plants									

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Outputs	Parameter		Symbol	Description	Units	ainages) Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Consumption of Produce Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Consumption**		$PRG_{soil,produce}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{p-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{p-ing}(i)}}$	pCi/g	**1.05E+02**	**3.70E+02**	**3.44E+01**	**3.80E+01**
	Corn	White	$PRG_{soil,produce}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{p-ing}(i) = \frac{PRG_{p-ing-plant}}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--
		Blue				--	--	--	--
		Yellow				7.07E+04	2.48E+05	4.57E+03	5.04E+03
		Red Speckled				--	--	--	--
		Sweet Corn				--	--	--	--
	Squash	Pumpkin				--	--	--	--
		Other Squash				6.63E+04	2.33E+05	4.60E+03	5.07E+03
	Melons	Watermelon				9.95E+04	3.49E+05	6.54E+04	7.21E+04
		Cantaloupe				--	--	--	--
	Tree Fruit	Apples				--	--	--	--
		Apricots				--	--	--	--
		Peaches				--	--	--	--
	Other Vegetables	Beans				--	--	--	--
		Brussels sprouts				--	--	--	--
		Cucumbers				--	--	--	--
		Tomatoes				--	--	--	--
		Chili				--	--	--	--
		Onions				--	--	--	--
		Potatoes				--	--	--	--
	Herbs and Medicinal:	Navajo Tea				1.06E+02	3.71E+02	3.50E+01	3.86E+01
		Sumac (skunkbush and other)							
		Rocky Mountain Juniper							
		Sagebrush							
		Mormon tea							
		Wild parsley							
		Corn tassels							
		Other Confidential Plants							

Attachment A - NAUM Calculation Tool

8 - Plant Consumption

Parameter	Decay Constant	Half-life		Wet Soil-to-plant transfer factors											
Symbol	λ			Woody Tree	Leaf	Root	Shrub	Non-Leafy Fruit	Maize Grain	Legume Seed	Tuber	Herbaceous	Sunflower Leaf	Maize Stems and Shoots	Cereal
Units	1/year	years		pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil
Isotope															
Ac-228	9.87E+02	7.02E-04		1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03
At-218	1.46E+07	4.76E-08		2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01
Bi-210	5.05E+01	1.37E-02		1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Bi-212	6.02E+03	1.15E-04		1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Bi-214	1.83E+04	3.79E-05		1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Hg-206	4.47E+04	1.55E-05		3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01
K-40	5.54E-10	1.25E+09		3.00E-01	1.30E+00	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	1.30E+00	3.00E-01	7.40E-01
Pa-234	9.06E+02	7.65E-04		1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
Pa-234m	3.11E+05	2.23E-06		1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
Pb-210	3.12E-02	2.22E+01		1.00E-02	8.00E-02	1.50E-02	1.00E-02	1.50E-02	1.20E-03	5.30E-03	1.50E-03	1.00E-02	8.00E-02	2.80E-03	1.10E-02
Pb-212	5.71E+02	1.21E-03		1.00E-02	8.00E-02	1.50E-02	1.00E-02	1.50E-02	1.20E-03	5.30E-03	1.50E-03	1.00E-02	8.00E-02	2.80E-03	1.10E-02
Pb-214	1.36E+04	5.10E-05		1.00E-02	8.00E-02	1.50E-02	1.00E-02	1.50E-02	1.20E-03	5.30E-03	1.50E-03	1.00E-02	8.00E-02	2.80E-03	1.10E-02
Po-210	1.83E+00	3.79E-01		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-212	7.31E+13	9.48E-15		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-214	1.33E+11	5.21E-12		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-216	1.51E+08	4.60E-09		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-218	1.17E+05	5.90E-06		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Ra-224	6.91E+01	1.00E-02		1.00E-02	9.10E-02	7.00E-02	1.00E-02	1.70E-02	2.40E-03	1.40E-02	1.10E-02	1.00E-02	4.20E-01	1.80E-02	1.70E-02
Ra-226	4.33E-04	1.60E+03		1.00E-02	9.10E-02	7.00E-02	1.00E-02	1.70E-02	2.40E-03	1.40E-02	1.10E-02	1.00E-02	4.20E-01	1.80E-02	1.70E-02
Ra-228	1.21E-01	5.75E+00		1.00E-02	9.10E-02	7.00E-02	1.00E-02	1.70E-02	2.40E-03	1.40E-02	1.10E-02	1.00E-02	4.20E-01	1.80E-02	1.70E-02
Rn-218	6.24E+08	1.11E-09		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn-220	3.93E+05	1.76E-06		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn-222	6.62E+01	1.05E-02		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Th-228	3.63E-01	1.91E+00		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Th-230	9.19E-06	7.54E+04		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Th-232	4.93E-11	1.41E+10		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Th-234	1.05E+01	6.60E-02		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Tl-206	8.67E+04	7.99E-06		8.00E-05	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04
Tl-208	1.19E+05	5.81E-06		8.00E-05	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04
Tl-210	2.80E+05	2.47E-06		8.00E-05	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04
U-234	2.82E-06	2.46E+05		1.00E-03	2.00E-02	8.40E-03	1.00E-03	1.50E-02	1.50E-02	2.20E-03	5.00E-03	1.00E-03	7.10E-02	7.80E-03	6.20E-03
U-238	1.55E-10	4.47E+09		1.00E-03	2.00E-02	8.40E-03	1.00E-03	1.50E-02	1.50E-02	2.20E-03	5.00E-03	1.00E-03	7.10E-02	7.80E-03	6.20E-03

Notes:
All transfer factors are from USEPA 2020, with the following exceptions:
Sunflower leaf transfer factors for Ra and U are taken from IAEA 2010. Transfer factors for all other radionuclides are from USEPA 2020.
Maize stems and shoots transfer factors for Pb, Ra, Th, and U are taken from IAEA 2010. Transfer factors for other radionuclides are based on maize grain from USEPA 2020.
Consideration was given to transfer factors for arid climates published by IAEA (IAEA 2021); however, based on the following reasons, these transfer factors are not incorporated in the calculation at this time:

1. Arid transfer factor data are missing for many significant radionuclides and plant types.
2. Most arid transfer factor data were collected from clay soil types, with fewer data from sand, loamy soil, and other soil types. Only a few radionuclides and plant types have data for sand, which is more appropriate for the NAUM sites.

Sources:
USEPA. 2020. Preliminary Remediation Goals for Radionuclides (PRG) Calculator. Downloaded November 2.
IAEA. 2010. Handbook of Parameter Values for the Prediction of Radionuclide Transfer in Terrestrial and Freshwater Environments. Technical Reports Series No. 472.
IAEA. 2021. Soil-Plant Transfer of Radionuclides in Non-temperate Environments, Report of Working Group 4, Transfer Processes and Data for Radiological Impact Assessment Subgroup 3 on Non-temperate Data. September.

Attachment A - NAUM Calculation Tool

9 - Animal Consumption

Animal Consumption Exposure Pathway

Selection =	Arsenic	Type = Metal	Concentration =	1	mg/kg

Cleanup Target and Risks [1,6]			Units	User-Specified Scenario	Navajo Nation Reference Scenarios					USEPA Default Scenario
Outputs	Parameter	Description		Custom	Kee'da'whíí téél (full-time Navajo residential)	Kǫǫh bí łíí nakaí (sheep camp)	Kǫǫ eí nahaazáh (easy access open space)	Kǫǫ eí doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)	PRG and RSL Calculator Default Resident
Cleanup Targets	Metal Cancer $PRG_{a\text{-}ing}$	Preliminary Remediation Goal based on the cancer toxicity for selected metal	mg/kg	10.1	24.8	54	109	270	54	--
	Metal Noncancer $PRG_{a\text{-}ing}$ [2, 3]	Preliminary Remediation Goal based on the noncancer roxicity for selected metal	mg/kg	12.5	54.3	117	229	583	117	--
	Final Metal $PRG_{a\text{-}ing}$ [4, 5]	Preliminary Remediation Goal for the selected metal	mg/kg	10.1	24.8	54	109	270	54	--
Risks and Hazards	Cancer Risk - Metals	Lifetime cancer risk for the selected metal	-	9.9E-06	4.0E-06	1.9E-06	9.2E-07	3.7E-07	1.9E-06	--
	Noncancer Hazard - Metals	Noncancer hazard for the selected metal	-	8.0E-02	1.8E-02	8.5E-03	4.4E-03	1.7E-03	8.5E-03	--

Inputs	Parameter		Symbol	Description	Units	Custom	Kee'da'whíí téél (full-time Navajo residential)	Kǫǫh bí łíí nakaí (sheep camp)	Kǫǫ eí nahaazáh (easy access open space)	Kǫǫ eí doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)
Contamination Fractions by Animal Type - Regular Consumption, Annual Average [8]	Domestic	Chicken	CF	The fraction of an animal product consumed by the receptor that was from onsite sources (as opposed to purchased commercially from sources that are not anticipated to include the site as a grazing area). Source for defaults: NNEPA 2021.	unitless	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
		Chicken Eggs				75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
		Beef				25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
		Milk - Cow				1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
		Pig				5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
		Goat				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Milk - Goat				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Sheep				90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
		Milk - Sheep				90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
		Horse				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Domesticated Turkey				5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
	Wild	Wild Turkey				2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
		Deer				2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
		Elk				2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
		Rabbit				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Prairie Dog				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Badger				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exposure Unit Area	Domestic and Wild	All animals	EUA	The area of the exposure unit being assessed.	acres	159.00	0.50	0.50	0.50	0.50	0.50
Home Range by Animal Type - Regular Consumption [8]	Domestic	Chicken	HR_A	The home range of the animal. Animal-specific home range areas are referenced at the bottom of this worksheet.	acres	0.00574					
		Chicken Eggs				0.00574					
		Beef				3					
		Milk - Cow				3					
		Pig				0.0833					
		Goat				0.25					
		Milk - Goat				0.25					
		Sheep				0.25					
		Milk - Sheep				0.25					
		Horse				30					
		Domesticated Turkey				0.0011					
	Wild	Wild Turkey				3,200					
		Deer				2,560					
		Elk				12,850					
		Rabbit				1					
		Prairie Dog				0.37					
		Badger				667					
Site Use Factor by Animal Type - Regular Consumption	Domestic	Chicken	SUF_A	The site use factor is the total area the animal is assumed to need to graze over to fulfull its forage needs. For some animals (chicken, pig, goats, and domestic turkeys), this is the same as the home range. For others (beef, milk cows, and sheep), the animal is assumed to graze over an area equivalent to that for five cows, eight sheep, and one horse. This allows for the consumption of animals while allowing replacment through breeding.	acres	0.00574					
		Chicken Eggs				0.00574					
		Beef				47					
		Milk - Cow				47					
		Pig				0.0833					
		Goat				0.25					
		Milk - Goat				0.25					
		Sheep				47					
		Milk - Sheep				47					
		Horse				47					
		Domesticated Turkey				0.0011					
	Wild	Wild Turkey				3,200					
		Deer				2,560					
		Elk				12,850					
		Rabbit				1					
		Prairie Dog				0.37					
		Badger				667					

Attachment A - NAUM Calculation Tool

9 - Animal Consumption

Spatial Fraction Onsite [8]	**Domestic**	Chicken	SPF	The ratio of the site to the animal's home range, expressed as a percentage (with a maximum of 100%).	Percent	100%	100%	100%	100%	100%	100%
		Chicken Eggs				100%	100%	100%	100%	100%	100%
		Beef				100.0%	1.1%	1.1%	1.1%	1.1%	1.1%
		Milk - Cow				100.0%	1.1%	1.1%	1.1%	1.1%	1.1%
		Pig				100%	100%	100%	100%	100%	100%
		Goat				100%	100%	100%	100%	100%	100%
		Milk - Goat				100%	100%	100%	100%	100%	100%
		Sheep				100.0%	1.1%	1.1%	1.1%	1.1%	1.1%
		Milk - Sheep				100.0%	1.1%	1.1%	1.1%	1.1%	1.1%
		Horse				100.0%	1.1%	1.1%	1.1%	1.1%	1.1%
		Domesticated Turkey				100%	100%	100%	100%	100%	100%
	Wild	Wild Turkey				4.969%	0.016%	0.016%	0.016%	0.016%	0.016%
		Deer				6.211%	0.020%	0.020%	0.020%	0.020%	0.020%
		Elk				1.2374%	0.0039%	0.0039%	0.0039%	0.0039%	0.0039%
		Rabbit				100%	50%	50%	50%	50%	50%
		Prairie Dog				100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Badger				23.838%	0.075%	0.075%	0.075%	0.075%	0.075%
Time Fraction Onsite [8]	**Domestic**	Chicken	TF	The fraction of time that the animal spends grazing in areas that can include the site. Source for defaults: NNEPA 2021.	Percent	**100.0%**	100.0%	0.0%	0.0%	0.0%	0.0%
		Chicken Eggs				**100.0%**	100.0%	0.0%	0.0%	0.0%	0.0%
		Beef				**100.0%**	100.0%	41.7%	16.7%	8.3%	41.7%
		Milk - Cow				**100.0%**	100.0%	41.7%	16.7%	8.3%	41.7%
		Pig				**100.0%**	100.0%	0.0%	0.0%	0.0%	0.0%
		Goat				**100.0%**	100.0%	41.7%	16.7%	8.3%	41.7%
		Milk - Goat				**100.0%**	100.0%	41.7%	16.7%	8.3%	41.7%
		Sheep				**100.0%**	100.0%	41.7%	16.7%	8.3%	41.7%
		Milk - Sheep				**100.0%**	100.0%	41.7%	16.7%	8.3%	41.7%
		Horse				**100.0%**	100.0%	41.7%	16.7%	8.3%	41.7%
		Domesticated Turkey				**100.0%**	100.0%	0.0%	0.0%	0.0%	0.0%
	Wild	Wild Turkey				**100.0%**	100.0%	100.0%	100.0%	20.0%	100.0%
		Deer				**100.0%**	100.0%	100.0%	100.0%	20.0%	100.0%
		Elk				**100.0%**	100.0%	100.0%	100.0%	20.0%	100.0%
		Rabbit				**100.0%**	100.0%	100.0%	100.0%	20.0%	100.0%
		Prairie Dog				**100.0%**	100.0%	100.0%	100.0%	20.0%	100.0%
		Badger				**100.0%**	100.0%	100.0%	100.0%	20.0%	100.0%
Fraction of Forage Grown Onsite	**Domestic**	Chicken	f_p	The fraction of forage consumed by the animal that is grown onsite. This is calculated as the spatial fraction onsite multiplied by the time fraction onsite.	unitless	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%
		Chicken Eggs				100.0%	100.0%	0.0%	0.0%	0.0%	0.0%
		Beef				100.0%	1.1%	0.4%	0.2%	0.1%	0.4%
		Milk - Cow				100.0%	1.1%	0.4%	0.2%	0.1%	0.4%
		Pig				100.0%	100.0%	0.0%	0.0%	0.0%	0.0%
		Goat				100.0%	100.0%	41.7%	16.7%	8.3%	41.7%
		Milk - Goat				100.0%	100.0%	41.7%	16.7%	8.3%	41.7%
		Sheep				100.0%	1.1%	0.4%	0.2%	0.1%	0.4%
		Milk - Sheep				100.0%	1.1%	0.4%	0.2%	0.1%	0.4%
		Horse				100.0%	1.1%	0.44%	0.18%	0.09%	0.44%
		Domesticated Turkey				100.0%	100.0%	0.0%	0.0%	0.0%	0.0%
	Wild	Wild Turkey				4.969%	0.016%	0.016%	0.016%	0.0031%	0.016%
		Deer				6.211%	0.020%	0.020%	0.020%	0.0039%	0.020%
		Elk				1.2374%	0.0039%	0.0039%	0.0039%	0.00078%	0.0039%
		Rabbit				100.0%	50.0%	50.0%	50.0%	10.0%	50.0%
		Prairie Dog				100.0%	100.0%	100.0%	100.0%	20.0%	100.0%
		Badger				23.838%	0.075%	0.075%	0.075%	0.015%	0.075%
Fraction of Soil Consumed onsite	**Domestic**	Chicken	f_s	The fraction of soil consumed by the animal that is grown onsite. This is calculated as the time fraction onsite multiplied by the ratio of the exposure unit area to the animal's home range (with a maximum of 100% for the spatial ratio). Since the soil consumed by an animal is generally consumed along with the forage consumed, this is the same as the fraction of forage grown onsite.	unitless	100%	100%	0%	0%	0%	0%
		Chicken Eggs				100%	100%	0%	0%	0%	0%
		Beef				100.0%	16.7%	6.9%	2.8%	1.4%	6.9%
		Milk - Cow				100.0%	16.7%	6.9%	2.8%	1.4%	6.9%
		Pig				100%	100%	0%	0%	0%	0%
		Goat				100%	100%	41.7%	16.7%	8.3%	41.7%
		Milk - Goat				100%	100%	41.7%	16.7%	8.3%	41.7%
		Sheep				100%	100%	41.7%	16.7%	8.3%	41.7%
		Milk - Sheep				100%	100%	41.7%	16.7%	8.3%	41.7%
		Horse				100.0%	1.7%	1%	0%	0%	1%
		Domesticated Turkey				100%	100%	0%	0%	0%	0%
	Wild	Wild Turkey				5.0%	0.016%	0.016%	0.016%	0.0031%	0.016%
		Deer				6.2%	0.0195%	0.0195%	0.0195%	0.0039%	0.020%
		Elk				1.2374%	0.0039%	0.0039%	0.0039%	0.00078%	0.0039%
		Rabbit				100.0%	50.0%	50.0%	50.0%	10.0%	50.0%
		Prairie Dog				100%	100%	100%	100%	20%	100%
		Badger				23.838%	0.075%	0.075%	0.075%	0.0150%	0.075%

Attachment A - NAUM Calculation Tool

9 - Animal Consumption

Inputs	Parameter		Symbol	Description	Units	Custom	Kee'da'whíí téél (full-time Navajo residential)	Kǫǫh bí łíí nakaí (sheep camp)	Kǫǫ eí nahaazáh (easy access open space)	Kǫǫ eí doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)
Total Animal Consumption	Total Animal Ingestion Rate - Adult		IR_{total}	Total mass of animal products eaten per day - adult. Source for defaults: NNEPA 2021.	g fresh weight/day	560.29	983	983	983	983	983.0
	Total Animal Ingestion Rate - Child			Total mass of animal products eaten per day - child. Source for defaults: Half of adult values.		491.5	491.5	491.5	491.5	491.5	491.5
Diet Fraction by Animal Product Type	**Total Animal Products**		DF	Diet fraction for animal products consumed on a regular basis. Source for defaults: NNEPA 2021.	Percent	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
	Domestic	Chicken				18.0%	20.0%	20.0%	20.0%	20.0%	20.0%
		Chicken Eggs				12.0%	7.0%	7.0%	7.0%	7.0%	7.0%
		Beef				21.0%	25.0%	25.0%	25.0%	25.0%	25.0%
		Milk - Cow				11.0%	6.0%	6.0%	6.0%	6.0%	6.0%
		Pig				6.0%	7.0%	7.0%	7.0%	7.0%	7.0%
		Goat				4.0%	5.0%	5.0%	5.0%	5.0%	5.0%
		Goat Milk				2.0%	1.0%	1.0%	1.0%	1.0%	1.0%
		Sheep				17.0%	20.0%	20.0%	20.0%	20.0%	20.0%
		Sheep Milk				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Horse				0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
		Domesticated Turkey				0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
	Wild	Wild Turkey				0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
		Deer				3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
		Elk				3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
		Rabbit				0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
		Prairie Dog				1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
		Badger				0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Ingestion Rate by Animal Product Type - Adult	**Total Animal Products**		IR_a	Ingestion rates for animal products consumed on a regular basis, adult receptors. $IR_a = (IR_{a,total} \times DF \times CF)$	g fresh weight/day	**560**	**983**	**983**	**983**	**983**	**983**
	Domestic	Chicken				101	197	197	197	197	197
		Chicken Eggs				67	69	69	69	69	69
		Beef				118	246	246	246	246	246
		Milk - Cow				62	59	59	59	59	59
		Pig				34	69	69	69	69	69
		Goat				22	49	49	49	49	49
		Goat Milk				11	10	10	10	10	10
		Sheep				95	197	197	197	197	197
		Sheep Milk				0	0	0	0	0	0
		Horse				3	5	5	5	5	5
		Domesticated Turkey				2	3	3	3	3	3
	Wild	Wild Turkey				1	2	2	2	2	2
		Deer				17	29	29	29	29	29
		Elk				17	29	29	29	29	29
		Rabbit				3	5	5	5	5	5
		Prairie Dog				6	10	10	10	10	10
		Badger				3	5	5	5	5	5
Ingestion Rate by Animal Product Type - Child	**Total Animal Products**		IR_c	Ingestion rates for animal products consumed on a regular basis, child receptors. $IR_c = (IR_{c,total} \times DF \times CF)$	g fresh weight/day	**491.5**	**491.5**	**491.5**	**491.5**	**491.5**	**491.5**
	Domestic	Chicken				88	88	88	88	88	88
		Chicken Eggs				59	59	59	59	59	59
		Beef				103	103	103	103	103	103
		Milk - Cow				54	54	54	54	54	54
		Pig				29	29	29	29	29	29
		Goat				20	20	20	20	20	20
		Goat Milk				10	10	10	10	10	10
		Sheep				84	84	84	84	84	84
		Sheep Milk				0	0	0	0	0	0
		Horse				2	2	2	2	2	2
		Domesticated Turkey				1	1	1	1	1	1
	Wild	Wild Turkey				1	1	1	1	1	1
		Deer				15	15	15	15	15	15
		Elk				15	15	15	15	15	15
		Rabbit				2	2	2	2	2	2
		Prairie Dog				5	5	5	5	5	5
		Badger				2	2	2	2	2	2

Attachment A - NAUM Calculation Tool

9 - Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Custom	Kee'da'whíí tééh (full-time Navajo residential)	Kǫǫh bí łíí nakaí (sheep camp)	Kǫǫ eí nahaazáh (easy access open space)	Kǫǫ eí doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)
Pathway-Specific Constants	Mass-Loading Factor for Pasture		$MLF_{pasture}$	The amount, or mass, of soil that adheres to the plant surface		grams-dry soil/grams-dry	0.25					
	Density of Milk		ρ_m	The density of milk produced by animals.		kg/L	1.03					
Fodder Intake Rate by Animal Product Type [9]	Domestic	Chicken	Q_p	The mass of fodder (Qp) consumed by the animal each day, based on the proxy animal listed in column F.	Chicken	kg dry fodder/day	0.2					
		Chicken Eggs			Chicken		0.2					
		Beef			Beef		11.77					
		Milk - Cow			Dairy		20.3					
		Pig			Swine		4.7					
		Goat			Goat		1.27					
		Goat Milk			Goat Milk		1.59					
		Sheep			Sheep		1.75					
		Sheep Milk			Sheep Milk		3.15					
		Horse			Beef		11.77					
		Domesticated Turkey			Turkey		0.68					
	Wild	Wild Turkey			Turkey		0.68					
		Deer			Beef		11.77					
		Elk			Beef		11.77					
		Rabbit			Goat		1.27					
		Prairie Dog			Goat		1.27					
		Badger			Goat		1.27					
Soil Intake Rate by Animal Product Type [9]	Domestic	Chicken	Q_s	The mass of soil (Qs) consumed by the animal each day, based on the proxy animal listed in column F.	Chicken	kg soil/day	0.022					
		Chicken Eggs			Chicken		0.022					
		Beef			Beef		0.5					
		Milk - Cow			Dairy		0.4					
		Pig			Swine		0.37					
		Goat			Goat		0.23					
		Goat Milk			Goat Milk		0.29					
		Sheep			Sheep		0.32					
		Sheep Milk			Sheep Milk		0.57					
		Horse			Beef		0.5					
		Domesticated Turkey			Turkey		0.068					
	Wild	Wild Turkey			Turkey		0.068					
		Deer			Beef		0.5					
		Elk			Beef		0.5					
		Rabbit			Goat		0.23					
		Prairie Dog			Goat		0.23					
		Badger			Goat		0.23					

Inputs	Parameter	Symbol	Description	Units	Custom	Kee'da'whíí tééh (full-time Navajo residential)	Kǫǫh bí łíí nakaí (sheep camp)	Kǫǫ eí nahaazáh (easy access open space)	Kǫǫ eí doo nahaazáh dah (difficult access open space)	Chíí dah wiih łeezh (washes and drainages)
Common Exposure Parameters	Exposure Duration - Adult	ED_a	Total years onsite	years	69	69	69	69	69	69
	Exposure Duration - Child	ED_c			6	6	6	6	6	6
	Averaging Time - Cancer	AT_c	Lifetime in days.	days	27,375	27,375	27,375	27,375	27,375	27,375
	Averaging Time - Noncancer - Adult	At_{nc-a}	Exposure duration x 365 days/year	days	25,185	25,185	25,185	25,185	25,185	25,185
	Averaging Time - Noncancer - Child	At_{nc-c}			2,190	2,190	2,190	2,190	2,190	2,190
	Consumption Exposure Frequency - Adult	CEF_a	The number of days per year the receptor consumes animal products that spend time onsite	days/year	350	350	350	350	350	350
	Consumption Exposure Frequency - Child	CEF_c			350	350	350	350	350	350
	Body Weight - Adult	BW_a	Average body weight	kg	80	80	80	80	80	80
	Body Weight - Child	BW_c			15	15	15	15	15	15
Risk and Toxicity	Target Risk	TR	The selected target cancer risk.	-	1E-04					
	Target Hazard Quotient	THQ	The selected target noncancer hazard quotient.	-	1					
	Oral Slope Factor - Food	SF_f	The isotope-specific cancer toxicity value for food ingestion pathway.	risk/pCi	--					
			The metal-specific cancer toxicity value for ingestion pathways.	$(mg/kg\text{-}day)^{-1}$	1.50E+00					
	Oral Reference Dose	RfD	The metal-specific non-cancer toxicity value for ingestion pathways.	mg/kg-day	3.00E-04					
	Conversion Factor 6	CF6	Conversion from kilograms to grams	kg/g	0.001					
	Conversion Factor 7	CF7	Convert pCi to Bq	pCi/Bq	27.027					

Attachment A - NAUM Calculation Tool

9 - Animal Consumption

Age-Adjusted Ingestion Fraction for Radionuclides by Animal Product Type	**Domestic**	Chicken	IF_{adj}	Age-adjusted ingestion fraction for animal products for radionuclide PRGs and risk. $IF_{adj} = (EF_c \times ED_c \times IR_c) + (EF_a \times ED_a \times IR_a)$	grams	2,621,368	4,933,677	4,933,677	4,933,677	4,933,677	4,933,677
		Chicken Eggs				1,747,578	1,785,620	1,785,620	1,785,620	1,785,620	1,785,620
		Beef				3,058,262	6,151,614	6,151,614	6,151,614	6,151,614	6,151,614
		Milk - Cow				1,601,947	1,537,904	1,537,904	1,537,904	1,537,904	1,537,904
		Pig				873,789	1,723,691	1,723,691	1,723,691	1,723,691	1,723,691
		Goat				582,526	1,228,259	1,228,259	1,228,259	1,228,259	1,228,259
		Goat Milk				291,263	258,038	258,038	258,038	258,038	258,038
		Sheep				2,475,736	4,923,356	4,923,356	4,923,356	4,923,356	4,923,356
		Sheep Milk				--	--	--	--	--	--
		Horse				72,816	123,858	123,858	123,858	123,858	123,858
		Domesticated Turkey				43,689	74,315	74,315	74,315	74,315	74,315
	Wild	Wild Turkey				29,126	49,543	49,543	49,543	49,543	49,543
		Deer				436,895	743,148	743,148	743,148	743,148	743,148
		Elk				436,895	743,148	743,148	743,148	743,148	743,148
		Rabbit				72,816	123,858	123,858	123,858	123,858	123,858
		Prairie Dog				145,632	247,716	247,716	247,716	247,716	247,716
		Badger				72,816	123,858	123,858	123,858	123,858	123,858
Age-Adjusted Ingestion Rate for Metals by Animal Product Type	**Domestic**	Chicken	IR_{adj}	Age-adjusted ingestion rate for animal products for metal PRGs and risk. $IR_{adj} = \frac{(EF_c \times ED_c \times IR_c)}{BW_c} + \frac{(EF_a \times ED_a \times IR_a)}{BW_a}$	grams/ kilogram	42,831	71,734	71,734	71,734	71,734	71,734
		Chicken Eggs				28,554	29,029	29,029	29,029	29,029	29,029
		Beef				49,969	88,636	88,636	88,636	88,636	88,636
		Milk - Cow				26,174	25,374	25,374	25,374	25,374	25,374
		Pig				14,277	24,901	24,901	24,901	24,901	24,901
		Goat				9,518	17,590	17,590	17,590	17,590	17,590
		Goat Milk				4,759	4,344	4,344	4,344	4,344	4,344
		Sheep				40,451	71,046	71,046	71,046	71,046	71,046
		Sheep Milk				--	--	--	--	--	--
		Horse				1,190	1,828	1,828	1,828	1,828	1,828
		Domesticated Turkey				714	1,097	1,097	1,097	1,097	1,097
	Wild	Wild Turkey				476	731	731	731	731	731
		Deer				7,138	10,967	10,967	10,967	10,967	10,967
		Elk				7,138	10,967	10,967	10,967	10,967	10,967
		Rabbit				1,190	1,828	1,828	1,828	1,828	1,828
		Prairie Dog				2,379	3,656	3,656	3,656	3,656	3,656
		Badger				1,190	1,828	1,828	1,828	1,828	1,828

Notes:

1 This calculator does not contain all the animal types available in the USEPA PRG calculator, and some animal types included here are not available in that calculator.
2 The PRGs are calculated for the six scenarios in the tables below the notes (rows 314 through 675), and are looked up in rows 6 through 9 for the selected metal or radionuclide.
3 Pathway-specific radionuclide PRG for ingestion of animal products.
4 The noncancer PRG is the lower of the child and adult noncancer hazard PRG.
5 Pathway-specific metal PRG for ingestion of animal products.
6 The final metal PRG is the lower of the cancer risk PRG and the noncancer hazard PRG.
7 The risk and hazards are back-calculated using the selected TR or THQ, the appropriate PRG, and the concentration.
8 The default ingestion rates for the default farmer are directly entered since the diet fraction for this default receptor varies for adults and children in the EPA PRG calculator. Fish is not available in this calculator.
9 Contamination fractions, home ranges, and time fractions onsite are entered as preliminary values in this version of the calculator, and may be updated based on input from NNEPA and EPA.
Fodder and soil intake rates for domestic animals are from the PRG Online Calculator. For wild animals, fodder and soil intake rates are set based on similar animal sizes, as follows:
- Horse uses intake rates for beef from the PRG Online Calculator.
- Wild turkey uses intake rates for domestic turkey from the PRG Online Calculator.
- Deer and elk use the intake rates for beef from the PRG Online Calculator.
- Rabbit, prairie dogs, and badger use intake rate for the goat from the PRG Online Calculator.

Note that for radionuclides, only 4 can be selected for summary-level input: Ra-226 in SE, U-238 in SE, Th-232 in SE, and K-40, but detailed calculations are shown for 5 other individual radionuclides.

g/day	Grams per day
kg/day	Kilograms per day
kg/L	Kilogram per liter
mg/kg	Milligrams per kilogram
mg/kg-day	Milligrams per kilogram per day
pCi	Picocuries
pCi/day	Picocuries per day
pCi/g	Picocuries per gram
pCi/kg	Picocuries per kilogram

Equations:

$$PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$$

$$Risk = \sum_{i=1}^{n} Risk(i)$$

Formatting guide:		
Type of Worksheet Cell	**Category 1**	**Category 2**
User-editable inputs	**Inputs that can be changed, but only on the current worksheet. Most inputs have limits on the minimum and maximum values.**	**Inputs that can be changed, appear on the current worksheet AND other worksheets, and can be changed on any worksheet they appear on. These will update automatically if changed on any worksheet.**
Non-editable inputs	Inputs that are not receptor-specific. Some are entered on a different worksheet, others are calculated from editable inputs on this worksheet or another worksheet.	Receptor-specific inputs which cannot be edited by the user. Different shades of orange indicate the custom scenario (lightest), Navajo scenarios (lighter) and the USEPA default scenario (darker).
Input headers	In the input receptor column headers, different shades of green in indicate the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	In the input header rows and non-receptor column headers (such as this table), the medium shade indicates summary-level headers, and lightest shade indicates more detailed header information.
Outputs	Different shades of blue indicate outputs for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.
Output headers	Different shades of yellow indicate output headers for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	1.5	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	4.00E-03	2.00E-01	3.60E-02	1.50E-01	1.00E-02	3.64E-01	7.50E-03	2.00E-02	4.00E-01	4.00E-03
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	--	--	--	--	1.06E-01	--	--	--	--
		Chicken Eggs			Eggs		--	--	--	--	--	2.50E-03	--	--	--	--
		Beef			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Milk - Cow			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Pig			Swine		--	--	--	--	--	1.91E-04	--	--	--	--
		Goat			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Goat Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Sheep			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Sheep Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Horse			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Domesticated Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
	Wild	Wild Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
		Deer			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Elk			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Rabbit			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Prairie Dog			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Badger			Swine		--	--	--	--	--	1.91E-04	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Custom Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Cancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	--	--	1.01E+01	--	--	--	--	--	--	--
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	1.89E+01	--	--	--	--	--	--	--
		Milk - Cow				--	--	1.87E+04	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	1.62E+02	--	--	--	--	--	--	--
		Goat Milk				--	--	8.58E+03	--	--	--	--	--	--	--
		Sheep				--	--	3.05E+01	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	1.98E+02	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	2.66E+04	--	--	--	--	--	--	--
		Elk				--	--	1.34E+05	--	--	--	--	--	--	--
		Rabbit				--	--	1.29E+03	--	--	--	--	--	--	--
		Prairie Dog				--	--	6.46E+02	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Custom Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	6.05E+04	2.31E+01	1.25E+01	7.56E+04	1.80E+02	1.19E+01	2.43E+04	1.30E+00	1.68E+02	3.20E+03
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	2.30E+01	--	--	--	--
		Chicken Eggs				--	--	--	--	--	9.77E+01	--	--	--	--
		Beef				1.16E+05	4.18E+01	2.35E+01	1.55E+05	3.41E+02	6.54E+01	4.68E+04	2.47E+00	2.98E+02	6.08E+03
		Milk - Cow				2.60E+07	1.21E+04	2.33E+04	1.94E+06	1.13E+07	3.46E+04	5.14E+06	7.38E+02	5.68E+04	1.46E+07
		Pig				--	--	--	--	--	1.71E+03	--	--	--	--
		Goat				9.60E+05	3.97E+02	2.01E+02	1.44E+06	2.84E+03	6.57E+02	3.90E+05	2.08E+01	3.02E+03	5.04E+04
		Goat Milk				1.15E+07	6.33E+03	1.07E+04	9.82E+05	5.03E+06	1.93E+04	2.28E+06	3.32E+02	3.21E+04	6.42E+06
		Sheep				1.81E+05	7.51E+01	3.80E+01	2.72E+05	5.37E+02	1.24E+02	7.36E+04	3.94E+00	5.71E+02	9.52E+03
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.22E+06	4.39E+02	2.47E+02	1.63E+06	3.58E+03	6.87E+02	4.92E+05	2.60E+01	3.12E+03	6.38E+04
		Domesticated Turkey				--	--	--	--	--	4.11E+02	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	3.10E+04	--	--	--	--
		Deer				1.63E+08	5.89E+04	3.31E+04	2.19E+08	4.80E+05	9.21E+04	6.60E+07	3.48E+03	4.19E+05	8.57E+06
		Elk				8.19E+08	2.96E+05	1.66E+05	1.10E+09	2.41E+06	4.62E+05	3.31E+08	1.75E+04	2.10E+06	4.30E+07
		Rabbit				7.68E+06	3.18E+03	1.61E+03	1.15E+07	2.27E+04	5.25E+03	3.12E+06	1.67E+02	2.41E+04	4.03E+05
		Prairie Dog				3.84E+06	1.59E+03	8.05E+02	5.75E+06	1.14E+04	2.63E+03	1.56E+06	8.33E+01	1.21E+04	2.02E+05
		Badger				--	--	--	--	--	1.38E+04	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	2.50E-01	0.00E+00	2.50E-01	3.20E-02	1.60E-02	4.00E-01	4.00E-03	8.50E-03	5.50E-03	2.50E-01
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Chicken Eggs			Eggs		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Beef			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Milk - Cow			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Pig			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04
		Goat			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Goat Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Sheep			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Sheep Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Horse			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Domesticated Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
	Wild	Wild Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Deer			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Elk			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Rabbit			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Prairie Dog			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Badger			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	**Cancer Soil PRG for Total Animal Consumption**		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--	--
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	--	--	--	--	--	--	--	--
		Milk - Cow				--	--	--	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	--	--	--	--	--	--	--	--	--
		Sheep				--	--	--	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	--	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	--	--	--	--	--	--	--	--
		Elk				--	--	--	--	--	--	--	--	--	--
		Rabbit				--	--	--	--	--	--	--	--	--	--
		Prairie Dog				--	--	--	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	**Noncancer Soil PRG for Total Animal Consumption**		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	**3.05E+03**	**4.74E+00**	**4.38E+01**	**2.79E+02**	**1.53E+01**	**5.17E+01**	**2.28E-02**	**7.70E+01**	**1.82E+02**	**5.88E+04**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	6.16E+02	--	--	2.09E+02	--	--	--	--	9.94E+05
		Chicken Eggs				--	6.16E+01	--	--	2.09E+01	--	--	--	--	9.94E+04
		Beef				5.70E+03	1.01E+01	7.91E+01	5.29E+02	3.69E+02	1.24E+02	4.34E-02	1.71E+02	3.46E+02	3.16E+05
		Milk - Cow				1.88E+05	7.01E+02	9.14E+03	9.45E+04	4.26E+03	5.32E+02	2.60E+01	1.71E+03	1.29E+06	2.53E+07
		Pig				--	6.08E+04	--	--	1.74E+02	--	--	--	--	9.17E+06
		Goat				5.52E+04	8.35E+01	7.67E+02	4.51E+03	3.09E+03	1.26E+03	3.60E-01	1.43E+03	2.87E+03	3.07E+06
		Goat Milk				1.01E+05	3.07E+02	4.89E+03	4.31E+04	1.91E+03	3.01E+02	1.15E+01	7.57E+02	5.71E+05	1.35E+07
		Sheep				1.04E+04	1.58E+01	1.45E+02	8.52E+02	5.85E+02	2.38E+02	6.80E-02	2.69E+02	5.42E+02	5.80E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				5.98E+04	1.06E+02	8.31E+02	5.56E+03	3.87E+03	1.30E+03	4.56E-01	1.80E+03	3.63E+03	3.32E+06
		Domesticated Turkey				--	1.12E+04	--	--	3.78E+03	--	--	--	--	1.78E+07
	Wild	Wild Turkey				--	8.44E+05	--	--	2.86E+05	--	--	--	--	1.35E+09
		Deer				8.03E+06	1.43E+04	1.11E+05	7.45E+05	5.19E+05	1.75E+05	6.12E+01	2.41E+05	4.87E+05	4.46E+08
		Elk				4.03E+07	7.16E+04	5.60E+05	3.74E+06	2.61E+06	8.77E+05	3.07E+02	1.21E+06	2.44E+06	2.24E+09
		Rabbit				4.42E+05	6.68E+02	6.13E+03	3.61E+04	2.47E+04	1.01E+04	2.88E+00	1.14E+04	2.30E+04	2.45E+07
		Prairie Dog				2.21E+05	3.34E+02	3.07E+03	1.80E+04	1.24E+04	5.03E+03	1.44E+00	5.70E+03	1.15E+04	1.23E+07
		Badger				--	4.32E+05	--	--	1.25E+03	--	--	--	--	7.25E+07

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	1.5	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	4.00E-03	2.00E-01	3.60E-02	1.50E-01	1.00E-02	3.64E-01	7.50E-03	2.00E-02	4.00E-01	4.00E-03
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	--	--	--	--	1.06E-01	--	--	--	--
		Chicken Eggs			Eggs		--	--	--	--	--	2.50E-03	--	--	--	--
		Beef			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Milk - Cow			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Pig			Swine		--	--	--	--	--	1.91E-04	--	--	--	--
		Goat			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Goat Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Sheep			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Sheep Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Horse			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Domesticated Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
	Wild	Wild Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
		Deer			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Elk			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Rabbit			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Prairie Dog			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Badger			Swine		--	--	--	--	--	1.91E-04	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Kee'da'whii teeh (full-time Navajo residential) Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Cancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	--	--	**2.48E+01**	--	--	--	--	--	--	--
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	3.46E+02	--	--	--	--	--	--	--
		Milk - Cow				--	--	9.33E+05	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	8.75E+01	--	--	--	--	--	--	--
		Goat Milk				--	--	9.40E+03	--	--	--	--	--	--	--
		Sheep				--	--	4.39E+01	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	1.13E+04	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	5.51E+06	--	--	--	--	--	--	--
		Elk				--	--	2.77E+07	--	--	--	--	--	--	--
		Rabbit				--	--	1.68E+03	--	--	--	--	--	--	--
		Prairie Dog				--	--	4.21E+02	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Kee'da'whii teeh (full-time Navajo residential) Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	**2.44E+05**	**1.25E+02**	**5.43E+01**	**3.04E+05**	**7.45E+02**	**1.64E+01**	**9.75E+04**	**5.45E+00**	**1.07E+03**	**1.31E+04**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	2.30E+01	--	--	--	--
		Chicken Eggs				--	--	--	--	--	9.77E+01	--	--	--	--
		Beef				3.51E+06	1.74E+03	7.63E+02	6.06E+06	1.05E+04	3.15E+03	1.43E+06	7.76E+01	1.47E+04	1.84E+05
		Milk - Cow				1.19E+09	7.06E+05	1.13E+06	1.08E+08	5.24E+08	2.23E+06	2.37E+08	3.47E+04	3.73E+06	6.67E+08
		Pig				--	--	--	--	--	1.71E+03	--	--	--	--
		Goat				9.60E+05	3.97E+02	2.01E+02	1.44E+06	2.84E+03	6.57E+02	3.90E+05	2.08E+01	3.02E+03	5.04E+04
		Goat Milk				1.15E+07	6.33E+03	1.07E+04	9.82E+05	5.03E+06	1.93E+04	2.28E+06	3.32E+02	3.21E+04	6.42E+06
		Sheep				4.27E+05	2.53E+02	9.59E+01	8.47E+05	1.28E+03	5.23E+02	1.75E+05	9.60E+00	2.51E+03	2.24E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.06E+08	3.94E+04	2.16E+04	1.45E+08	3.11E+05	6.22E+04	4.28E+07	2.27E+03	2.84E+05	5.55E+06
		Domesticated Turkey				--	--	--	--	--	4.11E+02	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	9.87E+06	--	--	--	--
		Deer				5.19E+10	1.87E+07	1.05E+07	6.95E+10	1.53E+08	2.93E+07	2.10E+10	1.11E+06	1.33E+08	2.72E+09
		Elk				2.60E+11	9.41E+07	5.29E+07	3.49E+11	7.66E+08	1.47E+08	1.05E+11	5.56E+06	6.69E+08	1.37E+10
		Rabbit				1.54E+07	6.35E+03	3.22E+03	2.30E+07	4.55E+04	1.05E+04	6.23E+06	3.33E+02	4.82E+04	8.06E+05
		Prairie Dog				3.84E+06	1.59E+03	8.05E+02	5.75E+06	1.14E+04	2.63E+03	1.56E+06	8.33E+01	1.21E+04	2.02E+05
		Badger				--	--	--	--	--	4.40E+06	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	2.50E-01	0.00E+00	2.50E-01	3.20E-02	1.60E-02	4.00E-01	4.00E-03	8.50E-03	5.50E-03	2.50E-01
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Chicken Eggs			Eggs		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Beef			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Milk - Cow			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Pig			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04
		Goat			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Goat Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Sheep			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Sheep Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Horse			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Domesticated Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
	Wild	Wild Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Deer			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Elk			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Rabbit			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Prairie Dog			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Badger			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Cancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--	--
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	--	--	--	--	--	--	--	--
		Milk - Cow				--	--	--	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	--	--	--	--	--	--	--	--	--
		Sheep				--	--	--	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	--	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	--	--	--	--	--	--	--	--
		Elk				--	--	--	--	--	--	--	--	--	--
		Rabbit				--	--	--	--	--	--	--	--	--	--
		Prairie Dog				--	--	--	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	1.55E+04	1.48E+01	2.43E+02	1.18E+03	1.65E+01	1.81E+02	9.29E-02	2.49E+02	7.47E+02	8.14E+04
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	6.16E+02	--	--	2.09E+02	--	--	--	--	9.94E+05
		Chicken Eggs				--	6.16E+01	--	--	2.09E+01	--	--	--	--	9.94E+04
		Beef				2.49E+05	3.04E+02	3.46E+03	1.70E+04	1.15E+04	6.13E+03	1.32E+00	5.24E+03	1.05E+04	1.38E+07
		Milk - Cow				1.14E+07	3.18E+04	5.52E+05	4.54E+06	1.99E+05	3.49E+04	1.19E+03	7.87E+04	5.94E+07	1.53E+09
		Pig				--	6.08E+04	--	--	1.74E+02	--	--	--	--	9.17E+06
		Goat				5.52E+04	8.35E+01	7.67E+02	4.51E+03	3.09E+03	1.26E+03	3.60E-01	1.43E+03	2.87E+03	3.07E+06
		Goat Milk				1.01E+05	3.07E+02	4.89E+03	4.31E+04	1.91E+03	3.01E+02	1.15E+01	7.57E+02	5.71E+05	1.35E+07
		Sheep				3.79E+04	3.68E+01	5.26E+02	2.13E+03	1.41E+03	1.04E+03	1.60E-01	6.40E+02	1.28E+03	2.11E+06
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				5.38E+06	9.23E+03	7.48E+04	4.86E+05	3.37E+05	1.18E+05	3.96E+01	1.56E+05	3.16E+05	2.99E+08
		Domesticated Turkey				--	1.12E+04	--	--	3.78E+03	--	--	--	--	1.78E+07
	Wild	Wild Turkey				--	2.68E+08	--	--	9.08E+07	--	--	--	--	4.28E+11
		Deer				2.55E+09	4.53E+06	3.54E+07	2.37E+08	1.65E+08	5.55E+07	1.95E+04	7.67E+07	1.55E+08	1.42E+11
		Elk				1.28E+10	2.28E+07	1.78E+08	1.19E+09	8.29E+08	2.79E+08	9.77E+04	3.85E+08	7.77E+08	7.12E+11
		Rabbit				8.83E+05	1.34E+03	1.23E+04	7.22E+04	4.95E+04	2.01E+04	5.76E+00	2.28E+04	4.59E+04	4.91E+07
		Prairie Dog				2.21E+05	3.34E+02	3.07E+03	1.80E+04	1.24E+04	5.03E+03	1.44E+00	5.70E+03	1.15E+04	1.23E+07
		Badger				--	1.37E+08	--	--	3.98E+05	--	--	--	--	2.31E+10

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	1.5	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	4.00E-03	2.00E-01	3.60E-02	1.50E-01	1.00E-02	3.64E-01	7.50E-03	2.00E-02	4.00E-01	4.00E-03
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	--	--	--	--	1.06E-01	--	--	--	--
		Chicken Eggs			Eggs		--	--	--	--	--	2.50E-03	--	--	--	--
		Beef			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Milk - Cow			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Pig			Swine		--	--	--	--	--	1.91E-04	--	--	--	--
		Goat			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Goat Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Sheep			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Sheep Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Horse			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Domesticated Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
	Wild	Wild Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
		Deer			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Elk			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Rabbit			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Prairie Dog			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Badger			Swine		--	--	--	--	--	1.91E-04	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Koǫh bi lii nakai (sheep camp) Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Cancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	--	--	**5.40E+01**	--	--	--	--	--	--	--
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	8.30E+02	--	--	--	--	--	--	--
		Milk - Cow				--	--	2.24E+06	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	2.10E+02	--	--	--	--	--	--	--
		Goat Milk				--	--	2.26E+04	--	--	--	--	--	--	--
		Sheep				--	--	1.05E+02	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	2.71E+04	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	5.51E+06	--	--	--	--	--	--	--
		Elk				--	--	2.77E+07	--	--	--	--	--	--	--
		Rabbit				--	--	1.68E+03	--	--	--	--	--	--	--
		Prairie Dog				--	--	4.21E+02	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Koǫh bi lii nakai (sheep camp) Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	**5.28E+05**	**2.63E+02**	**1.17E+02**	**6.67E+05**	**1.60E+03**	**4.84E+02**	**2.11E+05**	**1.17E+01**	**2.22E+03**	**2.82E+04**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				8.42E+06	4.17E+03	1.83E+03	1.45E+07	2.51E+04	7.57E+03	3.43E+06	1.86E+02	3.53E+04	4.42E+05
		Milk - Cow				2.86E+09	1.70E+06	2.70E+06	2.59E+08	1.26E+09	5.36E+06	5.68E+08	8.33E+04	8.94E+06	1.60E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				2.30E+06	9.53E+02	4.83E+02	3.45E+06	6.82E+03	1.58E+03	9.35E+05	5.00E+01	7.24E+03	1.21E+05
		Goat Milk				2.75E+07	1.52E+04	2.56E+04	2.36E+06	1.21E+07	4.64E+04	5.46E+06	7.96E+02	7.70E+04	1.54E+07
		Sheep				1.02E+06	6.08E+02	2.30E+02	2.03E+06	3.07E+03	1.26E+03	4.19E+05	2.30E+01	6.01E+03	5.38E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				2.54E+08	9.45E+04	5.19E+04	3.49E+08	7.47E+05	1.49E+05	1.03E+08	5.44E+03	6.81E+05	1.33E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	9.87E+06	--	--	--	--
		Deer				5.19E+10	1.87E+07	1.05E+07	6.95E+10	1.53E+08	2.93E+07	2.10E+10	1.11E+06	1.33E+08	2.72E+09
		Elk				2.60E+11	9.41E+07	5.29E+07	3.49E+11	7.66E+08	1.47E+08	1.05E+11	5.56E+06	6.69E+08	1.37E+10
		Rabbit				1.54E+07	6.35E+03	3.22E+03	2.30E+07	4.55E+04	1.05E+04	6.23E+06	3.33E+02	4.82E+04	8.06E+05
		Prairie Dog				3.84E+06	1.59E+03	8.05E+02	5.75E+06	1.14E+04	2.63E+03	1.56E+06	8.33E+01	1.21E+04	2.02E+05
		Badger				--	--	--	--	--	4.40E+06	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	2.50E-01	0.00E+00	2.50E-01	3.20E-02	1.60E-02	4.00E-01	4.00E-03	8.50E-03	5.50E-03	2.50E-01
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Chicken Eggs			Eggs		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Beef			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Milk - Cow			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Pig			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04
		Goat			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Goat Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Sheep			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Sheep Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Horse			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Domesticated Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
	Wild	Wild Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Deer			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Elk			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Rabbit			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Prairie Dog			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Badger			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	**Cancer Soil PRG for Total Animal Consumption**		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	mg/kg	--	--	--	--	--	--	--	--	--	--
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	--	--	--	--	--	--	--	--
		Milk - Cow				--	--	--	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	--	--	--	--	--	--	--	--	--
		Sheep				--	--	--	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	--	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	--	--	--	--	--	--	--	--
		Elk				--	--	--	--	--	--	--	--	--	--
		Rabbit				--	--	--	--	--	--	--	--	--	--
		Prairie Dog				--	--	--	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	**Noncancer Soil PRG for Total Animal Consumption**		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	mg/kg	**3.32E+04**	**4.38E+01**	**5.12E+02**	**2.55E+03**	**1.26E+03**	**4.08E+02**	**2.00E-01**	**5.55E+02**	**1.61E+03**	**2.01E+06**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				5.98E+05	7.29E+02	8.31E+03	4.09E+04	2.75E+04	1.47E+04	3.16E+00	1.26E+04	2.52E+04	3.32E+07
		Milk - Cow				2.73E+07	7.63E+04	1.33E+06	1.09E+07	4.78E+05	8.38E+04	2.86E+03	1.89E+05	1.42E+08	3.67E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				1.32E+05	2.00E+02	1.84E+03	1.08E+04	7.42E+03	3.02E+03	8.64E-01	3.42E+03	6.89E+03	7.36E+06
		Goat Milk				2.41E+05	7.37E+02	1.17E+04	1.03E+05	4.57E+03	7.21E+02	2.75E+01	1.82E+03	1.37E+06	3.25E+07
		Sheep				9.10E+04	8.84E+01	1.26E+03	5.12E+03	3.39E+03	2.51E+03	3.84E-01	1.54E+03	3.07E+03	5.05E+06
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.29E+07	2.22E+04	1.79E+05	1.17E+06	8.10E+05	2.84E+05	9.52E+01	3.75E+05	7.58E+05	7.18E+08
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	2.68E+08	--	--	9.08E+07	--	--	--	--	4.28E+11
		Deer				2.55E+09	4.53E+06	3.54E+07	2.37E+08	1.65E+08	5.55E+07	1.95E+04	7.67E+07	1.55E+08	1.42E+11
		Elk				1.28E+10	2.28E+07	1.78E+08	1.19E+09	8.29E+08	2.79E+08	9.77E+04	3.85E+08	7.77E+08	7.12E+11
		Rabbit				8.83E+05	1.34E+03	1.23E+04	7.22E+04	4.95E+04	2.01E+04	5.76E+00	2.28E+04	4.59E+04	4.91E+07
		Prairie Dog				2.21E+05	3.34E+02	3.07E+03	1.80E+04	1.24E+04	5.03E+03	1.44E+00	5.70E+03	1.15E+04	1.23E+07
		Badger				--	1.37E+08	--	--	3.98E+05	--	--	--	--	2.31E+10

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	1.5	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	4.00E-03	2.00E-01	3.60E-02	1.50E-01	1.00E-02	3.64E-01	7.50E-03	2.00E-02	4.00E-01	4.00E-03
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	--	--	--	--	1.06E-01	--	--	--	--
		Chicken Eggs			Eggs		--	--	--	--	--	2.50E-03	--	--	--	--
		Beef			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Milk - Cow			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Pig			Swine		--	--	--	--	--	1.91E-04	--	--	--	--
		Goat			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Goat Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Sheep			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Sheep Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Horse			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Domesticated Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
	Wild	Wild Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
		Deer			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Elk			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Rabbit			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Prairie Dog			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Badger			Swine		--	--	--	--	--	1.91E-04	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Koǫ ei nahaazáh (easy access open space) Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Cancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	**--**	**--**	**1.09E+02**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage+MLF_{forage}})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	2.07E+03	--	--	--	--	--	--	--
		Milk - Cow				--	--	5.60E+06	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	5.25E+02	--	--	--	--	--	--	--
		Goat Milk				--	--	5.64E+04	--	--	--	--	--	--	--
		Sheep				--	--	2.63E+02	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	6.79E+04	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	5.51E+06	--	--	--	--	--	--	--
		Elk				--	--	2.77E+07	--	--	--	--	--	--	--
		Rabbit				--	--	1.68E+03	--	--	--	--	--	--	--
		Prairie Dog				--	--	4.21E+02	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Koǫ ei nahaazáh (easy access open space) Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	**1.05E+06**	**5.02E+02**	**2.29E+02**	**1.37E+06**	**3.17E+03**	**8.98E+02**	**4.20E+05**	**2.32E+01**	**4.12E+03**	**5.59E+04**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{f_{forage}+MLF_{forage}})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				2.11E+07	1.04E+04	4.58E+03	3.64E+07	6.28E+04	1.89E+04	8.58E+06	4.66E+02	8.83E+04	1.11E+06
		Milk - Cow				7.14E+09	4.24E+06	6.76E+06	6.48E+08	3.14E+09	1.34E+07	1.42E+09	2.08E+05	2.24E+07	4.00E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				5.76E+06	2.38E+03	1.21E+03	8.63E+06	1.70E+04	3.94E+03	2.34E+06	1.25E+02	1.81E+04	3.02E+05
		Goat Milk				6.88E+07	3.80E+04	6.41E+04	5.89E+06	3.02E+07	1.16E+05	1.37E+07	1.99E+03	1.92E+05	3.85E+07
		Sheep				2.56E+06	1.52E+03	5.75E+02	5.08E+06	7.68E+03	3.14E+03	1.05E+06	5.76E+01	1.50E+04	1.35E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				6.34E+08	2.36E+05	1.30E+05	8.72E+08	1.87E+06	3.73E+05	2.57E+08	1.36E+04	1.70E+06	3.33E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	9.87E+06	--	--	--	--
		Deer				5.19E+10	1.87E+07	1.05E+07	6.95E+10	1.53E+08	2.93E+07	2.10E+10	1.11E+06	1.33E+08	2.72E+09
		Elk				2.60E+11	9.41E+07	5.29E+07	3.49E+11	7.66E+08	1.47E+08	1.05E+11	5.56E+06	6.69E+08	1.37E+10
		Rabbit				1.54E+07	6.35E+03	3.22E+03	2.30E+07	4.55E+04	1.05E+04	6.23E+06	3.33E+02	4.82E+04	8.06E+05
		Prairie Dog				3.84E+06	1.59E+03	8.05E+02	5.75E+06	1.14E+04	2.63E+03	1.56E+06	8.33E+01	1.21E+04	2.02E+05
		Badger				--	--	--	--	--	4.40E+06	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	2.50E-01	0.00E+00	2.50E-01	3.20E-02	1.60E-02	4.00E-01	4.00E-03	8.50E-03	5.50E-03	2.50E-01
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Chicken Eggs			Eggs		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Beef			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Milk - Cow			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Pig			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04
		Goat			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Goat Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Sheep			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Sheep Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Horse			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Domesticated Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
	Wild	Wild Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Deer			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Elk			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Rabbit			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Prairie Dog			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Badger			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	**Cancer Soil PRG for Total Animal Consumption**		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	mg/kg	--	--	--	--	--	--	--	--	--	--
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	--	--	--	--	--	--	--	--
		Milk - Cow				--	--	--	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	--	--	--	--	--	--	--	--	--
		Sheep				--	--	--	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	--	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	--	--	--	--	--	--	--	--
		Elk				--	--	--	--	--	--	--	--	--	--
		Rabbit				--	--	--	--	--	--	--	--	--	--
		Prairie Dog				--	--	--	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	**Noncancer Soil PRG for Total Animal Consumption**		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	mg/kg	**6.47E+04**	**8.79E+01**	**9.74E+02**	**5.04E+03**	**2.64E+03**	**8.86E+02**	**3.97E-01**	**1.17E+03**	**3.19E+03**	**3.84E+06**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				1.50E+06	1.82E+03	2.08E+04	1.02E+05	6.88E+04	3.68E+04	7.90E+00	3.14E+04	6.31E+04	8.31E+07
		Milk - Cow				6.82E+07	1.91E+05	3.31E+06	2.72E+07	1.19E+06	2.10E+05	7.14E+03	4.72E+05	3.56E+08	9.18E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				3.31E+05	5.01E+02	4.60E+03	2.71E+04	1.86E+04	7.54E+03	2.16E+00	8.55E+03	1.72E+04	1.84E+07
		Goat Milk				6.03E+05	1.84E+03	2.93E+04	2.59E+05	1.14E+04	1.80E+03	6.88E+01	4.54E+03	3.43E+06	8.12E+07
		Sheep				2.27E+05	2.21E+02	3.16E+03	1.28E+04	8.48E+03	6.26E+03	9.61E-01	3.84E+03	7.69E+03	1.26E+07
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				3.23E+07	5.54E+04	4.49E+05	2.92E+06	2.02E+06	7.09E+05	2.38E+02	9.38E+05	1.89E+06	1.79E+09
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	2.68E+08	--	--	9.08E+07	--	--	--	--	4.28E+11
		Deer				2.55E+09	4.53E+06	3.54E+07	2.37E+08	1.65E+08	5.55E+07	1.95E+04	7.67E+07	1.55E+08	1.42E+11
		Elk				1.28E+10	2.28E+07	1.78E+08	1.19E+09	8.29E+08	2.79E+08	9.77E+04	3.85E+08	7.77E+08	7.12E+11
		Rabbit				8.83E+05	1.34E+03	1.23E+04	7.22E+04	4.95E+04	2.01E+04	5.76E+00	2.28E+04	4.59E+04	4.91E+07
		Prairie Dog				2.21E+05	3.34E+02	3.07E+03	1.80E+04	1.24E+04	5.03E+03	1.44E+00	5.70E+03	1.15E+04	1.23E+07
		Badger				--	1.37E+08	--	--	3.98E+05	--	--	--	--	2.31E+10

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	1.5	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	4.00E-03	2.00E-01	3.60E-02	1.50E-01	1.00E-02	3.64E-01	7.50E-03	2.00E-02	4.00E-01	4.00E-03
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	--	--	--	--	1.06E-01	--	--	--	--
		Chicken Eggs			Eggs		--	--	--	--	--	2.50E-03	--	--	--	--
		Beef			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Milk - Cow			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Pig			Swine		--	--	--	--	--	1.91E-04	--	--	--	--
		Goat			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Goat Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Sheep			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Sheep Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Horse			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Domesticated Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
	Wild	Wild Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
		Deer			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Elk			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Rabbit			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Prairie Dog			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Badger			Swine		--	--	--	--	--	1.91E-04	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Koǫ ei doo nahaazáh dah (difficult access open space)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Cancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	--	--	**2.70E+02**	--	--	--	--	--	--	--
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	4.15E+03	--	--	--	--	--	--	--
		Milk - Cow				--	--	1.12E+07	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	1.05E+03	--	--	--	--	--	--	--
		Goat Milk				--	--	1.13E+05	--	--	--	--	--	--	--
		Sheep				--	--	5.26E+02	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	1.36E+05	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	2.75E+07	--	--	--	--	--	--	--
		Elk				--	--	1.38E+08	--	--	--	--	--	--	--
		Rabbit				--	--	8.42E+03	--	--	--	--	--	--	--
		Prairie Dog				--	--	2.10E+03	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Koǫ ei doo nahaazáh dah (difficult access open space)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	**2.64E+06**	**1.32E+03**	**5.83E+02**	**3.34E+06**	**8.02E+03**	**2.42E+03**	**1.05E+06**	**5.87E+01**	**1.11E+04**	**1.41E+05**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				4.21E+07	2.08E+04	9.16E+03	7.27E+07	1.26E+05	3.78E+04	1.72E+07	9.32E+02	1.77E+05	2.21E+06
		Milk - Cow				1.43E+10	8.48E+06	1.35E+07	1.30E+09	6.28E+09	2.68E+07	2.84E+09	4.17E+05	4.47E+07	8.00E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				1.15E+07	4.77E+03	2.41E+03	1.73E+07	3.41E+04	7.88E+03	4.67E+06	2.50E+02	3.62E+04	6.05E+05
		Goat Milk				1.38E+08	7.60E+04	1.28E+05	1.18E+07	6.03E+07	2.32E+05	2.73E+07	3.98E+03	3.85E+05	7.71E+07
		Sheep				5.12E+06	3.04E+03	1.15E+03	1.02E+07	1.54E+04	6.28E+03	2.10E+06	1.15E+02	3.01E+04	2.69E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.27E+09	4.72E+05	2.60E+05	1.74E+09	3.74E+06	7.47E+05	5.13E+08	2.72E+04	3.41E+06	6.66E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	4.94E+07	--	--	--	--
		Deer				2.59E+11	9.37E+07	5.27E+07	3.48E+11	7.63E+08	1.46E+08	1.05E+11	5.54E+06	6.66E+08	1.36E+10
		Elk				1.30E+12	4.70E+08	2.64E+08	1.75E+12	3.83E+09	7.35E+08	5.27E+11	2.78E+07	3.35E+09	6.84E+10
		Rabbit				7.68E+07	3.18E+04	1.61E+04	1.15E+08	2.27E+05	5.25E+04	3.12E+07	1.67E+03	2.41E+05	4.03E+06
		Prairie Dog				1.92E+07	7.94E+03	4.02E+03	2.88E+07	5.68E+04	1.31E+04	7.79E+06	4.17E+02	6.03E+04	1.01E+06
		Badger				--	--	--	--	--	2.20E+07	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	2.50E-01	0.00E+00	2.50E-01	3.20E-02	1.60E-02	4.00E-01	4.00E-03	8.50E-03	5.50E-03	2.50E-01
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Chicken Eggs			Eggs		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Beef			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Milk - Cow			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Pig			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04
		Goat			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Goat Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Sheep			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Sheep Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Horse			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Domesticated Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
	Wild	Wild Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Deer			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Elk			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Rabbit			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Prairie Dog			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Badger			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Cancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--	--
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	--	--	--	--	--	--	--	--
		Milk - Cow				--	--	--	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	--	--	--	--	--	--	--	--	--
		Sheep				--	--	--	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	--	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	--	--	--	--	--	--	--	--
		Elk				--	--	--	--	--	--	--	--	--	--
		Rabbit				--	--	--	--	--	--	--	--	--	--
		Prairie Dog				--	--	--	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	1.66E+05	2.19E+02	2.56E+03	1.27E+04	6.32E+03	2.04E+03	1.00E+00	2.78E+03	8.05E+03	1.00E+07
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				2.99E+06	3.65E+03	4.15E+04	2.04E+05	1.38E+05	7.36E+04	1.58E+01	6.29E+04	1.26E+05	1.66E+08
		Milk - Cow				1.36E+08	3.82E+05	6.63E+06	5.44E+07	2.39E+06	4.19E+05	1.43E+04	9.45E+05	7.12E+08	1.84E+10
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				6.62E+05	1.00E+03	9.20E+03	5.41E+04	3.71E+04	1.51E+04	4.32E+00	1.71E+04	3.44E+04	3.68E+07
		Goat Milk				1.21E+06	3.68E+03	5.87E+04	5.17E+05	2.29E+04	3.61E+03	1.38E+02	9.08E+03	6.86E+06	1.62E+08
		Sheep				4.55E+05	4.42E+02	6.32E+03	2.56E+04	1.70E+04	1.25E+04	1.92E+00	7.69E+03	1.54E+04	2.53E+07
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				6.46E+07	1.11E+05	8.97E+05	5.83E+06	4.05E+06	1.42E+06	4.76E+02	1.88E+06	3.79E+06	3.59E+09
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	1.34E+09	--	--	4.54E+08	--	--	--	--	2.14E+12
		Deer				1.28E+10	2.27E+07	1.77E+08	1.19E+09	8.26E+08	2.78E+08	9.73E+04	3.83E+08	7.74E+08	7.09E+11
		Elk				6.41E+10	1.14E+08	8.90E+08	5.95E+09	4.14E+09	1.39E+09	4.88E+05	1.92E+09	3.89E+09	3.56E+12
		Rabbit				4.42E+06	6.68E+03	6.13E+04	3.61E+05	2.47E+05	1.01E+05	2.88E+01	1.14E+05	2.30E+05	2.45E+08
		Prairie Dog				1.10E+06	1.67E+03	1.53E+04	9.02E+04	6.19E+04	2.51E+04	7.20E+00	2.85E+04	5.74E+04	6.13E+07
		Badger				--	6.86E+08	--	--	1.99E+06	--	--	--	--	1.15E+11

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	1.5	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	4.00E-03	2.00E-01	3.60E-02	1.50E-01	1.00E-02	3.64E-01	7.50E-03	2.00E-02	4.00E-01	4.00E-03
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	--	--	--	--	1.06E-01	--	--	--	--
		Chicken Eggs			Eggs		--	--	--	--	--	2.50E-03	--	--	--	--
		Beef			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Milk - Cow			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Pig			Swine		--	--	--	--	--	1.91E-04	--	--	--	--
		Goat			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Goat Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Sheep			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Sheep Milk			Milk		2.00E-04	1.00E-04	6.00E-05	3.50E-04	9.00E-07	6.50E-06	1.50E-03	2.00E-03	1.50E-03	2.50E-04
		Horse			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Domesticated Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
	Wild	Wild Turkey			Poultry		--	--	--	--	--	1.06E-01	--	--	--	--
		Deer			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Elk			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Rabbit			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Prairie Dog			Beef		1.50E-03	1.00E-03	2.00E-03	1.50E-04	1.00E-03	1.20E-04	5.50E-03	2.00E-02	1.00E-02	2.00E-02
		Badger			Swine		--	--	--	--	--	1.91E-04	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Chii dah wiih leezh (washes and drainages) Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	**Cancer Soil PRG for Total Animal Consumption**		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	**--**	**--**	**5.40E+01**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	8.30E+02	--	--	--	--	--	--	--
		Milk - Cow				--	--	2.24E+06	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	2.10E+02	--	--	--	--	--	--	--
		Goat Milk				--	--	2.26E+04	--	--	--	--	--	--	--
		Sheep				--	--	1.05E+02	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	2.71E+04	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	5.51E+06	--	--	--	--	--	--	--
		Elk				--	--	2.77E+07	--	--	--	--	--	--	--
		Rabbit				--	--	1.68E+03	--	--	--	--	--	--	--
		Prairie Dog				--	--	4.21E+02	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Chii dah wiih leezh (washes and drainages) Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	**Noncancer Soil PRG for Total Animal Consumption**		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	**5.28E+05**	**2.63E+02**	**1.17E+02**	**6.67E+05**	**1.60E+03**	**4.84E+02**	**2.11E+05**	**1.17E+01**	**2.22E+03**	**2.82E+04**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				8.42E+06	4.17E+03	1.83E+03	1.45E+07	2.51E+04	7.57E+03	3.43E+06	1.86E+02	3.53E+04	4.42E+05
		Milk - Cow				2.86E+09	1.70E+06	2.70E+06	2.59E+08	1.26E+09	5.36E+06	5.68E+08	8.33E+04	8.94E+06	1.60E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				2.30E+06	9.53E+02	4.83E+02	3.45E+06	6.82E+03	1.58E+03	9.35E+05	5.00E+01	7.24E+03	1.21E+05
		Goat Milk				2.75E+07	1.52E+04	2.56E+04	2.36E+06	1.21E+07	4.64E+04	5.46E+06	7.96E+02	7.70E+04	1.54E+07
		Sheep				1.02E+06	6.08E+02	2.30E+02	2.03E+06	3.07E+03	1.26E+03	4.19E+05	2.30E+01	6.01E+03	5.38E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				2.54E+08	9.45E+04	5.19E+04	3.49E+08	7.47E+05	1.49E+05	1.03E+08	5.44E+03	6.81E+05	1.33E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	9.87E+06	--	--	--	--
		Deer				5.19E+10	1.87E+07	1.05E+07	6.95E+10	1.53E+08	2.93E+07	2.10E+10	1.11E+06	1.33E+08	2.72E+09
		Elk				2.60E+11	9.41E+07	5.29E+07	3.49E+11	7.66E+08	1.47E+08	1.05E+11	5.56E+06	6.69E+08	1.37E+10
		Rabbit				1.54E+07	6.35E+03	3.22E+03	2.30E+07	4.55E+04	1.05E+04	6.23E+06	3.33E+02	4.82E+04	8.06E+05
		Prairie Dog				3.84E+06	1.59E+03	8.05E+02	5.75E+06	1.14E+04	2.63E+03	1.56E+06	8.33E+01	1.21E+04	2.02E+05
		Badger				--	--	--	--	--	4.40E+06	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Chemical-Specific Factors for Metals	Cancer Oral Slope Factor		SF_f	Slope factor for each metal.		$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--	--	--
	Noncancer Reference Dose		RfD	Reference dose for each metal		mg/kg-day	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
	Bioavailability in Soil		Bs	The amount of metal in soil that can be absorbed into the animal tissue.		-	1	1	1	1	1	1	1	1	1	1
	Metabolism Factor		MF	The metabolic factor for each metal.		-	1	1	1	1	1	1	1	1	1	1
	Plant-Soil Bioconcentration Factors for Metals		Br_{forage}	The bioconcentration factor from soil to plants for forage.		-	2.50E-01	0.00E+00	2.50E-01	3.20E-02	1.60E-02	4.00E-01	4.00E-03	8.50E-03	5.50E-03	2.50E-01
Animal-Specific Bioaccumulation Factors for Metals	Domestic	Chicken	Ba	Bioaccumulation factor for the specific animal type in pCi/kg per pCi/day based on the proxy animal product in column F.	Poultry	days/kg	--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Chicken Eggs			Eggs		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Beef			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Milk - Cow			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Pig			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04
		Goat			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Goat Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Sheep			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Sheep Milk			Milk		3.50E-04	2.26E-03	1.50E-03	1.00E-03	5.86E-03	2.00E-02	2.00E-03	6.00E-04	2.00E-05	3.25E-05
		Horse			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Domesticated Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
	Wild	Wild Turkey			Poultry		--	2.39E-02	--	--	1.13E+00	--	--	--	--	8.75E-03
		Deer			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Elk			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Rabbit			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Prairie Dog			Beef		4.00E-04	5.22E-03	6.00E-03	6.00E-03	2.27E-03	3.00E-03	4.00E-02	2.00E-04	2.50E-03	9.00E-05
		Badger			Swine		--	3.39E-05	--	--	1.88E-01	--	--	--	--	1.28E-04

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Cancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for cancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--	--
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{TR \times AT_c}{IR_{adj} \times SF_f \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				--	--	--	--	--	--	--	--	--	--
		Milk - Cow				--	--	--	--	--	--	--	--	--	--
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	--	--	--	--	--	--	--	--	--
		Sheep				--	--	--	--	--	--	--	--	--	--
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				--	--	--	--	--	--	--	--	--	--
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--	--	--
		Deer				--	--	--	--	--	--	--	--	--	--
		Elk				--	--	--	--	--	--	--	--	--	--
		Rabbit				--	--	--	--	--	--	--	--	--	--
		Prairie Dog				--	--	--	--	--	--	--	--	--	--
		Badger				--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Children - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	3.32E+04	4.38E+01	5.12E+02	2.55E+03	1.26E+03	4.08E+02	2.00E-01	5.55E+02	1.61E+03	2.01E+06
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-c} \times BW_c}{EF_c \times ED_c \times IR_c \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				5.98E+05	7.29E+02	8.31E+03	4.09E+04	2.75E+04	1.47E+04	3.16E+00	1.26E+04	2.52E+04	3.32E+07
		Milk - Cow				2.73E+07	7.63E+04	1.33E+06	1.09E+07	4.78E+05	8.38E+04	2.86E+03	1.89E+05	1.42E+08	3.67E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				1.32E+05	2.00E+02	1.84E+03	1.08E+04	7.42E+03	3.02E+03	8.64E-01	3.42E+03	6.89E+03	7.36E+06
		Goat Milk				2.41E+05	7.37E+02	1.17E+04	1.03E+05	4.57E+03	7.21E+02	2.75E+01	1.82E+03	1.37E+06	3.25E+07
		Sheep				9.10E+04	8.84E+01	1.26E+03	5.12E+03	3.39E+03	2.51E+03	3.84E-01	1.54E+03	3.07E+03	5.05E+06
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.29E+07	2.22E+04	1.79E+05	1.17E+06	8.10E+05	2.84E+05	9.52E+01	3.75E+05	7.58E+05	7.18E+08
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	2.68E+08	--	--	9.08E+07	--	--	--	--	4.28E+11
		Deer				2.55E+09	4.53E+06	3.54E+07	2.37E+08	1.65E+08	5.55E+07	1.95E+04	7.67E+07	1.55E+08	1.42E+11
		Elk				1.28E+10	2.28E+07	1.78E+08	1.19E+09	8.29E+08	2.79E+08	9.77E+04	3.85E+08	7.77E+08	7.12E+11
		Rabbit				8.83E+05	1.34E+03	1.23E+04	7.22E+04	4.95E+04	2.01E+04	5.76E+00	2.28E+04	4.59E+04	4.91E+07
		Prairie Dog				2.21E+05	3.34E+02	3.07E+03	1.80E+04	1.24E+04	5.03E+03	1.44E+00	5.70E+03	1.15E+04	1.23E+07
		Badger				--	1.37E+08	--	--	3.98E+05	--	--	--	--	2.31E+10

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Custom									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	2.83E+05	1.08E+02	5.86E+01	3.54E+05	8.41E+02	5.58E+01	1.14E+05	6.09E+00	7.88E+02	1.50E+04
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times \left[\left(f_p \times Q_p \times (Br_{forage}+MLF_{forage})\right) + \left(f_s \times Q_s \times B_s\right)\right] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	1.08E+02	--	--	--	--
		Chicken Eggs				--	--	--	--	--	4.57E+02	--	--	--	--
		Beef				5.42E+05	1.96E+02	1.10E+02	7.26E+05	1.59E+03	3.06E+02	2.19E+05	1.16E+01	1.39E+03	2.84E+04
		Milk - Cow				1.22E+08	5.68E+04	1.09E+05	9.08E+06	5.30E+07	1.62E+05	2.41E+07	3.45E+03	2.66E+05	6.82E+07
		Pig				--	--	--	--	--	7.98E+03	--	--	--	--
		Goat				4.49E+06	1.86E+03	9.41E+02	6.73E+06	1.33E+04	3.07E+03	1.82E+06	9.75E+01	1.41E+04	2.36E+05
		Goat Milk				5.37E+07	2.96E+04	5.00E+04	4.59E+06	2.35E+07	9.05E+04	1.06E+07	1.55E+03	1.50E+05	3.00E+07
		Sheep				8.49E+05	3.52E+02	1.78E+02	1.27E+06	2.51E+03	5.82E+02	3.44E+05	1.84E+01	2.67E+03	4.46E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				5.69E+06	2.06E+03	1.16E+03	7.62E+06	1.67E+04	3.21E+03	2.30E+06	1.21E+02	1.46E+04	2.99E+05
		Domesticated Turkey				--	--	--	--	--	1.92E+03	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	1.45E+05	--	--	--	--
		Deer				7.63E+08	2.76E+05	1.55E+05	1.02E+09	2.24E+06	4.31E+05	3.09E+08	1.63E+04	1.96E+06	4.01E+07
		Elk				3.83E+09	1.38E+06	7.78E+05	5.13E+09	1.13E+07	2.16E+06	1.55E+09	8.18E+04	9.84E+06	2.01E+08
		Rabbit				3.59E+07	1.49E+04	7.53E+03	5.38E+07	1.06E+05	2.46E+04	1.46E+07	7.80E+02	1.13E+05	1.89E+06
		Prairie Dog				1.80E+07	7.43E+03	3.77E+03	2.69E+07	5.32E+04	1.23E+04	7.29E+06	3.90E+02	5.64E+04	9.43E+05
		Badger				--	--	--	--	--	6.48E+04	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Hazard for Specific Metals - Custom									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	6.05E+04	2.31E+01	1.25E+01	7.56E+04	1.80E+02	1.19E+01	2.43E+04	1.30E+00	1.68E+02	3.20E+03
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	--	--	--	--	2.30E+01	--	--	--	--
		Chicken Eggs				--	--	--	--	--	9.77E+01	--	--	--	--
		Beef				1.16E+05	4.18E+01	2.35E+01	1.55E+05	3.41E+02	6.54E+01	4.68E+04	2.47E+00	2.98E+02	6.08E+03
		Milk - Cow				2.60E+07	1.21E+04	2.33E+04	1.94E+06	1.13E+07	3.46E+04	5.14E+06	7.38E+02	5.68E+04	1.46E+07
		Pig				--	--	--	--	--	1.71E+03	--	--	--	--
		Goat				9.60E+05	3.97E+02	2.01E+02	1.44E+06	2.84E+03	6.57E+02	3.90E+05	2.08E+01	3.02E+03	5.04E+04
		Goat Milk				1.15E+07	6.33E+03	1.07E+04	9.82E+05	5.03E+06	1.93E+04	2.28E+06	3.32E+02	3.21E+04	6.42E+06
		Sheep				1.81E+05	7.51E+01	3.80E+01	2.72E+05	5.37E+02	1.24E+02	7.36E+04	3.94E+00	5.71E+02	9.52E+03
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.22E+06	4.39E+02	2.47E+02	1.63E+06	3.58E+03	6.87E+02	4.92E+05	2.60E+01	3.12E+03	6.38E+04
		Domesticated Turkey				--	--	--	--	--	4.11E+02	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	3.10E+04	--	--	--	--
		Deer				1.63E+08	5.89E+04	3.31E+04	2.19E+08	4.80E+05	9.21E+04	6.60E+07	3.48E+03	4.19E+05	8.57E+06
		Elk				8.19E+08	2.96E+05	1.66E+05	1.10E+09	2.41E+06	4.62E+05	3.31E+08	1.75E+04	2.10E+06	4.30E+07
		Rabbit				7.68E+06	3.18E+03	1.61E+03	1.15E+07	2.27E+04	5.25E+03	3.12E+06	1.67E+02	2.41E+04	4.03E+05
		Prairie Dog				3.84E+06	1.59E+03	8.05E+02	5.75E+06	1.14E+04	2.63E+03	1.56E+06	8.33E+01	1.21E+04	2.02E+05
		Badger				--	--	--	--	--	1.38E+04	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	1.42E+04	2.22E+01	2.05E+02	1.31E+03	7.16E+01	2.42E+02	1.07E-01	3.60E+02	8.51E+02	2.75E+05
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times [(f_p \times Q_p \times (Br_{forage} + MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	2.88E+03	--	--	9.77E+02	--	--	--	--	4.65E+06
		Chicken Eggs				--	2.88E+02	--	--	9.77E+01	--	--	--	--	4.65E+05
		Beef				2.67E+04	4.73E+01	3.70E+02	2.48E+03	1.72E+03	5.80E+02	2.03E-01	8.01E+02	1.62E+03	1.48E+06
		Milk - Cow				8.80E+05	3.28E+03	4.28E+04	4.42E+05	1.99E+04	2.49E+03	1.22E+02	7.99E+03	6.06E+06	1.18E+08
		Pig				--	2.84E+05	--	--	8.16E+02	--	--	--	--	4.29E+07
		Goat				2.58E+05	3.91E+02	3.59E+03	2.11E+04	1.45E+04	5.88E+03	1.68E+00	6.67E+03	1.34E+04	1.43E+07
		Goat Milk				4.71E+05	1.44E+03	2.29E+04	2.02E+05	8.92E+03	1.41E+03	5.37E+01	3.54E+03	2.67E+06	6.33E+07
		Sheep				4.89E+04	7.38E+01	6.79E+02	3.99E+03	2.74E+03	1.11E+03	3.18E-01	1.26E+03	2.54E+03	2.71E+06
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				2.80E+05	4.97E+02	3.89E+03	2.60E+04	1.81E+04	6.09E+03	2.13E+00	8.41E+03	1.70E+04	1.55E+07
		Domesticated Turkey				--	5.23E+04	--	--	1.77E+04	--	--	--	--	8.34E+07
	Wild	Wild Turkey				--	3.95E+06	--	--	1.34E+06	--	--	--	--	6.30E+09
		Deer				3.75E+07	6.67E+04	5.21E+05	3.49E+06	2.43E+06	8.17E+05	2.86E+02	1.13E+06	2.28E+06	2.09E+09
		Elk				1.88E+08	3.35E+05	2.62E+06	1.75E+07	1.22E+07	4.10E+06	1.44E+03	5.66E+06	1.14E+07	1.05E+10
		Rabbit				2.07E+06	3.13E+03	2.87E+04	1.69E+05	1.16E+05	4.70E+04	1.35E+01	5.33E+04	1.07E+05	1.15E+08
		Prairie Dog				1.03E+06	1.56E+03	1.43E+04	8.44E+04	5.79E+04	2.35E+04	6.74E+00	2.67E+04	5.37E+04	5.74E+07
		Badger				--	2.02E+06	--	--	5.86E+03	--	--	--	--	3.39E+08

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	3.05E+03	4.74E+00	4.38E+01	2.79E+02	1.53E+01	5.17E+01	2.28E-02	7.70E+01	1.82E+02	5.88E+04
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	6.16E+02	--	--	2.09E+02	--	--	--	--	9.94E+05
		Chicken Eggs				--	6.16E+01	--	--	2.09E+01	--	--	--	--	9.94E+04
		Beef				5.70E+03	1.01E+01	7.91E+01	5.29E+02	3.69E+02	1.24E+02	4.34E-02	1.71E+02	3.46E+02	3.16E+05
		Milk - Cow				1.88E+05	7.01E+02	9.14E+03	9.45E+04	4.26E+03	5.32E+02	2.60E+01	1.71E+03	1.29E+06	2.53E+07
		Pig				--	6.08E+04	--	--	1.74E+02	--	--	--	--	9.17E+06
		Goat				5.52E+04	8.35E+01	7.67E+02	4.51E+03	3.09E+03	1.26E+03	3.60E-01	1.43E+03	2.87E+03	3.07E+06
		Goat Milk				1.01E+05	3.07E+02	4.89E+03	4.31E+04	1.91E+03	3.01E+02	1.15E+01	7.57E+02	5.71E+05	1.35E+07
		Sheep				1.04E+04	1.58E+01	1.45E+02	8.52E+02	5.85E+02	2.38E+02	6.80E-02	2.69E+02	5.42E+02	5.80E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				5.98E+04	1.06E+02	8.31E+02	5.56E+03	3.87E+03	1.30E+03	4.56E-01	1.80E+03	3.63E+03	3.32E+06
		Domesticated Turkey				--	1.12E+04	--	--	3.78E+03	--	--	--	--	1.78E+07
	Wild	Wild Turkey				--	8.44E+05	--	--	2.86E+05	--	--	--	--	1.35E+09
		Deer				8.03E+06	1.43E+04	1.11E+05	7.45E+05	5.19E+05	1.75E+05	6.12E+01	2.41E+05	4.87E+05	4.46E+08
		Elk				4.03E+07	7.16E+04	5.60E+05	3.74E+06	2.61E+06	8.77E+05	3.07E+02	1.21E+06	2.44E+06	2.24E+09
		Rabbit				4.42E+05	6.68E+02	6.13E+03	3.61E+04	2.47E+04	1.01E+04	2.88E+00	1.14E+04	2.30E+04	2.45E+07
		Prairie Dog				2.21E+05	3.34E+02	3.07E+03	1.80E+04	1.24E+04	5.03E+03	1.44E+00	5.70E+03	1.15E+04	1.23E+07
		Badger				--	4.32E+05	--	--	1.25E+03	--	--	--	--	7.25E+07

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kǫǫ ei nahaazáh (easy access open space)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		PRG_{a-ing}	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	**5.58E+05**	**2.85E+02**	**1.23E+02**	**8.35E+05**	**1.68E+03**	**4.27E+01**	**2.26E+05**	**1.24E+01**	**2.45E+03**	**2.96E+04**
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times \left[\left(f_p \times Q_p \times (Br_{forage} + MLF_{forage})\right) + \left(f_s \times Q_s \times B_s\right)\right] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	5.52E+01	--	--	--	--
		Chicken Eggs				--	--	--	--	--	4.47E+02	--	--	--	--
		Beef				7.86E+06	3.89E+03	1.71E+03	1.36E+07	2.34E+04	7.06E+03	3.20E+06	1.74E+02	3.30E+04	4.13E+05
		Milk - Cow				5.82E+09	3.45E+06	5.51E+06	5.28E+08	2.56E+09	1.09E+07	1.16E+09	1.70E+05	1.82E+07	3.26E+09
		Pig				--	--	--	--	--	3.90E+03	--	--	--	--
		Goat				2.05E+06	8.47E+02	4.29E+02	3.07E+06	6.06E+03	1.40E+03	8.31E+05	4.44E+01	6.43E+03	1.08E+05
		Goat Milk				6.12E+07	3.38E+04	5.70E+04	5.24E+06	2.68E+07	1.03E+05	1.21E+07	1.77E+03	1.71E+05	3.42E+07
		Sheep				9.68E+05	5.74E+02	2.17E+02	1.92E+06	2.90E+03	1.19E+03	3.96E+05	2.18E+01	5.68E+03	5.08E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				2.82E+08	1.05E+05	5.77E+04	3.87E+08	8.30E+05	1.66E+05	1.14E+08	6.04E+03	7.57E+05	1.48E+07
		Domesticated Turkey				--	--	--	--	--	1.10E+03	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	2.63E+07	--	--	--	--
		Deer				1.38E+11	5.00E+07	2.81E+07	1.85E+11	4.07E+08	7.81E+07	5.59E+10	2.95E+06	3.55E+08	7.26E+09
		Elk				6.95E+11	2.51E+08	1.41E+08	9.31E+11	2.04E+09	3.92E+08	2.81E+11	1.48E+07	1.78E+09	3.65E+10
		Rabbit				4.10E+07	1.69E+04	8.58E+03	6.13E+07	1.21E+05	2.80E+04	1.66E+07	8.89E+02	1.29E+05	2.15E+06
		Prairie Dog				1.02E+07	4.24E+03	2.15E+03	1.53E+07	3.03E+04	7.00E+03	4.16E+06	2.22E+02	3.22E+04	5.38E+05
		Badger				--	--	--	--	--	1.17E+07	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Hazard for Specific Metals - Kǫǫ ei nahaazáh (easy access open space)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		PRG_{a-ing}	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	**2.44E+05**	**1.25E+02**	**5.43E+01**	**3.04E+05**	**7.45E+02**	**1.64E+01**	**9.75E+04**	**5.45E+00**	**1.07E+03**	**1.31E+04**
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	--	--	--	--	2.30E+01	--	--	--	--
		Chicken Eggs				--	--	--	--	--	9.77E+01	--	--	--	--
		Beef				3.51E+06	1.74E+03	7.63E+02	6.06E+06	1.05E+04	3.15E+03	1.43E+06	7.76E+01	1.47E+04	1.84E+05
		Milk - Cow				1.19E+09	7.06E+05	1.13E+06	1.08E+08	5.24E+08	2.23E+06	2.37E+08	3.47E+04	3.73E+06	6.67E+08
		Pig				--	--	--	--	--	1.71E+03	--	--	--	--
		Goat				9.60E+05	3.97E+02	2.01E+02	1.44E+06	2.84E+03	6.57E+02	3.90E+05	2.08E+01	3.02E+03	5.04E+04
		Goat Milk				1.15E+07	6.33E+03	1.07E+04	9.82E+05	5.03E+06	1.93E+04	2.28E+06	3.32E+02	3.21E+04	6.42E+06
		Sheep				4.27E+05	2.53E+02	9.59E+01	8.47E+05	1.28E+03	5.23E+02	1.75E+05	9.60E+00	2.51E+03	2.24E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.06E+08	3.94E+04	2.16E+04	1.45E+08	3.11E+05	6.22E+04	4.28E+07	2.27E+03	2.84E+05	5.55E+06
		Domesticated Turkey				--	--	--	--	--	4.11E+02	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	9.87E+06	--	--	--	--
		Deer				5.19E+10	1.87E+07	1.05E+07	6.95E+10	1.53E+08	2.93E+07	2.10E+10	1.11E+06	1.33E+08	2.72E+09
		Elk				2.60E+11	9.41E+07	5.29E+07	3.49E+11	7.66E+08	1.47E+08	1.05E+11	5.56E+06	6.69E+08	1.37E+10
		Rabbit				1.54E+07	6.35E+03	3.22E+03	2.30E+07	4.55E+04	1.05E+04	6.23E+06	3.33E+02	4.82E+04	8.06E+05
		Prairie Dog				3.84E+06	1.59E+03	8.05E+02	5.75E+06	1.14E+04	2.63E+03	1.56E+06	8.33E+01	1.21E+04	2.02E+05
		Badger				--	--	--	--	--	4.40E+06	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	3.85E+04	3.94E+01	5.63E+02	2.72E+03	6.36E+01	6.27E+02	2.11E-01	6.95E+02	1.69E+03	3.19E+05
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	1.48E+03	--	--	5.01E+02	--	--	--	--	2.39E+06
		Chicken Eggs				--	2.82E+02	--	--	9.54E+01	--	--	--	--	4.54E+05
		Beef				5.58E+05	6.81E+02	7.75E+03	3.82E+04	2.57E+04	1.37E+04	2.95E+00	1.17E+04	2.35E+04	3.10E+07
		Milk - Cow				5.55E+07	1.55E+05	2.70E+06	2.22E+07	9.73E+05	1.71E+05	5.82E+03	3.85E+05	2.90E+08	7.48E+09
		Pig				--	1.39E+05	--	--	3.99E+02	--	--	--	--	2.10E+07
		Goat				1.18E+05	1.78E+02	1.64E+03	9.62E+03	6.60E+03	2.68E+03	7.68E-01	3.04E+03	6.12E+03	6.54E+06
		Goat Milk				5.36E+05	1.64E+03	2.61E+04	2.30E+05	1.02E+04	1.60E+03	6.12E+01	4.04E+03	3.05E+06	7.22E+07
		Sheep				8.59E+04	8.35E+01	1.19E+03	4.83E+03	3.20E+03	2.37E+03	3.63E-01	1.45E+03	2.90E+03	4.77E+06
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.44E+07	2.46E+04	1.99E+05	1.30E+06	9.00E+05	3.15E+05	1.06E+02	4.17E+05	8.42E+05	7.98E+08
		Domesticated Turkey				--	2.98E+04	--	--	1.01E+04	--	--	--	--	4.75E+07
	Wild	Wild Turkey				--	7.15E+08	--	--	2.42E+08	--	--	--	--	1.14E+12
		Deer				6.81E+09	1.21E+07	9.45E+07	6.32E+08	4.40E+08	1.48E+08	5.19E+04	2.04E+08	4.13E+08	3.78E+11
		Elk				3.42E+10	6.07E+07	4.74E+08	3.17E+09	2.21E+09	7.43E+08	2.60E+05	1.03E+09	2.07E+09	1.90E+12
		Rabbit				2.35E+06	3.56E+03	3.27E+04	1.92E+05	1.32E+05	5.36E+04	1.54E+01	6.08E+04	1.22E+05	1.31E+08
		Prairie Dog				5.89E+05	8.91E+02	8.18E+03	4.81E+04	3.30E+04	1.34E+04	3.84E+00	1.52E+04	3.06E+04	3.27E+07
		Badger				--	3.66E+08	--	--	1.06E+06	--	--	--	--	6.15E+10

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	1.55E+04	1.48E+01	2.43E+02	1.18E+03	1.65E+01	1.81E+02	9.29E-02	2.49E+02	7.47E+02	8.14E+04
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	6.16E+02	--	--	2.09E+02	--	--	--	--	9.94E+05
		Chicken Eggs				--	6.16E+01	--	--	2.09E+01	--	--	--	--	9.94E+04
		Beef				2.49E+05	3.04E+02	3.46E+03	1.70E+04	1.15E+04	6.13E+03	1.32E+00	5.24E+03	1.05E+04	1.38E+07
		Milk - Cow				1.14E+07	3.18E+04	5.52E+05	4.54E+06	1.99E+05	3.49E+04	1.19E+03	7.87E+04	5.94E+07	1.53E+09
		Pig				--	6.08E+04	--	--	1.74E+02	--	--	--	--	9.17E+06
		Goat				5.52E+04	8.35E+01	7.67E+02	4.51E+03	3.09E+03	1.26E+03	3.60E-01	1.43E+03	2.87E+03	3.07E+06
		Goat Milk				1.01E+05	3.07E+02	4.89E+03	4.31E+04	1.91E+03	3.01E+02	1.15E+01	7.57E+02	5.71E+05	1.35E+07
		Sheep				3.79E+04	3.68E+01	5.26E+02	2.13E+03	1.41E+03	1.04E+03	1.60E-01	6.40E+02	1.28E+03	2.11E+06
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				5.38E+06	9.23E+03	7.48E+04	4.86E+05	3.37E+05	1.18E+05	3.96E+01	1.56E+05	3.16E+05	2.99E+08
		Domesticated Turkey				--	1.12E+04	--	--	3.78E+03	--	--	--	--	1.78E+07
	Wild	Wild Turkey				--	2.68E+08	--	--	9.08E+07	--	--	--	--	4.28E+11
		Deer				2.55E+09	4.53E+06	3.54E+07	2.37E+08	1.65E+08	5.55E+07	1.95E+04	7.67E+07	1.55E+08	1.42E+11
		Elk				1.28E+10	2.28E+07	1.78E+08	1.19E+09	8.29E+08	2.79E+08	9.77E+04	3.85E+08	7.77E+08	7.12E+11
		Rabbit				8.83E+05	1.34E+03	1.23E+04	7.22E+04	4.95E+04	2.01E+04	5.76E+00	2.28E+04	4.59E+04	4.91E+07
		Prairie Dog				2.21E+05	3.34E+02	3.07E+03	1.80E+04	1.24E+04	5.03E+03	1.44E+00	5.70E+03	1.15E+04	1.23E+07
		Badger				--	1.37E+08	--	--	3.98E+05	--	--	--	--	2.31E+10

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kọọh bi łii nakaí (sheep camp)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		PRG_{a-ing}	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	1.22E+06	6.11E+02	2.68E+02	1.83E+06	3.68E+03	1.12E+03	4.94E+05	2.71E+01	5.19E+03	6.47E+04
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times \left[\left(f_p \times Q_p \times (Br_{forage} + MLF_{forage})\right) + \left(f_s \times Q_s \times B_s\right)\right] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				1.89E+07	9.33E+03	4.10E+03	3.26E+07	5.62E+04	1.70E+04	7.69E+06	4.17E+02	7.91E+04	9.91E+05
		Milk - Cow				1.40E+10	8.29E+06	1.32E+07	1.27E+09	6.14E+09	2.62E+07	2.78E+09	4.07E+05	4.37E+07	7.82E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				4.91E+06	2.03E+03	1.03E+03	7.36E+06	1.45E+04	3.36E+03	1.99E+06	1.07E+02	1.54E+04	2.58E+05
		Goat Milk				1.47E+08	8.10E+04	1.37E+05	1.26E+07	6.44E+07	2.47E+05	2.91E+07	4.25E+03	4.10E+05	8.22E+07
		Sheep				2.32E+06	1.38E+03	5.22E+02	4.61E+06	6.97E+03	2.85E+03	9.50E+05	5.22E+01	1.36E+04	1.22E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				6.77E+08	2.52E+05	1.38E+05	9.30E+08	1.99E+06	3.98E+05	2.74E+08	1.45E+04	1.82E+06	3.55E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	2.63E+07	--	--	--	--
		Deer				1.38E+11	5.00E+07	2.81E+07	1.85E+11	4.07E+08	7.81E+07	5.59E+10	2.95E+06	3.55E+08	7.26E+09
		Elk				6.95E+11	2.51E+08	1.41E+08	9.31E+11	2.04E+09	3.92E+08	2.81E+11	1.48E+07	1.78E+09	3.65E+10
		Rabbit				4.10E+07	1.69E+04	8.58E+03	6.13E+07	1.21E+05	2.80E+04	1.66E+07	8.89E+02	1.29E+05	2.15E+06
		Prairie Dog				1.02E+07	4.24E+03	2.15E+03	1.53E+07	3.03E+04	7.00E+03	4.16E+06	2.22E+02	3.22E+04	5.38E+05
		Badger				--	--	--	--	--	1.17E+07	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Hazard for Specific Metals - Kọọh bi łii nakaí (sheep camp)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		PRG_{a-ing}	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	5.28E+05	2.63E+02	1.17E+02	6.67E+05	1.60E+03	4.84E+02	2.11E+05	1.17E+01	2.22E+03	2.82E+04
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				8.42E+06	4.17E+03	1.83E+03	1.45E+07	2.51E+04	7.57E+03	3.43E+06	1.86E+02	3.53E+04	4.42E+05
		Milk - Cow				2.86E+09	1.70E+06	2.70E+06	2.59E+08	1.26E+09	5.36E+06	5.68E+08	8.33E+04	8.94E+06	1.60E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				2.30E+06	9.53E+02	4.83E+02	3.45E+06	6.82E+03	1.58E+03	9.35E+05	5.00E+01	7.24E+03	1.21E+05
		Goat Milk				2.75E+07	1.52E+04	2.56E+04	2.36E+06	1.21E+07	4.64E+04	5.46E+06	7.96E+02	7.70E+04	1.54E+07
		Sheep				1.02E+06	6.08E+02	2.30E+02	2.03E+06	3.07E+03	1.26E+03	4.19E+05	2.30E+01	6.01E+03	5.38E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				2.54E+08	9.45E+04	5.19E+04	3.49E+08	7.47E+05	1.49E+05	1.03E+08	5.44E+03	6.81E+05	1.33E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	9.87E+06	--	--	--	--
		Deer				5.19E+10	1.87E+07	1.05E+07	6.95E+10	1.53E+08	2.93E+07	2.10E+10	1.11E+06	1.33E+08	2.72E+09
		Elk				2.60E+11	9.41E+07	5.29E+07	3.49E+11	7.66E+08	1.47E+08	1.05E+11	5.56E+06	6.69E+08	1.37E+10
		Rabbit				1.54E+07	6.35E+03	3.22E+03	2.30E+07	4.55E+04	1.05E+04	6.23E+06	3.33E+02	4.82E+04	8.06E+05
		Prairie Dog				3.84E+06	1.59E+03	8.05E+02	5.75E+06	1.14E+04	2.63E+03	1.56E+06	8.33E+01	1.21E+04	2.02E+05
		Badger				--	--	--	--	--	4.40E+06	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	8.28E+04	1.04E+02	1.21E+03	5.93E+03	3.45E+03	1.39E+03	4.61E-01	1.55E+03	3.69E+03	4.78E+06
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				1.34E+06	1.63E+03	1.86E+04	9.16E+04	6.17E+04	3.30E+04	7.08E+00	2.82E+04	5.65E+04	7.44E+07
		Milk - Cow				1.33E+08	3.73E+05	6.48E+06	5.32E+07	2.34E+06	4.10E+05	1.40E+04	9.24E+05	6.97E+08	1.79E+10
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				2.83E+05	4.28E+02	3.92E+03	2.31E+04	1.58E+04	6.43E+03	1.84E+00	7.30E+03	1.47E+04	1.57E+07
		Goat Milk				1.29E+06	3.93E+03	6.26E+04	5.52E+05	2.44E+04	3.85E+03	1.47E+02	9.69E+03	7.31E+06	1.73E+08
		Sheep				2.06E+05	2.00E+02	2.86E+03	1.16E+04	7.69E+03	5.68E+03	8.71E-01	3.48E+03	6.97E+03	1.15E+07
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				3.45E+07	5.91E+04	4.79E+05	3.11E+06	2.16E+06	7.57E+05	2.54E+02	1.00E+06	2.02E+06	1.91E+09
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	7.15E+08	--	--	2.42E+08	--	--	--	--	1.14E+12
		Deer				6.81E+09	1.21E+07	9.45E+07	6.32E+08	4.40E+08	1.48E+08	5.19E+04	2.04E+08	4.13E+08	3.78E+11
		Elk				3.42E+10	6.07E+07	4.74E+08	3.17E+09	2.21E+09	7.43E+08	2.60E+05	1.03E+09	2.07E+09	1.90E+12
		Rabbit				2.35E+06	3.56E+03	3.27E+04	1.92E+05	1.32E+05	5.36E+04	1.54E+01	6.08E+04	1.22E+05	1.31E+08
		Prairie Dog				5.89E+05	8.91E+02	8.18E+03	4.81E+04	3.30E+04	1.34E+04	3.84E+00	1.52E+04	3.06E+04	3.27E+07
		Badger				--	3.66E+08	--	--	1.06E+06	--	--	--	--	6.15E+10

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	3.32E+04	4.38E+01	5.12E+02	2.55E+03	1.26E+03	4.08E+02	2.00E-01	5.55E+02	1.61E+03	2.01E+06
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				5.98E+05	7.29E+02	8.31E+03	4.09E+04	2.75E+04	1.47E+04	3.16E+00	1.26E+04	2.52E+04	3.32E+07
		Milk - Cow				2.73E+07	7.63E+04	1.33E+06	1.09E+07	4.78E+05	8.38E+04	2.86E+03	1.89E+05	1.42E+08	3.67E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				1.32E+05	2.00E+02	1.84E+03	1.08E+04	7.42E+03	3.02E+03	8.64E-01	3.42E+03	6.89E+03	7.36E+06
		Goat Milk				2.41E+05	7.37E+02	1.17E+04	1.03E+05	4.57E+03	7.21E+02	2.75E+01	1.82E+03	1.37E+06	3.25E+07
		Sheep				9.10E+04	8.84E+01	1.26E+03	5.12E+03	3.39E+03	2.51E+03	3.84E-01	1.54E+03	3.07E+03	5.05E+06
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.29E+07	2.22E+04	1.79E+05	1.17E+06	8.10E+05	2.84E+05	9.52E+01	3.75E+05	7.58E+05	7.18E+08
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	2.68E+08	--	--	9.08E+07	--	--	--	--	4.28E+11
		Deer				2.55E+09	4.53E+06	3.54E+07	2.37E+08	1.65E+08	5.55E+07	1.95E+04	7.67E+07	1.55E+08	1.42E+11
		Elk				1.28E+10	2.28E+07	1.78E+08	1.19E+09	8.29E+08	2.79E+08	9.77E+04	3.85E+08	7.77E+08	7.12E+11
		Rabbit				8.83E+05	1.34E+03	1.23E+04	7.22E+04	4.95E+04	2.01E+04	5.76E+00	2.28E+04	4.59E+04	4.91E+07
		Prairie Dog				2.21E+05	3.34E+02	3.07E+03	1.80E+04	1.24E+04	5.03E+03	1.44E+00	5.70E+03	1.15E+04	1.23E+07
		Badger				--	1.37E+08	--	--	3.98E+05	--	--	--	--	2.31E+10

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kǫǫ ei nahaazáh (easy access open space)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		PRG_{a-ing}	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	2.50E+06	1.20E+03	5.43E+02	3.74E+06	7.49E+03	2.15E+03	1.01E+06	5.52E+01	9.96E+03	1.32E+05
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times \left[\left(f_p \times Q_p \times (Br_{forage} + MLF_{forage})\right) + \left(f_s \times Q_s \times B_s\right)\right] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				4.72E+07	2.33E+04	1.03E+04	8.14E+07	1.41E+05	4.24E+04	1.92E+07	1.04E+03	1.98E+05	2.48E+06
		Milk - Cow				3.49E+10	2.07E+07	3.30E+07	3.17E+09	1.54E+10	6.55E+07	6.94E+09	1.02E+06	1.09E+08	1.96E+10
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				1.23E+07	5.08E+03	2.58E+03	1.84E+07	3.64E+04	8.40E+03	4.99E+06	2.67E+02	3.86E+04	6.45E+05
		Goat Milk				3.67E+08	2.03E+05	3.42E+05	3.14E+07	1.61E+08	6.19E+05	7.28E+07	1.06E+04	1.03E+06	2.05E+08
		Sheep				5.81E+06	3.45E+03	1.30E+03	1.15E+07	1.74E+04	7.11E+03	2.38E+06	1.31E+02	3.41E+04	3.05E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.69E+09	6.30E+05	3.46E+05	2.32E+09	4.98E+06	9.96E+05	6.85E+08	3.63E+04	4.54E+06	8.88E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	2.63E+07	--	--	--	--
		Deer				1.38E+11	5.00E+07	2.81E+07	1.85E+11	4.07E+08	7.81E+07	5.59E+10	2.95E+06	3.55E+08	7.26E+09
		Elk				6.95E+11	2.51E+08	1.41E+08	9.31E+11	2.04E+09	3.92E+08	2.81E+11	1.48E+07	1.78E+09	3.65E+10
		Rabbit				4.10E+07	1.69E+04	8.58E+03	6.13E+07	1.21E+05	2.80E+04	1.66E+07	8.89E+02	1.29E+05	2.15E+06
		Prairie Dog				1.02E+07	4.24E+03	2.15E+03	1.53E+07	3.03E+04	7.00E+03	4.16E+06	2.22E+02	3.22E+04	5.38E+05
		Badger				--	--	--	--	--	1.17E+07	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Hazard for Specific Metals - Kǫǫ ei nahaazáh (easy access open space)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		PRG_{a-ing}	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	1.05E+06	5.02E+02	2.29E+02	1.37E+06	3.17E+03	8.98E+02	4.20E+05	2.32E+01	4.12E+03	5.59E+04
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				2.11E+07	1.04E+04	4.58E+03	3.64E+07	6.28E+04	1.89E+04	8.58E+06	4.66E+02	8.83E+04	1.11E+06
		Milk - Cow				7.14E+09	4.24E+06	6.76E+06	6.48E+08	3.14E+09	1.34E+07	1.42E+09	2.08E+05	2.24E+07	4.00E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				5.76E+06	2.38E+03	1.21E+03	8.63E+06	1.70E+04	3.94E+03	2.34E+06	1.25E+02	1.81E+04	3.02E+05
		Goat Milk				6.88E+07	3.80E+04	6.41E+04	5.89E+06	3.02E+07	1.16E+05	1.37E+07	1.99E+03	1.92E+05	3.85E+07
		Sheep				2.56E+06	1.52E+03	5.75E+02	5.08E+06	7.68E+03	3.14E+03	1.05E+06	5.76E+01	1.50E+04	1.35E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				6.34E+08	2.36E+05	1.30E+05	8.72E+08	1.87E+06	3.73E+05	2.57E+08	1.36E+04	1.70E+06	3.33E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	9.87E+06	--	--	--	--
		Deer				5.19E+10	1.87E+07	1.05E+07	6.95E+10	1.53E+08	2.93E+07	2.10E+10	1.11E+06	1.33E+08	2.72E+09
		Elk				2.60E+11	9.41E+07	5.29E+07	3.49E+11	7.66E+08	1.47E+08	1.05E+11	5.56E+06	6.69E+08	1.37E+10
		Rabbit				1.54E+07	6.35E+03	3.22E+03	2.30E+07	4.55E+04	1.05E+04	6.23E+06	3.33E+02	4.82E+04	8.06E+05
		Prairie Dog				3.84E+06	1.59E+03	8.05E+02	5.75E+06	1.14E+04	2.63E+03	1.56E+06	8.33E+01	1.21E+04	2.02E+05
		Badger				--	--	--	--	--	4.40E+06	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	1.64E+05	2.13E+02	2.36E+03	1.20E+04	7.18E+03	2.91E+03	9.41E-01	3.24E+03	7.53E+03	9.38E+06
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				3.35E+06	4.08E+03	4.65E+04	2.29E+05	1.54E+05	8.24E+04	1.77E+01	7.04E+04	1.41E+05	1.86E+08
		Milk - Cow				3.33E+08	9.33E+05	1.62E+07	1.33E+08	5.84E+06	1.02E+06	3.49E+04	2.31E+06	1.74E+09	4.49E+10
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				7.06E+05	1.07E+03	9.81E+03	5.77E+04	3.96E+04	1.61E+04	4.61E+00	1.82E+04	3.67E+04	3.92E+07
		Goat Milk				3.22E+06	9.82E+03	1.56E+05	1.38E+06	6.10E+04	9.62E+03	3.67E+02	2.42E+04	1.83E+07	4.33E+08
		Sheep				5.15E+05	5.01E+02	7.16E+03	2.90E+04	1.92E+04	1.42E+04	2.18E+00	8.71E+03	1.74E+04	2.86E+07
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				8.61E+07	1.48E+05	1.20E+06	7.78E+06	5.40E+06	1.89E+06	6.34E+02	2.50E+06	5.05E+06	4.79E+09
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	7.15E+08	--	--	2.42E+08	--	--	--	--	1.14E+12
		Deer				6.81E+09	1.21E+07	9.45E+07	6.32E+08	4.40E+08	1.48E+08	5.19E+04	2.04E+08	4.13E+08	3.78E+11
		Elk				3.42E+10	6.07E+07	4.74E+08	3.17E+09	2.21E+09	7.43E+08	2.60E+05	1.03E+09	2.07E+09	1.90E+12
		Rabbit				2.35E+06	3.56E+03	3.27E+04	1.92E+05	1.32E+05	5.36E+04	1.54E+01	6.08E+04	1.22E+05	1.31E+08
		Prairie Dog				5.89E+05	8.91E+02	8.18E+03	4.81E+04	3.30E+04	1.34E+04	3.84E+00	1.52E+04	3.06E+04	3.27E+07
		Badger				--	3.66E+08	--	--	1.06E+06	--	--	--	--	6.15E+10

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	6.47E+04	8.79E+01	9.74E+02	5.04E+03	2.64E+03	8.86E+02	3.97E-01	1.17E+03	3.19E+03	3.84E+06
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				1.50E+06	1.82E+03	2.08E+04	1.02E+05	6.88E+04	3.68E+04	7.90E+00	3.14E+04	6.31E+04	8.31E+07
		Milk - Cow				6.82E+07	1.91E+05	3.31E+06	2.72E+07	1.19E+06	2.10E+05	7.14E+03	4.72E+05	3.56E+08	9.18E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				3.31E+05	5.01E+02	4.60E+03	2.71E+04	1.86E+04	7.54E+03	2.16E+00	8.55E+03	1.72E+04	1.84E+07
		Goat Milk				6.03E+05	1.84E+03	2.93E+04	2.59E+05	1.14E+04	1.80E+03	6.88E+01	4.54E+03	3.43E+06	8.12E+07
		Sheep				2.27E+05	2.21E+02	3.16E+03	1.28E+04	8.48E+03	6.26E+03	9.61E-01	3.84E+03	7.69E+03	1.26E+07
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				3.23E+07	5.54E+04	4.49E+05	2.92E+06	2.02E+06	7.09E+05	2.38E+02	9.38E+05	1.89E+06	1.79E+09
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	2.68E+08	--	--	9.08E+07	--	--	--	--	4.28E+11
		Deer				2.55E+09	4.53E+06	3.54E+07	2.37E+08	1.65E+08	5.55E+07	1.95E+04	7.67E+07	1.55E+08	1.42E+11
		Elk				1.28E+10	2.28E+07	1.78E+08	1.19E+09	8.29E+08	2.79E+08	9.77E+04	3.85E+08	7.77E+08	7.12E+11
		Rabbit				8.83E+05	1.34E+03	1.23E+04	7.22E+04	4.95E+04	2.01E+04	5.76E+00	2.28E+04	4.59E+04	4.91E+07
		Prairie Dog				2.21E+05	3.34E+02	3.07E+03	1.80E+04	1.24E+04	5.03E+03	1.44E+00	5.70E+03	1.15E+04	1.23E+07
		Badger				--	1.37E+08	--	--	3.98E+05	--	--	--	--	2.31E+10

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		PRG_{a-ing}	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	6.12E+06	3.06E+03	1.34E+03	9.15E+06	1.84E+04	5.60E+03	2.47E+06	1.36E+02	2.60E+04	3.24E+05
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times \left[\left(f_p \times Q_p \times (Br_{forage} + MLF_{forage})\right) + \left(f_s \times Q_s \times B_s\right)\right] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				9.44E+07	4.67E+04	2.05E+04	1.63E+08	2.81E+05	8.48E+04	3.85E+07	2.09E+03	3.96E+05	4.95E+06
		Milk - Cow				6.98E+10	4.14E+07	6.61E+07	6.34E+09	3.07E+10	1.31E+08	1.39E+10	2.04E+06	2.19E+08	3.91E+10
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				2.46E+07	1.02E+04	5.15E+03	3.68E+07	7.27E+04	1.68E+04	9.97E+06	5.33E+02	7.72E+04	1.29E+06
		Goat Milk				7.34E+08	4.05E+05	6.84E+05	6.28E+07	3.22E+08	1.24E+06	1.46E+08	2.12E+04	2.05E+06	4.11E+08
		Sheep				1.16E+07	6.89E+03	2.61E+03	2.30E+07	3.48E+04	1.42E+04	4.75E+06	2.61E+02	6.81E+04	6.10E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				3.38E+09	1.26E+06	6.92E+05	4.65E+09	9.96E+06	1.99E+06	1.37E+09	7.25E+04	9.08E+06	1.78E+08
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	1.32E+08	--	--	--	--
		Deer				6.92E+11	2.50E+08	1.40E+08	9.27E+11	2.03E+09	3.91E+08	2.80E+11	1.48E+07	1.78E+09	3.63E+10
		Elk				3.47E+12	1.25E+09	7.05E+08	4.65E+12	1.02E+10	1.96E+09	1.40E+12	7.41E+07	8.92E+09	1.82E+11
		Rabbit				2.05E+08	8.47E+04	4.29E+04	3.07E+08	6.06E+05	1.40E+05	8.31E+07	4.44E+03	6.43E+05	1.08E+07
		Prairie Dog				5.12E+07	2.12E+04	1.07E+04	7.67E+07	1.52E+05	3.50E+04	2.08E+07	1.11E+03	1.61E+05	2.69E+06
		Badger				--	--	--	--	--	5.87E+07	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Hazard for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		PRG_{a-ing}	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	2.64E+06	1.32E+03	5.83E+02	3.34E+06	8.02E+03	2.42E+03	1.05E+06	5.87E+01	1.11E+04	1.41E+05
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				4.21E+07	2.08E+04	9.16E+03	7.27E+07	1.26E+05	3.78E+04	1.72E+07	9.32E+02	1.77E+05	2.21E+06
		Milk - Cow				1.43E+10	8.48E+06	1.35E+07	1.30E+09	6.28E+09	2.68E+07	2.84E+09	4.17E+05	4.47E+07	8.00E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				1.15E+07	4.77E+03	2.41E+03	1.73E+07	3.41E+04	7.88E+03	4.67E+06	2.50E+02	3.62E+04	6.05E+05
		Goat Milk				1.38E+08	7.60E+04	1.28E+05	1.18E+07	6.03E+07	2.32E+05	2.73E+07	3.98E+03	3.85E+05	7.71E+07
		Sheep				5.12E+06	3.04E+03	1.15E+03	1.02E+07	1.54E+04	6.28E+03	2.10E+06	1.15E+02	3.01E+04	2.69E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.27E+09	4.72E+05	2.60E+05	1.74E+09	3.74E+06	7.47E+05	5.13E+08	2.72E+04	3.41E+06	6.66E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	4.94E+07	--	--	--	--
		Deer				2.59E+11	9.37E+07	5.27E+07	3.48E+11	7.63E+08	1.46E+08	1.05E+11	5.54E+06	6.66E+08	1.36E+10
		Elk				1.30E+12	4.70E+08	2.64E+08	1.75E+12	3.83E+09	7.35E+08	5.27E+11	2.78E+07	3.35E+09	6.84E+10
		Rabbit				7.68E+07	3.18E+04	1.61E+04	1.15E+08	2.27E+05	5.25E+04	3.12E+07	1.67E+03	2.41E+05	4.03E+06
		Prairie Dog				1.92E+07	7.94E+03	4.02E+03	2.88E+07	5.68E+04	1.31E+04	7.79E+06	4.17E+02	6.03E+04	1.01E+06
		Badger				--	--	--	--	--	2.20E+07	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	4.14E+05	5.20E+02	6.03E+03	2.97E+04	1.72E+04	6.96E+03	2.31E+00	7.73E+03	1.85E+04	2.39E+07
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				6.70E+06	8.17E+03	9.30E+04	4.58E+05	3.08E+05	1.65E+05	3.54E+01	1.41E+05	2.83E+05	3.72E+08
		Milk - Cow				6.66E+08	1.87E+06	3.24E+07	2.66E+08	1.17E+07	2.05E+06	6.98E+04	4.62E+06	3.48E+09	8.97E+10
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				1.41E+06	2.14E+03	1.96E+04	1.15E+05	7.92E+04	3.22E+04	9.22E+00	3.65E+04	7.35E+04	7.85E+07
		Goat Milk				6.44E+06	1.96E+04	3.13E+05	2.76E+06	1.22E+05	1.92E+04	7.34E+02	4.84E+04	3.66E+07	8.66E+08
		Sheep				1.03E+06	1.00E+03	1.43E+04	5.80E+04	3.84E+04	2.84E+04	4.36E+00	1.74E+04	3.48E+04	5.73E+07
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.72E+08	2.95E+05	2.39E+06	1.56E+07	1.08E+07	3.78E+06	1.27E+03	5.00E+06	1.01E+07	9.57E+09
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	3.58E+09	--	--	1.21E+09	--	--	--	--	5.71E+12
		Deer				3.40E+10	6.05E+07	4.73E+08	3.16E+09	2.20E+09	7.40E+08	2.59E+05	1.02E+09	2.06E+09	1.89E+12
		Elk				1.71E+11	3.03E+08	2.37E+09	1.59E+10	1.11E+10	3.72E+09	1.30E+06	5.13E+09	1.04E+10	9.49E+12
		Rabbit				1.18E+07	1.78E+04	1.64E+05	9.62E+05	6.60E+05	2.68E+05	7.68E+01	3.04E+05	6.12E+05	6.54E+08
		Prairie Dog				2.94E+06	4.45E+03	4.09E+04	2.41E+05	1.65E+05	6.70E+04	1.92E+01	7.60E+04	1.53E+05	1.64E+08
		Badger				--	1.83E+09	--	--	5.31E+06	--	--	--	--	3.08E+11

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	1.66E+05	2.19E+02	2.56E+03	1.27E+04	6.32E+03	2.04E+03	1.00E+00	2.78E+03	8.05E+03	1.00E+07
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				2.99E+06	3.65E+03	4.15E+04	2.04E+05	1.38E+05	7.36E+04	1.58E+01	6.29E+04	1.26E+05	1.66E+08
		Milk - Cow				1.36E+08	3.82E+05	6.63E+06	5.44E+07	2.39E+06	4.19E+05	1.43E+04	9.45E+05	7.12E+08	1.84E+10
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				6.62E+05	1.00E+03	9.20E+03	5.41E+04	3.71E+04	1.51E+04	4.32E+00	1.71E+04	3.44E+04	3.68E+07
		Goat Milk				1.21E+06	3.68E+03	5.87E+04	5.17E+05	2.29E+04	3.61E+03	1.38E+02	9.08E+03	6.86E+06	1.62E+08
		Sheep				4.55E+05	4.42E+02	6.32E+03	2.56E+04	1.70E+04	1.25E+04	1.92E+00	7.69E+03	1.54E+04	2.53E+07
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				6.46E+07	1.11E+05	8.97E+05	5.83E+06	4.05E+06	1.42E+06	4.76E+02	1.88E+06	3.79E+06	3.59E+09
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	1.34E+09	--	--	4.54E+08	--	--	--	--	2.14E+12
		Deer				1.28E+10	2.27E+07	1.77E+08	1.19E+09	8.26E+08	2.78E+08	9.73E+04	3.83E+08	7.74E+08	7.09E+11
		Elk				6.41E+10	1.14E+08	8.90E+08	5.95E+09	4.14E+09	1.39E+09	4.88E+05	1.92E+09	3.89E+09	3.56E+12
		Rabbit				4.42E+06	6.68E+03	6.13E+04	3.61E+05	2.47E+05	1.01E+05	2.88E+01	1.14E+05	2.30E+05	2.45E+08
		Prairie Dog				1.10E+06	1.67E+03	1.53E+04	9.02E+04	6.19E+04	2.51E+04	7.20E+00	2.85E+04	5.74E+04	6.13E+07
		Badger				--	6.86E+08	--	--	1.99E+06	--	--	--	--	1.15E+11

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Chii dah wiih leezh (washes and drainages)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		PRG_{a-ing}	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	1.22E+06	6.11E+02	2.68E+02	1.83E+06	3.68E+03	1.12E+03	4.94E+05	2.71E+01	5.19E+03	6.47E+04
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times \left[\left(f_p \times Q_p \times (Br_{forage} + MLF_{forage})\right) + \left(f_s \times Q_s \times B_s\right)\right] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				1.89E+07	9.33E+03	4.10E+03	3.26E+07	5.62E+04	1.70E+04	7.69E+06	4.17E+02	7.91E+04	9.91E+05
		Milk - Cow				1.40E+10	8.29E+06	1.32E+07	1.27E+09	6.14E+09	2.62E+07	2.78E+09	4.07E+05	4.37E+07	7.82E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				4.91E+06	2.03E+03	1.03E+03	7.36E+06	1.45E+04	3.36E+03	1.99E+06	1.07E+02	1.54E+04	2.58E+05
		Goat Milk				1.47E+08	8.10E+04	1.37E+05	1.26E+07	6.44E+07	2.47E+05	2.91E+07	4.25E+03	4.10E+05	8.22E+07
		Sheep				2.32E+06	1.38E+03	5.22E+02	4.61E+06	6.97E+03	2.85E+03	9.50E+05	5.22E+01	1.36E+04	1.22E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				6.77E+08	2.52E+05	1.38E+05	9.30E+08	1.99E+06	3.98E+05	2.74E+08	1.45E+04	1.82E+06	3.55E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	2.63E+07	--	--	--	--
		Deer				1.38E+11	5.00E+07	2.81E+07	1.85E+11	4.07E+08	7.81E+07	5.59E+10	2.95E+06	3.55E+08	7.26E+09
		Elk				6.95E+11	2.51E+08	1.41E+08	9.31E+11	2.04E+09	3.92E+08	2.81E+11	1.48E+07	1.78E+09	3.65E+10
		Rabbit				4.10E+07	1.69E+04	8.58E+03	6.13E+07	1.21E+05	2.80E+04	1.66E+07	8.89E+02	1.29E+05	2.15E+06
		Prairie Dog				1.02E+07	4.24E+03	2.15E+03	1.53E+07	3.03E+04	7.00E+03	4.16E+06	2.22E+02	3.22E+04	5.38E+05
		Badger				--	--	--	--	--	1.17E+07	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Hazard for Specific Metals - Chíí dah wiih leezh (washes and drainages)									
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		PRG_{a-ing}	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	5.28E+05	2.63E+02	1.17E+02	6.67E+05	1.60E+03	4.84E+02	2.11E+05	1.17E+01	2.22E+03	2.82E+04
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				8.42E+06	4.17E+03	1.83E+03	1.45E+07	2.51E+04	7.57E+03	3.43E+06	1.86E+02	3.53E+04	4.42E+05
		Milk - Cow				2.86E+09	1.70E+06	2.70E+06	2.59E+08	1.26E+09	5.36E+06	5.68E+08	8.33E+04	8.94E+06	1.60E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				2.30E+06	9.53E+02	4.83E+02	3.45E+06	6.82E+03	1.58E+03	9.35E+05	5.00E+01	7.24E+03	1.21E+05
		Goat Milk				2.75E+07	1.52E+04	2.56E+04	2.36E+06	1.21E+07	4.64E+04	5.46E+06	7.96E+02	7.70E+04	1.54E+07
		Sheep				1.02E+06	6.08E+02	2.30E+02	2.03E+06	3.07E+03	1.26E+03	4.19E+05	2.30E+01	6.01E+03	5.38E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				2.54E+08	9.45E+04	5.19E+04	3.49E+08	7.47E+05	1.49E+05	1.03E+08	5.44E+03	6.81E+05	1.33E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	9.87E+06	--	--	--	--
		Deer				5.19E+10	1.87E+07	1.05E+07	6.95E+10	1.53E+08	2.93E+07	2.10E+10	1.11E+06	1.33E+08	2.72E+09
		Elk				2.60E+11	9.41E+07	5.29E+07	3.49E+11	7.66E+08	1.47E+08	1.05E+11	5.56E+06	6.69E+08	1.37E+10
		Rabbit				1.54E+07	6.35E+03	3.22E+03	2.30E+07	4.55E+04	1.05E+04	6.23E+06	3.33E+02	4.82E+04	8.06E+05
		Prairie Dog				3.84E+06	1.59E+03	8.05E+02	5.75E+06	1.14E+04	2.63E+03	1.56E+06	8.33E+01	1.21E+04	2.02E+05
		Badger				--	--	--	--	--	4.40E+06	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk for Adults - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	mg/kg	8.28E+04	1.04E+02	1.21E+03	5.93E+03	3.45E+03	1.39E+03	4.61E-01	1.55E+03	3.69E+03	4.78E+06
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil. $PRG_{a-ing}(i) = \frac{THQ \times RfD_o \times AT_{nc-a} \times BW_a}{EF_a \times ED_a \times IR_a \times [(f_p \times Q_p \times (Br_{forage}+MLF_{forage})) + (f_s \times Q_s \times B_s)] \times CF \times Ba \times MF \times CF_6}$	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				1.34E+06	1.63E+03	1.86E+04	9.16E+04	6.17E+04	3.30E+04	7.08E+00	2.82E+04	5.65E+04	7.44E+07
		Milk - Cow				1.33E+08	3.73E+05	6.48E+06	5.32E+07	2.34E+06	4.10E+05	1.40E+04	9.24E+05	6.97E+08	1.79E+10
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				2.83E+05	4.28E+02	3.92E+03	2.31E+04	1.58E+04	6.43E+03	1.84E+00	7.30E+03	1.47E+04	1.57E+07
		Goat Milk				1.29E+06	3.93E+03	6.26E+04	5.52E+05	2.44E+04	3.85E+03	1.47E+02	9.69E+03	7.31E+06	1.73E+08
		Sheep				2.06E+05	2.00E+02	2.86E+03	1.16E+04	7.69E+03	5.68E+03	8.71E-01	3.48E+03	6.97E+03	1.15E+07
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				3.45E+07	5.91E+04	4.79E+05	3.11E+06	2.16E+06	7.57E+05	2.54E+02	1.00E+06	2.02E+06	1.91E+09
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	7.15E+08	--	--	2.42E+08	--	--	--	--	1.14E+12
		Deer				6.81E+09	1.21E+07	9.45E+07	6.32E+08	4.40E+08	1.48E+08	5.19E+04	2.04E+08	4.13E+08	3.78E+11
		Elk				3.42E+10	6.07E+07	4.74E+08	3.17E+09	2.21E+09	7.43E+08	2.60E+05	1.03E+09	2.07E+09	1.90E+12
		Rabbit				2.35E+06	3.56E+03	3.27E+04	1.92E+05	1.32E+05	5.36E+04	1.54E+01	6.08E+04	1.22E+05	1.31E+08
		Prairie Dog				5.89E+05	8.91E+02	8.18E+03	4.81E+04	3.30E+04	1.34E+04	3.84E+00	1.52E+04	3.06E+04	3.27E+07
		Badger				--	3.66E+08	--	--	1.06E+06	--	--	--	--	6.15E+10

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Risk - Consumption of Animal Products for Metals Back-Calculated to Soil	Noncancer Soil PRG for Total Animal Consumption		$PRG_{a\text{-}ing}$	The preliminary remediation goals for noncancer for all animal consumption, back-calculated to soil.	mg/kg	3.32E+04	4.38E+01	5.12E+02	2.55E+03	1.26E+03	4.08E+02	2.00E-01	5.55E+02	1.61E+03	2.01E+06
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for cancer for each animal product, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--	--
		Beef				5.98E+05	7.29E+02	8.31E+03	4.09E+04	2.75E+04	1.47E+04	3.16E+00	1.26E+04	2.52E+04	3.32E+07
		Milk - Cow				2.73E+07	7.63E+04	1.33E+06	1.09E+07	4.78E+05	8.38E+04	2.86E+03	1.89E+05	1.42E+08	3.67E+09
		Pig				--	--	--	--	--	--	--	--	--	--
		Goat				1.32E+05	2.00E+02	1.84E+03	1.08E+04	7.42E+03	3.02E+03	8.64E-01	3.42E+03	6.89E+03	7.36E+06
		Goat Milk				2.41E+05	7.37E+02	1.17E+04	1.03E+05	4.57E+03	7.21E+02	2.75E+01	1.82E+03	1.37E+06	3.25E+07
		Sheep				9.10E+04	8.84E+01	1.26E+03	5.12E+03	3.39E+03	2.51E+03	3.84E-01	1.54E+03	3.07E+03	5.05E+06
		Sheep Milk				--	--	--	--	--	--	--	--	--	--
		Horse				1.29E+07	2.22E+04	1.79E+05	1.17E+06	8.10E+05	2.84E+05	9.52E+01	3.75E+05	7.58E+05	7.18E+08
		Domesticated Turkey				--	--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	2.68E+08	--	--	9.08E+07	--	--	--	--	4.28E+11
		Deer				2.55E+09	4.53E+06	3.54E+07	2.37E+08	1.65E+08	5.55E+07	1.95E+04	7.67E+07	1.55E+08	1.42E+11
		Elk				1.28E+10	2.28E+07	1.78E+08	1.19E+09	8.29E+08	2.79E+08	9.77E+04	3.85E+08	7.77E+08	7.12E+11
		Rabbit				8.83E+05	1.34E+03	1.23E+04	7.22E+04	4.95E+04	2.01E+04	5.76E+00	2.28E+04	4.59E+04	4.91E+07
		Prairie Dog				2.21E+05	3.34E+02	3.07E+03	1.80E+04	1.24E+04	5.03E+03	1.44E+00	5.70E+03	1.15E+04	1.23E+07
		Badger				--	1.37E+08	--	--	3.98E+05	--	--	--	--	2.31E+10

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniculides					
							Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	--	--	8.51E-01	1.26E-02	1.95E-02	2.41E-03	7.13E-03	7.13E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	--	--	75	75	75	75	75	75
	Decay Constant		λ			1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00	1.00
Radionuclide Transfer Factors for Animal Products, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Chicken Eggs			Eggs		--	--	--	1.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	1.10E+00
		Beef			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Milk - Cow			Milk		--	--	--	6.80E-03	1.84E-04	3.69E-04	4.85E-06	1.75E-03	1.75E-03
		Pig			Swine		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-02	4.40E-02
		Goat			Goat		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	--	--	0.00E+00	5.83E-03	0.00E+00	0.00E+00	1.36E-03	1.36E-03
		Sheep			Sheep		--	--	--	0.00E+00	7.10E-03	5.00E-03	1.00E-03	2.00E-03	2.00E-03
		Sheep Milk			Sheep Milk		--	--	--	0.00E+00	3.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Domesticated Turkey			Poultry		--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
	Wild	Wild Turkey			Poultry		--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Deer			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Elk			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Rabbit			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Prairie Dog			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Badger			Goat		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides - Custom			PRGs for non-SE Radioniculides - Custom					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Direct Consumption of Animal Products for Radionuclides, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal(i)}}}$	pCi/g	**5.76E-03**	**5.32E-03**	**8.79E-03**	**5.08E-01**	**1.47E-02**	**3.38E-02**	**1.46E-01**	**1.82E-01**	**2.01E-01**
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal(i)}$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal(i)} = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	3.39E-01	3.14E-01	3.86E-01	2.23E+01	6.47E-01	1.48E+00	6.41E+00	7.99E+00	8.81E+00
		Chicken Eggs				3.39E-02	3.14E-02	3.86E-02	2.23E+00	6.47E-02	1.48E-01	6.41E-01	7.99E-01	8.81E-01
		Beef				3.30E-02	3.05E-02	6.61E-02	3.82E+00	1.11E-01	2.54E-01	1.10E+00	1.37E+00	1.51E+00
		Milk - Cow				1.58E+00	1.45E+00	3.16E+00	1.83E+02	5.29E+00	1.21E+01	5.25E+01	6.54E+01	7.21E+01
		Pig				--	1.26E+01	1.16E+00	6.69E+01	1.94E+00	4.45E+00	1.92E+01	2.40E+01	2.64E+01
		Goat				--	--	8.68E-02	5.02E+00	1.45E-01	3.34E-01	1.44E+00	1.80E+00	1.98E+00
		Goat Milk				1.00E-01	9.50E-02	1.74E-01	1.00E+01	2.91E-01	6.68E-01	2.89E+00	3.60E+00	3.96E+00
		Sheep				1.14E-02	1.05E-02	2.27E-02	1.31E+00	3.80E-02	8.73E-02	3.77E-01	4.70E-01	5.18E-01
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				3.47E-01	3.20E-01	6.94E-01	4.02E+01	1.16E+00	2.67E+00	1.15E+01	1.44E+01	1.59E+01
		Domesticated Turkey				2.03E+01	1.88E+01	2.31E+01	1.34E+03	3.88E+01	8.91E+01	3.85E+02	4.79E+02	5.29E+02
	Wild	Wild Turkey				7.63E+01	7.06E+01	8.68E+01	5.02E+03	1.45E+02	3.34E+02	1.44E+03	1.80E+03	1.98E+03
		Deer				2.89E+00	2.67E+00	5.78E+00	3.35E+02	9.70E+00	2.23E+01	9.62E+01	1.20E+02	1.32E+02
		Elk				2.89E+00	2.67E+00	5.78E+00	3.35E+02	9.70E+00	2.23E+01	9.62E+01	1.20E+02	1.32E+02
		Rabbit				3.47E-01	3.20E-01	6.94E-01	4.02E+01	1.16E+00	2.67E+00	1.15E+01	1.44E+01	1.59E+01
		Prairie Dog				1.73E-01	1.60E-01	3.47E-01	2.01E+01	5.82E-01	1.34E+00	5.77E+00	7.19E+00	7.93E+00
		Badger				--	--	6.94E-01	4.02E+01	1.16E+00	2.67E+00	1.15E+01	1.44E+01	1.59E+01

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides - Custom			PRGs for non-SE Radioniculides - Custom					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Consumption of Animal Products for Radionuclides, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	pCi/g	**1.05E-01**	**1.03E-01**	**4.18E+00**	**5.26E+00**	**1.39E+01**	**1.38E+01**	**3.51E+02**	**8.61E+00**	**9.50E+00**
	Domestic	Chicken	$PRG_{a\text{-}ing(i)}$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal(i)}}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal(i)}}{\left(\frac{TF_f}{P_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	1.96E+00	1.91E+00	--	9.21E+02	--	--	--	1.45E+02	1.60E+02
		Chicken Eggs				1.52E-01	1.47E-01	--	9.21E+00	--	--	--	9.89E+00	1.09E+01
		Beef				4.41E+00	4.35E+00	1.29E+01	1.42E+01	1.14E+02	4.14E+01	1.38E+03	9.96E+02	1.10E+03
		Milk - Cow				1.16E+03	8.57E+02	1.71E+03	1.18E+03	1.30E+04	5.70E+03	1.96E+06	6.66E+03	7.34E+03
		Pig				--	1.81E+02	--	--	--	--	--	3.45E+02	3.81E+02
		Goat				--	--	--	--	--	--	--	--	--
		Goat Milk				3.89E+01	3.81E+01	2.20E+03	--	1.83E+02	--	--	3.79E+03	4.17E+03
		Sheep				4.78E-01	4.76E-01	6.67E+00	--	1.78E+01	2.24E+01	4.95E+02	3.05E+02	3.37E+02
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				4.63E+01	4.57E+01	1.36E+02	1.49E+02	1.20E+03	4.35E+02	1.45E+04	1.05E+04	1.15E+04
		Domesticated Turkey				3.56E+01	3.47E+01	--	1.64E+04	--	--	--	2.63E+03	2.90E+03
	Wild	Wild Turkey				8.37E+03	8.16E+03	--	9.60E+06	--	--	--	6.29E+05	6.94E+05
		Deer				3.17E+04	3.13E+04	9.24E+04	2.06E+05	8.35E+05	3.07E+05	9.84E+06	7.19E+06	7.93E+06
		Elk				2.03E+05	2.01E+05	5.92E+05	2.05E+06	5.39E+06	1.99E+06	6.30E+07	4.62E+07	5.10E+07
		Rabbit				2.93E+02	2.89E+02	8.56E+02	1.23E+03	7.64E+03	2.79E+03	9.12E+04	6.63E+04	7.31E+04
		Prairie Dog				1.46E+02	1.44E+02	4.28E+02	6.17E+02	3.82E+03	1.40E+03	4.56E+04	3.31E+04	3.65E+04
		Badger				--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniculides					
							Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	--	--	8.51E-01	1.26E-02	1.95E-02	2.41E-03	7.13E-03	7.13E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	--	--	75	75	75	75	75	75
	Decay Constant		λ			1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00	1.00
Radionuclide Transfer Factors for Animal Products, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Chicken Eggs			Eggs		--	--	--	1.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	1.10E+00
		Beef			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Milk - Cow			Milk		--	--	--	6.80E-03	1.84E-04	3.69E-04	4.85E-06	1.75E-03	1.75E-03
		Pig			Swine		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-02	4.40E-02
		Goat			Goat		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	--	--	0.00E+00	5.83E-03	0.00E+00	0.00E+00	1.36E-03	1.36E-03
		Sheep			Sheep		--	--	--	0.00E+00	7.10E-03	5.00E-03	1.00E-03	2.00E-03	2.00E-03
		Sheep Milk			Sheep Milk		--	--	--	0.00E+00	3.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Domesticated Turkey			Poultry		--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
	Wild	Wild Turkey			Poultry		--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Deer			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Elk			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Rabbit			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Prairie Dog			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Badger			Goat		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Outputs	Parameter		Symbol	Description	Units	Radionuclides - Kee'da'whíí tééh (full-time Navajo residential)			PRGs for non-SE Radioniculides - Kee'da'whíí tééh (full-time Navajo residential)					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Direct Consumption of Animal Products for Radionuclides, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	**3.31E-03**	**3.06E-03**	**7.77E-03**	**2.98E-01**	**8.65E-03**	**1.99E-02**	**8.58E-02**	**1.07E-01**	**1.18E-01**
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	1.80E-01	1.67E-01	--	1.19E+01	3.44E-01	7.89E-01	3.41E+00	4.24E+00	4.68E+00
		Chicken Eggs				3.32E-02	3.07E-02	--	2.18E+00	6.33E-02	1.45E-01	6.27E-01	7.82E-01	8.62E-01
		Beef				1.64E-02	1.51E-02	3.29E-02	1.90E+00	5.51E-02	1.27E-01	5.46E-01	6.81E-01	7.51E-01
		Milk - Cow				1.64E+00	1.51E+00	3.29E+00	1.90E+02	5.51E+00	1.27E+01	5.46E+01	6.81E+01	7.51E+01
		Pig				--	6.37E+00	--	3.39E+01	9.83E-01	2.26E+00	9.75E+00	1.21E+01	1.34E+01
		Goat				--	--	--	2.38E+00	6.90E-02	1.58E-01	6.84E-01	8.53E-01	9.40E-01
		Goat Milk				1.13E-01	1.07E-01	1.09E+01	1.13E+01	3.28E-01	7.54E-01	3.26E+00	4.06E+00	4.48E+00
		Sheep				5.72E-03	5.27E-03	1.14E-02	6.60E-01	1.91E-02	4.39E-02	1.90E-01	2.36E-01	2.61E-01
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				2.04E-01	1.88E-01	4.08E-01	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00
		Domesticated Turkey				1.20E+01	1.11E+01	--	7.87E+02	2.28E+01	5.24E+01	2.26E+02	2.82E+02	3.11E+02
	Wild	Wild Turkey				4.49E+01	4.15E+01	--	2.95E+03	8.55E+01	1.96E+02	8.48E+02	1.06E+03	1.17E+03
		Deer				1.70E+00	1.57E+00	3.40E+00	1.97E+02	5.70E+00	1.31E+01	5.65E+01	7.05E+01	7.77E+01
		Elk				1.70E+00	1.57E+00	3.40E+00	1.97E+02	5.70E+00	1.31E+01	5.65E+01	7.05E+01	7.77E+01
		Rabbit				2.04E-01	1.88E-01	4.08E-01	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00
		Prairie Dog				1.02E-01	9.40E-02	2.04E-01	1.18E+01	3.42E-01	7.85E-01	3.39E+00	4.23E+00	4.66E+00
		Badger				--	--	--	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides - Kee'da'whíí tééh (full-			PRGs for non-SE Radioniculides - Kee'da'whíí tééh (full-time Navajo residential)					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Consumption of Animal Products for Radionuclides, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	**1.28E-01**	**1.24E-01**	**1.14E+02**	**8.58E+00**	**1.51E+02**	**3.96E+02**	**1.10E+04**	**8.13E+00**	**8.97E+00**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left(\left(Q_p \times fp \times fs \times \left(Bv_{dry} + MLF_p\right)\right) + \left(Q_s \times fp\right)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{P_{milk}} \times \left(\left(Q_p \times fp \times fs \times \left(Bv_{dry} + MLF_p\right)\right) + \left(Q_s \times fp\right)\right)\right)}$	pCi/g	1.04E+00	1.02E+00	--	4.89E+02	--	--	--	7.71E+01	8.50E+01
		Chicken Eggs				1.49E-01	1.44E-01	--	9.01E+00	--	--	--	9.68E+00	1.07E+01
		Beef				7.21E+02	7.12E+02	2.11E+03	3.36E+03	1.89E+04	6.91E+03	2.24E+05	1.63E+05	1.80E+05
		Milk - Cow				5.06E+05	3.73E+05	7.38E+05	6.38E+05	5.64E+06	2.50E+06	8.44E+08	2.88E+06	3.18E+06
		Pig				--	9.17E+01	--	--	--	--	--	1.75E+02	1.93E+02
		Goat				--	--	--	--	--	--	--	--	--
		Goat Milk				4.39E+01	4.30E+01	2.48E+03	--	2.06E+02	--	--	4.27E+03	4.71E+03
		Sheep				2.26E+01	2.25E+01	3.15E+02	--	8.41E+02	1.06E+03	2.34E+04	1.44E+04	1.59E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				1.63E+04	1.61E+04	4.74E+04	1.55E+05	4.31E+05	1.60E+05	5.05E+06	3.70E+06	4.08E+06
		Domesticated Turkey				2.09E+01	2.04E+01	--	9.64E+03	--	--	--	1.55E+03	1.71E+03
	Wild	Wild Turkey				1.76E+06	1.71E+06	--	2.77E+09	--	--	--	1.33E+08	1.46E+08
		Deer				8.12E+06	8.02E+06	2.36E+07	1.00E+08	2.16E+08	8.00E+07	2.52E+09	1.85E+09	2.04E+09
		Elk				4.08E+07	4.03E+07	1.19E+08	5.05E+08	1.08E+09	4.02E+08	1.26E+10	9.28E+09	1.02E+10
		Rabbit				4.86E+02	4.80E+02	1.42E+03	2.54E+03	1.28E+04	4.68E+03	1.51E+05	1.10E+05	1.22E+05
		Prairie Dog				8.60E+01	8.49E+01	2.51E+02	3.62E+02	2.25E+03	8.20E+02	2.68E+04	1.95E+04	2.15E+04
		Badger				--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radionuclides					
							Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	#N/A	#N/A	#N/A	8.51E-01	1.26E-02	1.95E-02	2.41E-03	7.13E-03	7.13E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	75	75	75	75	75	75	75	75	75
	Decay Constant		λ			1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
Radionuclide Transfer Factors for Animal Products, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	#N/A	#N/A	#N/A	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Chicken Eggs			Eggs		#N/A	#N/A	#N/A	1.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	1.10E+00
		Beef			Beef		#N/A	#N/A	#N/A	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Milk - Cow			Milk		#N/A	#N/A	#N/A	6.80E-03	1.84E-04	3.69E-04	4.85E-06	1.75E-03	1.75E-03
		Pig			Swine		#N/A	#N/A	#N/A	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-02	4.40E-02
		Goat			Goat		#N/A	#N/A	#N/A	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		#N/A	#N/A	#N/A	0.00E+00	5.83E-03	0.00E+00	0.00E+00	1.36E-03	1.36E-03
		Sheep			Sheep		#N/A	#N/A	#N/A	0.00E+00	7.10E-03	5.00E-03	1.00E-03	2.00E-03	2.00E-03
		Sheep Milk			Sheep Milk		#N/A	#N/A	#N/A	0.00E+00	3.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		#N/A	#N/A	#N/A	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Domesticated Turkey			Poultry		#N/A	#N/A	#N/A	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
	Wild	Wild Turkey			Poultry		#N/A	#N/A	#N/A	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Deer			Beef		#N/A	#N/A	#N/A	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Elk			Beef		#N/A	#N/A	#N/A	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Rabbit			Beef		#N/A	#N/A	#N/A	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Prairie Dog			Beef		#N/A	#N/A	#N/A	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Badger			Goat		#N/A	#N/A	#N/A	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Outputs	Parameter		Symbol	Description	Units	Radionuclides - Kọọh bí łíí nakaí (sheep camp)			PRGs for non-SE Radioniculides - Kọọh bí łíí nakaí (sheep camp)					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Direct Consumption of Animal Products for Radionuclides, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal(i)}}}$	pCi/g	**3.76E-03**	**3.06E-03**	**7.77E-03**	**3.60E-01**	**1.04E-02**	**2.40E-02**	**1.03E-01**	**1.29E-01**	**1.42E-01**
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	1.67E-01	--	--	--	--	--	--	--
		Chicken Eggs				--	3.07E-02	--	--	--	--	--	--	--
		Beef				1.64E-02	1.51E-02	3.29E-02	1.90E+00	5.51E-02	1.27E-01	5.46E-01	6.81E-01	7.51E-01
		Milk - Cow				1.64E+00	1.51E+00	3.29E+00	1.90E+02	5.51E+00	1.27E+01	5.46E+01	6.81E+01	7.51E+01
		Pig				--	6.37E+00	--	--	--	--	--	--	--
		Goat				--	--	--	2.38E+00	6.90E-02	1.58E-01	6.84E-01	8.53E-01	9.40E-01
		Goat Milk				1.13E-01	1.07E-01	1.09E+01	1.13E+01	3.28E-01	7.54E-01	3.26E+00	4.06E+00	4.48E+00
		Sheep				5.72E-03	5.27E-03	1.14E-02	6.60E-01	1.91E-02	4.39E-02	1.90E-01	2.36E-01	2.61E-01
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				2.04E-01	1.88E-01	4.08E-01	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00
		Domesticated Turkey				--	1.11E+01	--	--	--	--	--	--	--
	Wild	Wild Turkey				4.49E+01	4.15E+01	--	2.95E+03	8.55E+01	1.96E+02	8.48E+02	1.06E+03	1.17E+03
		Deer				1.70E+00	1.57E+00	3.40E+00	1.97E+02	5.70E+00	1.31E+01	5.65E+01	7.05E+01	7.77E+01
		Elk				1.70E+00	1.57E+00	3.40E+00	1.97E+02	5.70E+00	1.31E+01	5.65E+01	7.05E+01	7.77E+01
		Rabbit				2.04E-01	1.88E-01	4.08E-01	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00
		Prairie Dog				1.02E-01	9.40E-02	2.04E-01	1.18E+01	3.42E-01	7.85E-01	3.39E+00	4.23E+00	4.66E+00
		Badger				--	--	--	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides - Kọọh bí łíí nakaí (sheep			PRGs for non-SE Radioniculides - Kọọh bí łíí nakaí (sheep camp)					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Consumption of Animal Products for Radionuclides, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	pCi/g	**3.07E+01**	**3.04E+01**	**1.72E+02**	**3.11E+02**	**4.57E+02**	**5.77E+02**	**1.75E+04**	**6.86E+03**	**7.57E+03**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{P_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--
		Beef				2.44E+03	2.41E+03	7.13E+03	1.53E+04	6.43E+04	2.37E+04	7.59E+05	5.55E+05	6.12E+05
		Milk - Cow				2.03E+06	1.50E+06	2.94E+06	3.23E+06	2.27E+07	1.01E+07	3.36E+09	1.15E+07	1.27E+07
		Pig				--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--
		Goat Milk				1.60E+02	1.57E+02	9.09E+03	--	7.55E+02	--	--	1.56E+04	1.72E+04
		Sheep				8.19E+01	8.16E+01	1.14E+03	--	3.08E+03	3.90E+03	8.49E+04	5.25E+04	5.79E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				4.13E+04	4.07E+04	1.20E+05	4.51E+05	1.10E+06	4.06E+05	1.28E+07	9.39E+06	1.04E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				1.76E+06	1.71E+06	--	2.77E+09	--	--	--	1.33E+08	1.46E+08
		Deer				8.12E+06	8.02E+06	2.36E+07	1.00E+08	2.16E+08	8.00E+07	2.52E+09	1.85E+09	2.04E+09
		Elk				4.08E+07	4.03E+07	1.19E+08	5.05E+08	1.08E+09	4.02E+08	1.26E+10	9.28E+09	1.02E+10
		Rabbit				4.86E+02	4.80E+02	1.42E+03	2.54E+03	1.28E+04	4.68E+03	1.51E+05	1.10E+05	1.22E+05
		Prairie Dog				8.60E+01	8.49E+01	2.51E+02	3.62E+02	2.25E+03	8.20E+02	2.68E+04	1.95E+04	2.15E+04
		Badger				--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniculides					
							Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	--	--	8.51E-01	1.26E-02	1.95E-02	2.41E-03	7.13E-03	7.13E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	--	--	75	75	75	75	75	75
	Decay Constant		λ			1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00	1.00
Radionuclide Transfer Factors for Animal Products, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Chicken Eggs			Eggs		--	--	--	1.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	1.10E+00
		Beef			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Milk - Cow			Milk		--	--	--	6.80E-03	1.84E-04	3.69E-04	4.85E-06	1.75E-03	1.75E-03
		Pig			Swine		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-02	4.40E-02
		Goat			Goat		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	--	--	0.00E+00	5.83E-03	0.00E+00	0.00E+00	1.36E-03	1.36E-03
		Sheep			Sheep		--	--	--	0.00E+00	7.10E-03	5.00E-03	1.00E-03	2.00E-03	2.00E-03
		Sheep Milk			Sheep Milk		--	--	--	0.00E+00	3.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Domesticated Turkey			Poultry		--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
	Wild	Wild Turkey			Poultry		--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Deer			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Elk			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Rabbit			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Prairie Dog			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Badger			Goat		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Outputs	Parameter		Symbol	Description	Units	Radionuclides - Kọọ eí nahaazáh (easy access open space)			PRGs for non-SE Radionuclides - Kọọ eí nahaazáh (easy access open space)					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Direct Consumption of Animal Products for Radionuclides, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	**3.76E-03**	**3.06E-03**	**7.77E-03**	**3.60E-01**	**1.04E-02**	**2.40E-02**	**1.03E-01**	**1.29E-01**	**1.42E-01**
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	1.67E-01	--	--	--	--	--	--	--
		Chicken Eggs				--	3.07E-02	--	--	--	--	--	--	--
		Beef				1.64E-02	1.51E-02	3.29E-02	1.90E+00	5.51E-02	1.27E-01	5.46E-01	6.81E-01	7.51E-01
		Milk - Cow				1.64E+00	1.51E+00	3.29E+00	1.90E+02	5.51E+00	1.27E+01	5.46E+01	6.81E+01	7.51E+01
		Pig				--	6.37E+00	--	--	--	--	--	--	--
		Goat				--	--	--	2.38E+00	6.90E-02	1.58E-01	6.84E-01	8.53E-01	9.40E-01
		Goat Milk				1.13E-01	1.07E-01	1.09E+01	1.13E+01	3.28E-01	7.54E-01	3.26E+00	4.06E+00	4.48E+00
		Sheep				5.72E-03	5.27E-03	1.14E-02	6.60E-01	1.91E-02	4.39E-02	1.90E-01	2.36E-01	2.61E-01
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				2.04E-01	1.88E-01	4.08E-01	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00
		Domesticated Turkey				--	1.11E+01	--	--	--	--	--	--	--
	Wild	Wild Turkey				4.49E+01	4.15E+01	--	2.95E+03	8.55E+01	1.96E+02	8.48E+02	1.06E+03	1.17E+03
		Deer				1.70E+00	1.57E+00	3.40E+00	1.97E+02	5.70E+00	1.31E+01	5.65E+01	7.05E+01	7.77E+01
		Elk				1.70E+00	1.57E+00	3.40E+00	1.97E+02	5.70E+00	1.31E+01	5.65E+01	7.05E+01	7.77E+01
		Rabbit				2.04E-01	1.88E-01	4.08E-01	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00
		Prairie Dog				1.02E-01	9.40E-02	2.04E-01	1.18E+01	3.42E-01	7.85E-01	3.39E+00	4.23E+00	4.66E+00
		Badger				--	--	--	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides - Kọọ eí nahaazáh (easy			PRGs for non-SE Radionuclides - Kọọ eí nahaazáh (easy access open space)					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Consumption of Animal Products for Radionuclides, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	**5.10E+01**	**5.04E+01**	**1.99E+02**	**3.16E+02**	**9.61E+02**	**6.55E+02**	**2.08E+04**	**1.15E+04**	**1.27E+04**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times fp \times fs \times (Bv_{dry} + MLF_p)) + (Q_s \times fp)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{P_{milk}} \times \left((Q_p \times fp \times fs \times (Bv_{dry} + MLF_p)) + (Q_s \times fp)\right)\right)}$	pCi/g	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--
		Beef				7.42E+03	7.32E+03	2.16E+04	6.23E+04	1.96E+05	7.25E+04	2.30E+06	1.69E+06	1.86E+06
		Milk - Cow				7.16E+06	5.26E+06	1.03E+07	1.55E+07	7.96E+07	3.56E+07	1.17E+10	4.03E+07	4.45E+07
		Pig				--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--
		Goat Milk				5.14E+02	5.04E+02	2.93E+04	--	2.44E+03	--	--	5.00E+04	5.52E+04
		Sheep				2.62E+02	2.61E+02	3.66E+03	--	9.92E+03	1.26E+04	2.72E+05	1.69E+05	1.86E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				1.06E+05	1.04E+05	3.08E+05	1.24E+06	2.81E+06	1.04E+06	3.27E+07	2.41E+07	2.65E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				1.76E+06	1.71E+06	--	2.77E+09	--	--	--	1.33E+08	1.46E+08
		Deer				8.12E+06	8.02E+06	2.36E+07	1.00E+08	2.16E+08	8.00E+07	2.52E+09	1.85E+09	2.04E+09
		Elk				4.08E+07	4.03E+07	1.19E+08	5.05E+08	1.08E+09	4.02E+08	1.26E+10	9.28E+09	1.02E+10
		Rabbit				4.86E+02	4.80E+02	1.42E+03	2.54E+03	1.28E+04	4.68E+03	1.51E+05	1.10E+05	1.22E+05
		Prairie Dog				8.60E+01	8.49E+01	2.51E+02	3.62E+02	2.25E+03	8.20E+02	2.68E+04	1.95E+04	2.15E+04
		Badger				--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniculides					
							Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	--	--	8.51E-01	1.26E-02	1.95E-02	2.41E-03	7.13E-03	7.13E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	--	--	75	75	75	75	75	75
	Decay Constant		λ			1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00	1.00
Radionuclide Transfer Factors for Animal Products, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Chicken Eggs			Eggs		--	--	--	1.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	1.10E+00
		Beef			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Milk - Cow			Milk		--	--	--	6.80E-03	1.84E-04	3.69E-04	4.85E-06	1.75E-03	1.75E-03
		Pig			Swine		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-02	4.40E-02
		Goat			Goat		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	--	--	0.00E+00	5.83E-03	0.00E+00	0.00E+00	1.36E-03	1.36E-03
		Sheep			Sheep		--	--	--	0.00E+00	7.10E-03	5.00E-03	1.00E-03	2.00E-03	2.00E-03
		Sheep Milk			Sheep Milk		--	--	--	0.00E+00	3.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Domesticated Turkey			Poultry		--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
	Wild	Wild Turkey			Poultry		--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Deer			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Elk			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Rabbit			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Prairie Dog			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Badger			Goat		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Outputs	Parameter		Symbol	Description	Units	Radionuclides - Kọọ ei doo nahaazáh dah (difficult access open space)			Gs for non-SE Radioniculides - Kọọ ei doo nahaazáh dah (difficult access open spac					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Direct Consumption of Animal Products for Radionuclides, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal(i)}}}$	pCi/g	**3.76E-03**	**3.06E-03**	**7.77E-03**	**3.60E-01**	**1.04E-02**	**2.40E-02**	**1.03E-01**	**1.29E-01**	**1.42E-01**
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal(i)}$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal(i)} = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	1.67E-01	--	--	--	--	--	--	--
		Chicken Eggs				--	3.07E-02	--	--	--	--	--	--	--
		Beef				1.64E-02	1.51E-02	3.29E-02	1.90E+00	5.51E-02	1.27E-01	5.46E-01	6.81E-01	7.51E-01
		Milk - Cow				1.64E+00	1.51E+00	3.29E+00	1.90E+02	5.51E+00	1.27E+01	5.46E+01	6.81E+01	7.51E+01
		Pig				--	6.37E+00	--	--	--	--	--	--	--
		Goat				--	--	--	2.38E+00	6.90E-02	1.58E-01	6.84E-01	8.53E-01	9.40E-01
		Goat Milk				1.13E-01	1.07E-01	1.09E+01	1.13E+01	3.28E-01	7.54E-01	3.26E+00	4.06E+00	4.48E+00
		Sheep				5.72E-03	5.27E-03	1.14E-02	6.60E-01	1.91E-02	4.39E-02	1.90E-01	2.36E-01	2.61E-01
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				2.04E-01	1.88E-01	4.08E-01	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00
		Domesticated Turkey				--	1.11E+01	--	--	--	--	--	--	--
	Wild	Wild Turkey				4.49E+01	4.15E+01	--	2.95E+03	8.55E+01	1.96E+02	8.48E+02	1.06E+03	1.17E+03
		Deer				1.70E+00	1.57E+00	3.40E+00	1.97E+02	5.70E+00	1.31E+01	5.65E+01	7.05E+01	7.77E+01
		Elk				1.70E+00	1.57E+00	3.40E+00	1.97E+02	5.70E+00	1.31E+01	5.65E+01	7.05E+01	7.77E+01
		Rabbit				2.04E-01	1.88E-01	4.08E-01	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00
		Prairie Dog				1.02E-01	9.40E-02	2.04E-01	1.18E+01	3.42E-01	7.85E-01	3.39E+00	4.23E+00	4.66E+00
		Badger				--	--	--	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides - Kọọ ei doo nahaazáh			Gs for non-SE Radioniculides - Kọọ ei doo nahaazáh dah (difficult access open spac					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Consumption of Animal Products for Radionuclides, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	pCi/g	**2.39E+02**	**2.36E+02**	**1.47E+03**	**4.74E+03**	**3.44E+03**	**5.06E+03**	**1.48E+05**	**5.35E+04**	**5.90E+04**
	Domestic	Chicken	$PRG_{a\text{-}ing(i)}$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal(i)}}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal(i)}}{\left(\frac{TF_f}{P_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--
		Beef				1.60E+04	1.58E+04	4.66E+04	1.58E+05	4.24E+05	1.57E+05	4.95E+06	3.63E+06	4.01E+06
		Milk - Cow				1.66E+07	1.22E+07	2.36E+07	4.44E+07	1.84E+08	8.26E+07	2.70E+10	9.30E+07	1.03E+08
		Pig				--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--
		Goat Milk				1.14E+03	1.11E+03	6.49E+04	--	5.39E+03	--	--	1.11E+05	1.22E+05
		Sheep				5.78E+02	5.76E+02	8.08E+03	--	2.20E+04	2.80E+04	6.00E+05	3.73E+05	4.11E+05
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				2.13E+05	2.10E+05	6.21E+05	2.57E+06	5.66E+06	2.10E+06	6.60E+07	4.85E+07	5.35E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				8.79E+06	8.58E+06	--	1.39E+10	--	--	--	6.63E+08	7.31E+08
		Deer				4.06E+07	4.01E+07	1.18E+08	5.03E+08	1.08E+09	4.01E+08	1.26E+10	9.25E+09	1.02E+10
		Elk				2.04E+08	2.01E+08	5.94E+08	2.53E+09	5.42E+09	2.01E+09	6.32E+10	4.64E+10	5.12E+10
		Rabbit				3.63E+03	3.59E+03	1.06E+04	3.19E+04	9.61E+04	3.55E+04	1.13E+06	8.25E+05	9.10E+05
		Prairie Dog				8.08E+02	7.98E+02	2.36E+03	5.79E+03	2.13E+04	7.87E+03	2.51E+05	1.84E+05	2.02E+05
		Badger				--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radionuclides					
							Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	--	--	8.51E-01	1.26E-02	1.95E-02	2.41E-03	7.13E-03	7.13E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	--	--	75	75	75	75	75	75
	Decay Constant		λ			1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00	1.00
Radionuclide Transfer Factors for Animal Products, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Chicken Eggs			Eggs		--	--	--	1.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	1.10E+00
		Beef			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Milk - Cow			Milk		--	--	--	6.80E-03	1.84E-04	3.69E-04	4.85E-06	1.75E-03	1.75E-03
		Pig			Swine		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-02	4.40E-02
		Goat			Goat		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	--	--	0.00E+00	5.83E-03	0.00E+00	0.00E+00	1.36E-03	1.36E-03
		Sheep			Sheep		--	--	--	0.00E+00	7.10E-03	5.00E-03	1.00E-03	2.00E-03	2.00E-03
		Sheep Milk			Sheep Milk		--	--	--	0.00E+00	3.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Domesticated Turkey			Poultry		--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
	Wild	Wild Turkey			Poultry		--	--	--	1.00E-01	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Deer			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Elk			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Rabbit			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Prairie Dog			Beef		--	--	--	2.00E-02	7.00E-04	1.70E-03	2.30E-04	3.90E-04	3.90E-04
		Badger			Goat		--	--	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides -			PRGs for non-SE Radionuclides -					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Direct Consumption of Animal Products for Radionuclides, by Type	**Total Animal Products PRG for Animal Product**		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	**3.76E-03**	**3.06E-03**	**7.77E-03**	**3.60E-01**	**1.04E-02**	**2.40E-02**	**1.03E-01**	**1.29E-01**	**1.42E-01**
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	1.67E-01	--	--	--	--	--	--	--
		Chicken Eggs				--	3.07E-02	--	--	--	--	--	--	--
		Beef				1.64E-02	1.51E-02	3.29E-02	1.90E+00	5.51E-02	1.27E-01	5.46E-01	6.81E-01	7.51E-01
		Milk - Cow				1.64E+00	1.51E+00	3.29E+00	1.90E+02	5.51E+00	1.27E+01	5.46E+01	6.81E+01	7.51E+01
		Pig				--	6.37E+00	--	--	--	--	--	--	--
		Goat				--	--	--	2.38E+00	6.90E-02	1.58E-01	6.84E-01	8.53E-01	9.40E-01
		Goat Milk				1.13E-01	1.07E-01	1.09E+01	1.13E+01	3.28E-01	7.54E-01	3.26E+00	4.06E+00	4.48E+00
		Sheep				5.72E-03	5.27E-03	1.14E-02	6.60E-01	1.91E-02	4.39E-02	1.90E-01	2.36E-01	2.61E-01
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				2.04E-01	1.88E-01	4.08E-01	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00
		Domesticated Turkey				--	1.11E+01	--	--	--	--	--	--	--
	Wild	Wild Turkey				4.49E+01	4.15E+01	--	2.95E+03	8.55E+01	1.96E+02	8.48E+02	1.06E+03	1.17E+03
		Deer				1.70E+00	1.57E+00	3.40E+00	1.97E+02	5.70E+00	1.31E+01	5.65E+01	7.05E+01	7.77E+01
		Elk				1.70E+00	1.57E+00	3.40E+00	1.97E+02	5.70E+00	1.31E+01	5.65E+01	7.05E+01	7.77E+01
		Rabbit				2.04E-01	1.88E-01	4.08E-01	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00
		Prairie Dog				1.02E-01	9.40E-02	2.04E-01	1.18E+01	3.42E-01	7.85E-01	3.39E+00	4.23E+00	4.66E+00
		Badger				--	--	--	2.36E+01	6.84E-01	1.57E+00	6.78E+00	8.45E+00	9.32E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides -			PRGs for non-SE Radionuclides -					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Consumption of Animal Products for Radionuclides, Back-Calculated to Soil, by Type	**Total Animal Products PRG for Soil**		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	**3.07E+01**	**3.04E+01**	**1.72E+02**	**3.11E+02**	**4.57E+02**	**5.77E+02**	**1.75E+04**	**6.86E+03**	**7.57E+03**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left(\left(Q_p \times fp \times fs \times \left(Bv_{dry} + MLF_p\right)\right) + \left(Q_s \times fp\right)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{P_{milk}} \times \left(\left(Q_p \times fp \times fs \times \left(Bv_{dry} + MLF_p\right)\right) + \left(Q_s \times fp\right)\right)\right)}$	pCi/g	--	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--	--
		Beef				2.44E+03	2.41E+03	7.13E+03	1.53E+04	6.43E+04	2.37E+04	7.59E+05	5.55E+05	6.12E+05
		Milk - Cow				2.03E+06	1.50E+06	2.94E+06	3.23E+06	2.27E+07	1.01E+07	3.36E+09	1.15E+07	1.27E+07
		Pig				--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--
		Goat Milk				1.60E+02	1.57E+02	9.09E+03	--	7.55E+02	--	--	1.56E+04	1.72E+04
		Sheep				8.19E+01	8.16E+01	1.14E+03	--	3.08E+03	3.90E+03	8.49E+04	5.25E+04	5.79E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--
		Horse				4.13E+04	4.07E+04	1.20E+05	4.51E+05	1.10E+06	4.06E+05	1.28E+07	9.39E+06	1.04E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--	--
	Wild	Wild Turkey				1.76E+06	1.71E+06	--	2.77E+09	--	--	--	1.33E+08	1.46E+08
		Deer				8.12E+06	8.02E+06	2.36E+07	1.00E+08	2.16E+08	8.00E+07	2.52E+09	1.85E+09	2.04E+09
		Elk				4.08E+07	4.03E+07	1.19E+08	5.05E+08	1.08E+09	4.02E+08	1.26E+10	9.28E+09	1.02E+10
		Rabbit				4.86E+02	4.80E+02	1.42E+03	2.54E+03	1.28E+04	4.68E+03	1.51E+05	1.10E+05	1.22E+05
		Prairie Dog				8.60E+01	8.49E+01	2.51E+02	3.62E+02	2.25E+03	8.20E+02	2.68E+04	1.95E+04	2.15E+04
		Badger				--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Ra-226	TFs for Secular Equilibrium Progeny Radionuclides of Ra-226					
								Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	5.00E-01	5.00E-01	1.26E-02	1.26E-02	2.76E-04	1.95E-02
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	75	75	75	75	75	75
	Lamda		λ			1/Year	--	5.05E+01	1.83E+04	3.12E-02	1.36E+04	1.83E+00	4.33E-04
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Ra-226 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00	0.00E+00
		Beef			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Milk - Cow			Milk		--	1.03E-03	1.03E-03	1.96E-04	1.96E-04	2.16E-04	3.91E-04
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02	5.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Deer			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Elk			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Rabbit			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Prairie Dog			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Custom					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 in SE - Direct Consumption of Animal Products, by Type	**Total Animal Products PRG for Animal Product**		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	**5.76E-03**	**7.06E+00**	**3.46E+02**	**2.35E-02**	**5.71E+01**	**8.80E-03**	**5.86E-02**
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	3.39E-01	--	--	--	--	3.39E-01	--
		Chicken Eggs				3.39E-02	--	--	--	--	3.39E-02	--
		Beef				3.30E-02	1.01E+01	4.94E+02	1.11E-01	2.70E+02	5.81E-02	2.54E-01
		Milk - Cow				1.58E+00	4.80E+02	2.36E+04	5.29E+00	1.29E+04	2.77E+00	1.21E+01
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				1.00E-01	--	--	2.91E-01	7.08E+02	1.53E-01	--
		Sheep				1.14E-02	--	--	3.80E-02	9.25E+01	1.99E-02	8.73E-02
		Sheep Milk				--	--	--	--	--	--	--
		Horse				3.47E-01	1.06E+02	5.18E+03	1.16E+00	2.83E+03	6.10E-01	2.67E+00
		Domesticated Turkey				2.03E+01	--	--	--	--	2.03E+01	--
	Wild	Wild Turkey				7.63E+01	--	--	--	--	7.63E+01	--
		Deer				2.89E+00	8.80E+02	4.32E+04	9.70E+00	2.36E+04	5.09E+00	2.23E+01
		Elk				2.89E+00	8.80E+02	4.32E+04	9.70E+00	2.36E+04	5.09E+00	2.23E+01
		Rabbit				3.47E-01	1.06E+02	5.18E+03	1.16E+00	2.83E+03	6.10E-01	2.67E+00
		Prairie Dog				1.73E-01	5.28E+01	2.59E+03	5.82E-01	1.42E+03	3.05E-01	1.34E+00
		Badger				--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Custom					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 - Consumption of Animal Products, Back-Calculated to Soil, by Type	**Total Animal Products PRG for Soil**		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	**1.05E-01**	**4.69E+02**	**2.30E+04**	**5.36E+00**	**1.30E+04**	**1.08E-01**	**1.36E+01**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{\gamma_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	1.96E+00	--	--	--	--	1.96E+00	--
		Chicken Eggs				1.52E-01	--	--	--	--	1.52E-01	--
		Beef				4.41E+00	5.39E+02	2.65E+04	4.41E+01	1.07E+05	5.62E+00	4.08E+01
		Milk - Cow				1.16E+03	2.98E+04	1.46E+06	4.72E+03	1.15E+07	2.34E+03	5.29E+03
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				3.89E+01	--	--	6.65E+01	1.62E+05	9.36E+01	--
		Sheep				4.78E-01	--	--	6.87E+00	1.67E+04	5.26E-01	2.21E+01
		Sheep Milk				--	--	--	--	--	--	--
		Horse				4.63E+01	5.66E+03	2.78E+05	4.63E+02	1.13E+06	5.90E+01	4.28E+02
		Domesticated Turkey				3.56E+01	--	--	--	--	3.56E+01	--
	Wild	Wild Turkey				8.37E+03	--	--	--	--	8.37E+03	--
		Deer				3.17E+04	6.76E+06	3.32E+08	3.22E+05	7.84E+08	4.00E+04	3.03E+05
		Elk				2.03E+05	5.84E+07	2.86E+09	2.08E+06	5.06E+09	2.55E+05	1.96E+06
		Rabbit				2.93E+02	4.47E+04	2.19E+06	2.95E+03	7.18E+06	3.71E+02	2.75E+03
		Prairie Dog				1.46E+02	2.23E+04	1.10E+06	1.48E+03	3.59E+06	1.86E+02	1.37E+03
		Badger				--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Ra-226	TFs for Secular Equilibrium Progeny Radionuclides of Ra-226					
								Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	5.00E-01	5.00E-01	1.26E-02	1.26E-02	2.76E-04	1.95E-02
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	75	75	75	75	75	75
	Lamda		λ			1/Year	--	5.05E+01	1.83E+04	3.12E-02	1.36E+04	1.83E+00	4.33E-04
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Ra-226 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00	0.00E+00
		Beef			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Milk - Cow			Milk		--	1.03E-03	1.03E-03	1.96E-04	1.96E-04	2.16E-04	3.91E-04
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02	5.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Deer			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Elk			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Rabbit			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Prairie Dog			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Kee'da'whii tééh (full-time Navajo residential)					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	3.31E-03	3.70E+00	1.82E+02	1.25E-02	3.05E+01	5.32E-03	2.99E-02
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	1.80E-01	--	--	--	--	1.80E-01	--
		Chicken Eggs				3.32E-02	--	--	--	--	3.32E-02	--
		Beef				1.64E-02	5.00E+00	2.45E+02	5.51E-02	1.34E+02	2.89E-02	1.27E-01
		Milk - Cow				1.64E+00	5.00E+02	2.45E+04	5.51E+00	1.34E+04	2.89E+00	1.27E+01
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				1.13E-01	--	--	3.28E-01	7.99E+02	1.72E-01	--
		Sheep				5.72E-03	--	--	1.91E-02	4.65E+01	1.00E-02	4.39E-02
		Sheep Milk				--	--	--	--	--	--	--
		Horse				2.04E-01	6.21E+01	3.05E+03	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Domesticated Turkey				1.20E+01	--	--	--	--	1.20E+01	--
	Wild	Wild Turkey				4.49E+01	--	--	--	--	4.49E+01	--
		Deer				1.70E+00	5.18E+02	2.54E+04	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Elk				1.70E+00	5.18E+02	2.54E+04	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Rabbit				2.04E-01	6.21E+01	3.05E+03	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Prairie Dog				1.02E-01	3.11E+01	1.52E+03	3.42E-01	8.32E+02	1.79E-01	7.85E-01
		Badger				--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Kee'da'whii tééh (full-time Navajo residential)					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	1.28E-01	1.04E+04	5.10E+05	5.59E+01	1.36E+05	1.28E-01	3.89E+02
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{P_{milk}} \times \left(\left(Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)\right) + (Q_s \times f_p)\right)\right)}$	pCi/g	1.04E+00	--	--	--	--	1.04E+00	--
		Chicken Eggs				1.49E-01	--	--	--	--	1.49E-01	--
		Beef				7.21E+02	1.19E+05	5.85E+06	7.29E+03	1.77E+07	9.14E+02	6.80E+03
		Milk - Cow				5.06E+05	1.55E+07	7.62E+08	2.05E+06	5.00E+09	1.01E+06	2.32E+06
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				4.39E+01	--	--	7.51E+01	1.83E+05	1.06E+02	--
		Sheep				2.26E+01	--	--	3.25E+02	7.90E+05	2.49E+01	1.04E+03
		Sheep Milk				--	--	--	--	--	--	--
		Horse				1.63E+04	4.51E+06	2.21E+08	1.67E+05	4.05E+08	2.05E+04	1.57E+05
		Domesticated Turkey				2.09E+01	--	--	--	--	2.09E+01	--
	Wild	Wild Turkey				1.76E+06	--	--	--	--	1.76E+06	--
		Deer				8.12E+06	2.64E+09	1.30E+11	8.33E+07	2.03E+11	1.02E+07	7.87E+07
		Elk				4.08E+07	1.33E+10	6.52E+11	4.19E+08	1.02E+12	5.12E+07	3.96E+08
		Rabbit				4.86E+02	8.79E+04	4.31E+06	4.93E+03	1.20E+07	6.15E+02	4.61E+03
		Prairie Dog				8.60E+01	1.31E+04	6.44E+05	8.67E+02	2.11E+06	1.09E+02	8.07E+02
		Badger				--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Ra-226	TFs for Secular Equilibrium Progeny Radionuclides of Ra-226					
								Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	5.00E-01	5.00E-01	1.26E-02	1.26E-02	2.76E-04	1.95E-02
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	75	75	75	75	75	75
	Lamda		λ			1/Year	--	5.05E+01	1.83E+04	3.12E-02	1.36E+04	1.83E+00	4.33E-04
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Ra-226 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00	0.00E+00
		Beef			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Milk - Cow			Milk		--	1.03E-03	1.03E-03	1.96E-04	1.96E-04	2.16E-04	3.91E-04
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02	5.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Deer			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Elk			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Rabbit			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Prairie Dog			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Kǫǫh bi łíí nakaí (sheep camp)					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	3.76E-03	3.70E+00	1.82E+02	1.25E-02	3.05E+01	6.57E-03	2.99E-02
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--
		Beef				1.64E-02	5.00E+00	2.45E+02	5.51E-02	1.34E+02	2.89E-02	1.27E-01
		Milk - Cow				1.64E+00	5.00E+02	2.45E+04	5.51E+00	1.34E+04	2.89E+00	1.27E+01
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				1.13E-01	--	--	3.28E-01	7.99E+02	1.72E-01	--
		Sheep				5.72E-03	--	--	1.91E-02	4.65E+01	1.00E-02	4.39E-02
		Sheep Milk				--	--	--	--	--	--	--
		Horse				2.04E-01	6.21E+01	3.05E+03	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Domesticated Turkey				--	--	--	--	--	--	--
	Wild	Wild Turkey				4.49E+01	--	--	--	--	4.49E+01	--
		Deer				1.70E+00	5.18E+02	2.54E+04	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Elk				1.70E+00	5.18E+02	2.54E+04	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Rabbit				2.04E-01	6.21E+01	3.05E+03	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Prairie Dog				1.02E-01	3.11E+01	1.52E+03	3.42E-01	8.32E+02	1.79E-01	7.85E-01
		Badger				--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Kǫǫh bi łíí nakaí (sheep camp)					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	3.07E+01	1.12E+04	5.48E+05	1.70E+02	4.14E+05	4.02E+01	5.68E+02
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{\rho_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--
		Beef				2.44E+03	5.07E+05	2.49E+07	2.49E+04	6.05E+07	3.08E+03	2.33E+04
		Milk - Cow				2.03E+06	7.52E+07	3.69E+09	8.25E+06	2.01E+10	4.00E+06	9.35E+06
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				1.60E+02	--	--	2.75E+02	6.69E+05	3.83E+02	--
		Sheep				8.19E+01	--	--	1.19E+03	2.89E+06	9.01E+01	3.84E+03
		Sheep Milk				--	--	--	--	--	--	--
		Horse				4.13E+04	1.25E+07	6.12E+08	4.23E+05	1.03E+09	5.18E+04	3.99E+05
		Domesticated Turkey				--	--	--	--	--	--	--
	Wild	Wild Turkey				1.76E+06	--	--	--	--	1.76E+06	--
		Deer				8.12E+06	2.64E+09	1.30E+11	8.33E+07	2.03E+11	1.02E+07	7.87E+07
		Elk				4.08E+07	1.33E+10	6.52E+11	4.19E+08	1.02E+12	5.12E+07	3.96E+08
		Rabbit				4.86E+02	8.79E+04	4.31E+06	4.93E+03	1.20E+07	6.15E+02	4.61E+03
		Prairie Dog				8.60E+01	1.31E+04	6.44E+05	8.67E+02	2.11E+06	1.09E+02	8.07E+02
		Badger				--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Ra-226	TFs for Secular Equilibrium Progeny Radionuclides of Ra-226					
								Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	5.00E-01	5.00E-01	1.26E-02	1.26E-02	2.76E-04	1.95E-02
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	75	75	75	75	75	75
	Lamda		λ			1/Year	--	5.05E+01	1.83E+04	3.12E-02	1.36E+04	1.83E+00	4.33E-04
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Ra-226 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00	0.00E+00
		Beef			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Milk - Cow			Milk		--	1.03E-03	1.03E-03	1.96E-04	1.96E-04	2.16E-04	3.91E-04
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02	5.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Deer			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Elk			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Rabbit			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Prairie Dog			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Kǫǫ́ eí nahaazáh (easy access open space)					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	3.76E-03	3.70E+00	1.82E+02	1.25E-02	3.05E+01	6.57E-03	2.99E-02
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--
		Beef				1.64E-02	5.00E+00	2.45E+02	5.51E-02	1.34E+02	2.89E-02	1.27E-01
		Milk - Cow				1.64E+00	5.00E+02	2.45E+04	5.51E+00	1.34E+04	2.89E+00	1.27E+01
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				1.13E-01	--	--	3.28E-01	7.99E+02	1.72E-01	--
		Sheep				5.72E-03	--	--	1.91E-02	4.65E+01	1.00E-02	4.39E-02
		Sheep Milk				--	--	--	--	--	--	--
		Horse				2.04E-01	6.21E+01	3.05E+03	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Domesticated Turkey				--	--	--	--	--	--	--
	Wild	Wild Turkey				4.49E+01	--	--	--	--	4.49E+01	--
		Deer				1.70E+00	5.18E+02	2.54E+04	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Elk				1.70E+00	5.18E+02	2.54E+04	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Rabbit				2.04E-01	6.21E+01	3.05E+03	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Prairie Dog				1.02E-01	3.11E+01	1.52E+03	3.42E-01	8.32E+02	1.79E-01	7.85E-01
		Badger				--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Kǫǫ́ eí nahaazáh (easy access open space)					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	5.10E+01	1.14E+04	5.57E+05	3.62E+02	8.82E+05	6.58E+01	6.45E+02
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{\gamma_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--
		Beef				7.42E+03	1.89E+06	9.29E+07	7.58E+04	1.84E+08	9.34E+03	7.14E+04
		Milk - Cow				7.16E+06	3.33E+08	1.63E+10	2.90E+07	7.05E+10	1.39E+07	3.30E+07
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				5.14E+02	--	--	8.87E+02	2.16E+06	1.22E+03	--
		Sheep				2.62E+02	--	--	3.83E+03	9.32E+06	2.88E+02	1.24E+04
		Sheep Milk				--	--	--	--	--	--	--
		Horse				1.06E+05	3.34E+07	1.64E+09	1.08E+06	2.64E+09	1.33E+05	1.02E+06
		Domesticated Turkey				--	--	--	--	--	--	--
	Wild	Wild Turkey				1.76E+06	--	--	--	--	1.76E+06	--
		Deer				8.12E+06	2.64E+09	1.30E+11	8.33E+07	2.03E+11	1.02E+07	7.87E+07
		Elk				4.08E+07	1.33E+10	6.52E+11	4.19E+08	1.02E+12	5.12E+07	3.96E+08
		Rabbit				4.86E+02	8.79E+04	4.31E+06	4.93E+03	1.20E+07	6.15E+02	4.61E+03
		Prairie Dog				8.60E+01	1.31E+04	6.44E+05	8.67E+02	2.11E+06	1.09E+02	8.07E+02
		Badger				--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Ra-226	TFs for Secular Equilibrium Progeny Radionuclides of Ra-226					
								Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	5.00E-01	5.00E-01	1.26E-02	1.26E-02	2.76E-04	1.95E-02
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	75	75	75	75	75	75
	Lamda		λ			1/Year	--	5.05E+01	1.83E+04	3.12E-02	1.36E+04	1.83E+00	4.33E-04
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Ra-226 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00	0.00E+00
		Beef			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Milk - Cow			Milk		--	1.03E-03	1.03E-03	1.96E-04	1.96E-04	2.16E-04	3.91E-04
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02	5.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Deer			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Elk			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Rabbit			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Prairie Dog			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Kọọ eí doo nahaazáh dah (difficult access open space)					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	3.76E-03	3.70E+00	1.82E+02	1.25E-02	3.05E+01	6.57E-03	2.99E-02
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--
		Beef				1.64E-02	5.00E+00	2.45E+02	5.51E-02	1.34E+02	2.89E-02	1.27E-01
		Milk - Cow				1.64E+00	5.00E+02	2.45E+04	5.51E+00	1.34E+04	2.89E+00	1.27E+01
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				1.13E-01	--	--	3.28E-01	7.99E+02	1.72E-01	--
		Sheep				5.72E-03	--	--	1.91E-02	4.65E+01	1.00E-02	4.39E-02
		Sheep Milk				--	--	--	--	--	--	--
		Horse				2.04E-01	6.21E+01	3.05E+03	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Domesticated Turkey				--	--	--	--	--	--	--
	Wild	Wild Turkey				4.49E+01	--	--	--	--	4.49E+01	--
		Deer				1.70E+00	5.18E+02	2.54E+04	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Elk				1.70E+00	5.18E+02	2.54E+04	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Rabbit				2.04E-01	6.21E+01	3.05E+03	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Prairie Dog				1.02E-01	3.11E+01	1.52E+03	3.42E-01	8.32E+02	1.79E-01	7.85E-01
		Badger				--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Kọọ eí doo nahaazáh dah (difficult access open space)					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	2.39E+02	1.49E+05	7.32E+06	1.28E+03	3.11E+06	3.12E+02	4.97E+03
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{P_{milk}} \times \left(\left(Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)\right) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--
		Beef				1.60E+04	4.53E+06	2.22E+08	1.64E+05	3.98E+08	2.01E+04	1.54E+05
		Milk - Cow				1.66E+07	8.96E+08	4.39E+10	6.70E+07	1.63E+11	3.20E+07	7.66E+07
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				1.14E+03	--	--	1.96E+03	4.78E+06	2.70E+03	--
		Sheep				5.78E+02	--	--	8.48E+03	2.06E+07	6.35E+02	2.76E+04
		Sheep Milk				--	--	--	--	--	--	--
		Horse				2.13E+05	6.84E+07	3.35E+09	2.19E+06	5.32E+09	2.68E+05	2.07E+06
		Domesticated Turkey				--	--	--	--	--	--	--
	Wild	Wild Turkey				8.79E+06	--	--	--	--	8.79E+06	--
		Deer				4.06E+07	1.32E+10	6.50E+11	4.17E+08	1.01E+12	5.10E+07	3.94E+08
		Elk				2.04E+08	6.65E+10	3.26E+12	2.09E+09	5.09E+12	2.56E+08	1.98E+09
		Rabbit				3.63E+03	9.55E+05	4.68E+07	3.71E+04	9.03E+07	4.57E+03	3.50E+04
		Prairie Dog				8.08E+02	1.85E+05	9.06E+06	8.24E+03	2.00E+07	1.02E+03	7.74E+03
		Badger				--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Ra-226	TFs for Secular Equilibrium Progeny Radionuclides of Ra-226					
								Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	5.00E-01	5.00E-01	1.26E-02	1.26E-02	2.76E-04	1.95E-02
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	75	75	75	75	75	75
	Lamda		λ			1/Year	--	5.05E+01	1.83E+04	3.12E-02	1.36E+04	1.83E+00	4.33E-04
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.		Unitless	--	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Ra-226 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00	0.00E+00
		Beef			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Milk - Cow			Milk		--	1.03E-03	1.03E-03	1.96E-04	1.96E-04	2.16E-04	3.91E-04
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02	5.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Deer			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Elk			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Rabbit			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Prairie Dog			Beef		--	2.00E-03	2.00E-03	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Progeny - Chíí dah wiih łeezh (washes and drainages)					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	3.76E-03	3.70E+00	1.82E+02	1.25E-02	3.05E+01	6.57E-03	2.99E-02
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_j \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--
		Beef				1.64E-02	5.00E+00	2.45E+02	5.51E-02	1.34E+02	2.89E-02	1.27E-01
		Milk - Cow				1.64E+00	5.00E+02	2.45E+04	5.51E+00	1.34E+04	2.89E+00	1.27E+01
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				1.13E-01	--	--	3.28E-01	7.99E+02	1.72E-01	--
		Sheep				5.72E-03	--	--	1.91E-02	4.65E+01	1.00E-02	4.39E-02
		Sheep Milk				--	--	--	--	--	--	--
		Horse				2.04E-01	6.21E+01	3.05E+03	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Domesticated Turkey				--	--	--	--	--	--	--
	Wild	Wild Turkey				4.49E+01	--	--	--	--	4.49E+01	--
		Deer				1.70E+00	5.18E+02	2.54E+04	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Elk				1.70E+00	5.18E+02	2.54E+04	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Rabbit				2.04E-01	6.21E+01	3.05E+03	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Prairie Dog				1.02E-01	3.11E+01	1.52E+03	3.42E-01	8.32E+02	1.79E-01	7.85E-01
		Badger				--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Ra-226	PRGs for Secular Equilibrium Progeny Radionuclides of Ra-226 -					
							Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of Ra-226 - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	3.07E+01	1.12E+04	5.48E+05	1.70E+02	4.14E+05	4.02E+01	5.68E+02
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{\rho_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--
		Beef				2.44E+03	5.07E+05	2.49E+07	2.49E+04	6.05E+07	3.08E+03	2.33E+04
		Milk - Cow				2.03E+06	7.52E+07	3.69E+09	8.25E+06	2.01E+10	4.00E+06	9.35E+06
		Pig				--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--
		Goat Milk				1.60E+02	--	--	2.75E+02	6.69E+05	3.83E+02	--
		Sheep				8.19E+01	--	--	1.19E+03	2.89E+06	9.01E+01	3.84E+03
		Sheep Milk				--	--	--	--	--	--	--
		Horse				4.13E+04	1.25E+07	6.12E+08	4.23E+05	1.03E+09	5.18E+04	3.99E+05
		Domesticated Turkey				--	--	--	--	--	--	--
	Wild	Wild Turkey				1.76E+06	--	--	--	--	1.76E+06	--
		Deer				8.12E+06	2.64E+09	1.30E+11	8.33E+07	2.03E+11	1.02E+07	7.87E+07
		Elk				4.08E+07	1.33E+10	6.52E+11	4.19E+08	1.02E+12	5.12E+07	3.96E+08
		Rabbit				4.86E+02	8.79E+04	4.31E+06	4.93E+03	1.20E+07	6.15E+02	4.61E+03
		Prairie Dog				8.60E+01	1.31E+04	6.44E+05	8.67E+02	2.11E+06	1.09E+02	8.07E+02
		Badger				--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Th-232	TFs for Secular Equilibrium Progeny Radionuclides of Th-232						
								Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	1.00E-01	5.00E-01	1.26E-02	1.95E-02	0.00E+00	2.41E-03	2.41E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	138	138	138	138	138	138	138
	Lamda		λ			1/Year	--	9.87E+02	6.02E+03	5.71E+02	6.91E+01	1.21E-01	3.63E-01	4.93E-11
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	--	1	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Th-232 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Beef			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Milk - Cow			Milk		--	2.06E-06	1.03E-03	1.96E-04	3.91E-04	3.91E-04	5.15E-06	5.15E-06
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	5.00E-03	5.00E-03	1.00E-03	1.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Deer			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Elk			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Rabbit			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Prairie Dog			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Secular Equilibrium Progeny Radionuclides of Th-232 - Custom						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal(i)}}}$	pCi/g	8.79E-03	6.37E+00	1.72E+01	4.87E-01	7.30E-02	1.22E-02	1.17E-01	1.31E-01
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	3.86E-01	2.79E+02	7.55E+02	2.14E+01	3.21E+00	5.37E-01	5.16E+00	5.74E+00
		Chicken Eggs				3.86E-02	2.79E+01	7.55E+01	2.14E+00	3.21E-01	5.37E-02	5.16E-01	5.74E-01
		Beef				6.61E-02	4.79E+01	1.29E+02	3.66E+00	5.50E-01	9.21E-02	8.84E-01	9.83E-01
		Milk - Cow				3.16E+00	2.29E+03	6.18E+03	1.75E+02	2.62E+01	4.40E+00	4.22E+01	4.69E+01
		Pig				1.16E+00	8.38E+02	2.27E+03	6.41E+01	9.62E+00	1.61E+00	1.55E+01	1.72E+01
		Goat				8.68E-02	6.29E+01	1.70E+02	4.81E+00	7.21E-01	1.21E-01	1.16E+00	1.29E+00
		Goat Milk				1.74E-01	1.26E+02	3.40E+02	9.62E+00	1.44E+00	2.42E-01	2.32E+00	2.58E+00
		Sheep				2.27E-02	1.64E+01	4.44E+01	1.26E+00	1.89E-01	3.16E-02	3.03E-01	3.37E-01
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				6.94E-01	5.03E+02	1.36E+03	3.85E+01	5.77E+00	9.67E-01	9.28E+00	1.03E+01
		Domesticated Turkey				2.31E+01	1.68E+04	4.53E+04	1.28E+03	1.92E+02	3.22E+01	3.09E+02	3.44E+02
	Wild	Wild Turkey				8.68E+01	6.29E+04	1.70E+05	4.81E+03	7.21E+02	1.21E+02	1.16E+03	1.29E+03
		Deer				5.78E+00	4.19E+03	1.13E+04	3.21E+02	4.81E+01	8.06E+00	7.73E+01	8.60E+01
		Elk				5.78E+00	4.19E+03	1.13E+04	3.21E+02	4.81E+01	8.06E+00	7.73E+01	8.60E+01
		Rabbit				6.94E-01	5.03E+02	1.36E+03	3.85E+01	5.77E+00	9.67E-01	9.28E+00	1.03E+01
		Prairie Dog				3.47E-01	2.52E+02	6.80E+02	1.92E+01	2.89E+00	4.84E-01	4.64E+00	5.16E+00
		Badger				6.94E-01	5.03E+02	1.36E+03	3.85E+01	5.77E+00	9.67E-01	9.28E+00	1.03E+01

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Secular Equilibrium Progeny Radionuclides of Th-232 - Custom						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	pCi/g	4.18E+00	4.55E+05	6.04E+03	1.77E+02	2.94E+01	5.19E+00	2.82E+02	3.14E+02
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left(\left(Q_p \times f_p \times f_s \times \left(Bv_{dry} + MLF_p\right)\right) + \left(Q_s \times f_p\right)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{\rho_{milk}} \times \left(\left(Q_p \times f_p \times f_s \times \left(Bv_{dry} + MLF_p\right)\right) + \left(Q_s \times f_p\right)\right)\right)}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				1.29E+01	5.19E+05	6.94E+03	1.46E+03	8.80E+01	1.57E+01	1.11E+03	1.23E+03
		Milk - Cow				1.71E+03	1.48E+08	3.84E+05	1.56E+05	1.14E+04	2.05E+03	1.48E+06	1.65E+06
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				2.20E+03	--	--	2.20E+03	--	--	--	--
		Sheep				6.67E+00	--	--	2.27E+02	4.76E+01	8.34E+00	3.98E+02	4.43E+02
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				1.36E+02	5.44E+06	7.29E+04	1.53E+04	9.24E+02	1.65E+02	1.16E+04	1.29E+04
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				9.24E+04	4.46E+09	8.70E+07	1.07E+07	6.53E+05	1.12E+05	7.91E+06	8.80E+06
		Elk				5.92E+05	3.07E+10	7.52E+08	6.88E+07	4.24E+06	7.14E+05	5.06E+07	5.63E+07
		Rabbit				8.56E+02	3.73E+07	5.75E+05	9.75E+04	5.93E+03	1.04E+03	7.33E+04	8.15E+04
		Prairie Dog				4.28E+02	1.86E+07	2.87E+05	4.88E+04	2.97E+03	5.20E+02	3.66E+04	4.08E+04
		Badger				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Th-232	TFs for Secular Equilibrium Progeny Radionuclides of Th-232						
								Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	1.00E-01	5.00E-01	1.26E-02	1.95E-02	0.00E+00	2.41E-03	2.41E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	138	138	138	138	138	138	138
	Lamda		λ	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		1/Year	--	9.87E+02	6.02E+03	5.71E+02	6.91E+01	1.21E-01	3.63E-01	4.93E-11
	Decay Function		-			Unitless	--	1	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Th-232 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Beef			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Milk - Cow			Milk		--	2.06E-06	1.03E-03	1.96E-04	3.91E-04	3.91E-04	5.15E-06	5.15E-06
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	5.00E-03	5.00E-03	1.00E-03	1.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Deer			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Elk			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Rabbit			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Prairie Dog			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kee'da'whii téèh (full-time Navajo residential)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a-ing-animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal(i)}}}$	pCi/g	7.77E-03	1.76E+01	4.76E+01	4.14E-01	6.45E-02	1.08E-02	1.04E-01	1.16E-01
	Domestic	Chicken	$PRG_{a-ing-animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				3.29E-02	2.38E+01	6.44E+01	1.82E+00	2.73E-01	4.58E-02	4.39E-01	4.89E-01
		Milk - Cow				3.29E+00	2.38E+03	6.44E+03	1.82E+02	2.73E+01	4.58E+00	4.39E+01	4.89E+01
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				1.09E+01	--	--	1.09E+01	--	--	--	--
		Sheep				1.14E-02	--	--	6.32E-01	9.48E-02	1.59E-02	1.52E-01	1.70E-01
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				4.08E-01	2.96E+02	7.99E+02	2.26E+01	3.39E+00	5.69E-01	5.46E+00	6.07E+00
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				3.40E+00	2.46E+03	6.66E+03	1.88E+02	2.83E+01	4.74E+00	4.55E+01	5.06E+01
		Elk				3.40E+00	2.46E+03	6.66E+03	1.88E+02	2.83E+01	4.74E+00	4.55E+01	5.06E+01
		Rabbit				4.08E-01	2.96E+02	7.99E+02	2.26E+01	3.39E+00	5.69E-01	5.46E+00	6.07E+00
		Prairie Dog				2.04E-01	1.48E+02	4.00E+02	1.13E+01	1.70E+00	2.84E-01	2.73E+00	3.04E+00
		Badger				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kee'da'whii téèh (full-time Navajo residential)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		PRG_{a-ing}	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	pCi/g	1.14E+02	8.51E+06	1.34E+05	1.85E+03	8.41E+02	1.47E+02	8.80E+03	9.80E+03
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{TF_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				2.11E+03	9.43E+07	1.53E+06	2.41E+05	1.47E+04	2.56E+03	1.80E+05	2.01E+05
		Milk - Cow				7.38E+05	6.86E+10	2.00E+08	6.79E+07	5.00E+06	8.83E+05	6.39E+08	7.12E+08
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				2.48E+03	--	--	2.48E+03	--	--	--	--
		Sheep				3.15E+02	--	--	1.07E+04	2.25E+03	3.94E+02	1.88E+04	2.09E+04
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				4.74E+04	2.44E+09	5.81E+07	5.51E+06	3.39E+05	5.73E+04	4.06E+06	4.51E+06
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				2.36E+07	1.26E+12	3.40E+10	2.75E+09	1.70E+08	2.85E+07	2.02E+09	2.25E+09
		Elk				1.19E+08	6.33E+12	1.71E+11	1.38E+10	8.55E+08	1.43E+08	1.02E+10	1.13E+10
		Rabbit				1.42E+03	6.54E+07	1.13E+06	1.63E+05	9.95E+03	1.72E+03	1.22E+05	1.35E+05
		Prairie Dog				2.51E+02	1.10E+07	1.69E+05	2.87E+04	1.74E+03	3.05E+02	2.15E+04	2.40E+04
		Badger				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Th-232	TFs for Secular Equilibrium Progeny Radionuclides of Th-232						
								Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	1.00E-01	5.00E-01	1.26E-02	1.95E-02	0.00E+00	2.41E-03	2.41E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	138	138	138	138	138	138	138
	Lamda		λ			1/Year	--	9.87E+02	6.02E+03	5.71E+02	6.91E+01	1.21E-01	3.63E-01	4.93E-11
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	--	1	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Th-232 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Beef			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Milk - Cow			Milk		--	2.06E-06	1.03E-03	1.96E-04	3.91E-04	3.91E-04	5.15E-06	5.15E-06
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	5.00E-03	5.00E-03	1.00E-03	1.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Deer			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Elk			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Rabbit			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Prairie Dog			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Secular Equilibrium Progeny Radionuclides of Th-232 - Kǫǫh bi łíí nakaí (sheep camp)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal(i)}}}$	pCi/g	7.77E-03	1.76E+01	4.76E+01	4.14E-01	6.45E-02	1.08E-02	1.04E-01	1.16E-01
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				3.29E-02	2.38E+01	6.44E+01	1.82E+00	2.73E-01	4.58E-02	4.39E-01	4.89E-01
		Milk - Cow				3.29E+00	2.38E+03	6.44E+03	1.82E+02	2.73E+01	4.58E+00	4.39E+01	4.89E+01
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				1.09E+01	--	--	1.09E+01	--	--	--	--
		Sheep				1.14E-02	--	--	6.32E-01	9.48E-02	1.59E-02	1.52E-01	1.70E-01
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				4.08E-01	2.96E+02	7.99E+02	2.26E+01	3.39E+00	5.69E-01	5.46E+00	6.07E+00
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				3.40E+00	2.46E+03	6.66E+03	1.88E+02	2.83E+01	4.74E+00	4.55E+01	5.06E+01
		Elk				3.40E+00	2.46E+03	6.66E+03	1.88E+02	2.83E+01	4.74E+00	4.55E+01	5.06E+01
		Rabbit				4.08E-01	2.96E+02	7.99E+02	2.26E+01	3.39E+00	5.69E-01	5.46E+00	6.07E+00
		Prairie Dog				2.04E-01	1.48E+02	4.00E+02	1.13E+01	1.70E+00	2.84E-01	2.73E+00	3.04E+00
		Badger				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kǫǫh bi łíí nakaí (sheep camp)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	pCi/g	1.72E+02	9.12E+06	1.44E+05	5.62E+03	1.23E+03	2.14E+02	1.41E+04	1.57E+04
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{\rho_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				7.13E+03	3.42E+08	6.52E+06	8.21E+05	5.03E+04	8.63E+03	6.10E+05	6.79E+05
		Milk - Cow				2.94E+06	2.92E+11	9.68E+08	2.73E+08	2.02E+07	3.51E+06	2.55E+09	2.83E+09
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				9.09E+03	--	--	9.09E+03	--	--	--	--
		Sheep				1.14E+03	--	--	3.93E+04	8.28E+03	1.43E+03	6.82E+04	7.59E+04
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				1.20E+05	6.31E+09	1.61E+08	1.40E+07	8.62E+05	1.45E+05	1.03E+07	1.14E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				2.36E+07	1.26E+12	3.40E+10	2.75E+09	1.70E+08	2.85E+07	2.02E+09	2.25E+09
		Elk				1.19E+08	6.33E+12	1.71E+11	1.38E+10	8.55E+08	1.43E+08	1.02E+10	1.13E+10
		Rabbit				1.42E+03	6.54E+07	1.13E+06	1.63E+05	9.95E+03	1.72E+03	1.22E+05	1.35E+05
		Prairie Dog				2.51E+02	1.10E+07	1.69E+05	2.87E+04	1.74E+03	3.05E+02	2.15E+04	2.40E+04
		Badger				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Th-232	TFs for Secular Equilibrium Progeny Radionuclides of Th-232						
								Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	1.00E-01	5.00E-01	1.26E-02	1.95E-02	0.00E+00	2.41E-03	2.41E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	138	138	138	138	138	138	138
	Lamda		λ			1/Year	--	9.87E+02	6.02E+03	5.71E+02	6.91E+01	1.21E-01	3.63E-01	4.93E-11
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	--	1	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Th-232 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Beef			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Milk - Cow			Milk		--	2.06E-06	1.03E-03	1.96E-04	3.91E-04	3.91E-04	5.15E-06	5.15E-06
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	5.00E-03	5.00E-03	1.00E-03	1.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Deer			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Elk			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Rabbit			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Prairie Dog			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kǫǫ ei nahaazáh (easy access open space)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal(i)}}}$	pCi/g	7.77E-03	1.76E+01	4.76E+01	4.14E-01	6.45E-02	1.08E-02	1.04E-01	1.16E-01
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				3.29E-02	2.38E+01	6.44E+01	1.82E+00	2.73E-01	4.58E-02	4.39E-01	4.89E-01
		Milk - Cow				3.29E+00	2.38E+03	6.44E+03	1.82E+02	2.73E+01	4.58E+00	4.39E+01	4.89E+01
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				1.09E+01	--	--	1.09E+01	--	--	--	--
		Sheep				1.14E-02	--	--	6.32E-01	9.48E-02	1.59E-02	1.52E-01	1.70E-01
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				4.08E-01	2.96E+02	7.99E+02	2.26E+01	3.39E+00	5.69E-01	5.46E+00	6.07E+00
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				3.40E+00	2.46E+03	6.66E+03	1.88E+02	2.83E+01	4.74E+00	4.55E+01	5.06E+01
		Elk				3.40E+00	2.46E+03	6.66E+03	1.88E+02	2.83E+01	4.74E+00	4.55E+01	5.06E+01
		Rabbit				4.08E-01	2.96E+02	7.99E+02	2.26E+01	3.39E+00	5.69E-01	5.46E+00	6.07E+00
		Prairie Dog				2.04E-01	1.48E+02	4.00E+02	1.13E+01	1.70E+00	2.84E-01	2.73E+00	3.04E+00
		Badger				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kǫǫ ei nahaazáh (easy access open space)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	pCi/g	1.99E+02	9.30E+06	1.46E+05	1.20E+04	1.39E+03	2.43E+02	1.67E+04	1.86E+04
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left(\left(Q_p \times f_p \times f_s \times \left(Bv_{dry} + MLF_p\right)\right) + \left(Q_s \times f_p\right)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{\rho_{milk}} \times \left(\left(Q_p \times f_p \times f_s \times \left(Bv_{dry} + MLF_p\right)\right) + \left(Q_s \times f_p\right)\right)\right)}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				2.16E+04	1.09E+09	2.44E+07	2.50E+06	1.54E+05	2.61E+04	1.85E+06	2.06E+06
		Milk - Cow				1.03E+07	1.09E+12	4.28E+09	9.58E+08	7.13E+07	1.22E+07	8.87E+09	9.87E+09
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				2.93E+04	--	--	2.93E+04	--	--	--	--
		Sheep				3.66E+03	--	--	1.27E+05	2.68E+04	4.56E+03	2.18E+05	2.43E+05
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				3.08E+05	1.63E+10	4.30E+08	3.58E+07	2.21E+06	3.71E+05	2.63E+07	2.93E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				2.36E+07	1.26E+12	3.40E+10	2.75E+09	1.70E+08	2.85E+07	2.02E+09	2.25E+09
		Elk				1.19E+08	6.33E+12	1.71E+11	1.38E+10	8.55E+08	1.43E+08	1.02E+10	1.13E+10
		Rabbit				1.42E+03	6.54E+07	1.13E+06	1.63E+05	9.95E+03	1.72E+03	1.22E+05	1.35E+05
		Prairie Dog				2.51E+02	1.10E+07	1.69E+05	2.87E+04	1.74E+03	3.05E+02	2.15E+04	2.40E+04
		Badger				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Th-232	TFs for Secular Equilibrium Progeny Radionuclides of Th-232						
								Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	1.00E-01	5.00E-01	1.26E-02	1.95E-02	0.00E+00	2.41E-03	2.41E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	138	138	138	138	138	138	138
	Lamda		λ	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		1/Year	--	9.87E+02	6.02E+03	5.71E+02	6.91E+01	1.21E-01	3.63E-01	4.93E-11
	Decay Function		-			Unitless	--	1	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Th-232 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Beef			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Milk - Cow			Milk		--	2.06E-06	1.03E-03	1.96E-04	3.91E-04	3.91E-04	5.15E-06	5.15E-06
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	5.00E-03	5.00E-03	1.00E-03	1.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Deer			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Elk			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Rabbit			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Prairie Dog			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny Th-232 - Kǫǫ ei doo nahaazáh dah (difficult access open space)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a-ing-animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal(i)}}}$	pCi/g	7.77E-03	1.76E+01	4.76E+01	4.14E-01	6.45E-02	1.08E-02	1.04E-01	1.16E-01
	Domestic	Chicken	$PRG_{a-ing-animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				3.29E-02	2.38E+01	6.44E+01	1.82E+00	2.73E-01	4.58E-02	4.39E-01	4.89E-01
		Milk - Cow				3.29E+00	2.38E+03	6.44E+03	1.82E+02	2.73E+01	4.58E+00	4.39E+01	4.89E+01
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				1.09E+01	--	--	1.09E+01	--	--	--	--
		Sheep				1.14E-02	--	--	6.32E-01	9.48E-02	1.59E-02	1.52E-01	1.70E-01
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				4.08E-01	2.96E+02	7.99E+02	2.26E+01	3.39E+00	5.69E-01	5.46E+00	6.07E+00
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				3.40E+00	2.46E+03	6.66E+03	1.88E+02	2.83E+01	4.74E+00	4.55E+01	5.06E+01
		Elk				3.40E+00	2.46E+03	6.66E+03	1.88E+02	2.83E+01	4.74E+00	4.55E+01	5.06E+01
		Rabbit				4.08E-01	2.96E+02	7.99E+02	2.26E+01	3.39E+00	5.69E-01	5.46E+00	6.07E+00
		Prairie Dog				2.04E-01	1.48E+02	4.00E+02	1.13E+01	1.70E+00	2.84E-01	2.73E+00	3.04E+00
		Badger				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kǫǫ ei doo nahaazáh dah (difficult access open space)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		PRG_{a-ing}	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	pCi/g	1.47E+03	9.15E+07	1.92E+06	4.23E+04	1.07E+04	1.83E+03	1.19E+05	1.32E+05
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{T_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				4.66E+04	2.41E+09	5.83E+07	5.41E+06	3.33E+05	5.62E+04	3.98E+06	4.43E+06
		Milk - Cow				2.36E+07	2.62E+12	1.15E+10	2.21E+09	1.65E+08	2.80E+07	2.04E+10	2.27E+10
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				6.49E+04	--	--	6.49E+04	--	--	--	--
		Sheep				8.08E+03	--	--	2.80E+05	5.95E+04	1.01E+04	4.82E+05	5.36E+05
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				6.21E+05	3.30E+10	8.80E+08	7.23E+07	4.46E+06	7.48E+05	5.31E+07	5.91E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				1.18E+08	6.31E+12	1.70E+11	1.38E+10	8.51E+08	1.43E+08	1.01E+10	1.13E+10
		Elk				5.94E+08	3.17E+13	8.56E+11	6.92E+10	4.27E+09	7.16E+08	5.08E+10	5.65E+10
		Rabbit				1.06E+04	5.39E+08	1.23E+07	1.23E+06	7.55E+04	1.28E+04	9.05E+05	1.01E+06
		Prairie Dog				2.36E+03	1.16E+08	2.38E+06	2.72E+05	1.67E+04	2.85E+03	2.02E+05	2.24E+05
		Badger				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for Th-232	TFs for Secular Equilibrium Progeny Radionuclides of Th-232						
								Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	1.00E-01	5.00E-01	1.26E-02	1.95E-02	0.00E+00	2.41E-03	2.41E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	138	138	138	138	138	138	138
	Lamda		λ			1/Year	--	9.87E+02	6.02E+03	5.71E+02	6.91E+01	1.21E-01	3.63E-01	4.93E-11
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	--	1	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of Th-232 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Beef			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Milk - Cow			Milk		--	2.06E-06	1.03E-03	1.96E-04	3.91E-04	3.91E-04	5.15E-06	5.15E-06
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	6.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Sheep			Sheep		--	0.00E+00	0.00E+00	7.10E-03	5.00E-03	5.00E-03	1.00E-03	1.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Deer			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Elk			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Rabbit			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Prairie Dog			Beef		--	2.00E-05	2.00E-03	7.00E-04	1.70E-03	1.70E-03	2.30E-04	2.30E-04
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Chíí dah wiih leezh (washes and drainages)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal(i)}}}$	pCi/g	7.77E-03	1.76E+01	4.76E+01	4.14E-01	6.45E-02	1.08E-02	1.04E-01	1.16E-01
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				3.29E-02	2.38E+01	6.44E+01	1.82E+00	2.73E-01	4.58E-02	4.39E-01	4.89E-01
		Milk - Cow				3.29E+00	2.38E+03	6.44E+03	1.82E+02	2.73E+01	4.58E+00	4.39E+01	4.89E+01
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				1.09E+01	--	--	1.09E+01	--	--	--	--
		Sheep				1.14E-02	--	--	6.32E-01	9.48E-02	1.59E-02	1.52E-01	1.70E-01
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				4.08E-01	2.96E+02	7.99E+02	2.26E+01	3.39E+00	5.69E-01	5.46E+00	6.07E+00
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				3.40E+00	2.46E+03	6.66E+03	1.88E+02	2.83E+01	4.74E+00	4.55E+01	5.06E+01
		Elk				3.40E+00	2.46E+03	6.66E+03	1.88E+02	2.83E+01	4.74E+00	4.55E+01	5.06E+01
		Rabbit				4.08E-01	2.96E+02	7.99E+02	2.26E+01	3.39E+00	5.69E-01	5.46E+00	6.07E+00
		Prairie Dog				2.04E-01	1.48E+02	4.00E+02	1.13E+01	1.70E+00	2.84E-01	2.73E+00	3.04E+00
		Badger				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Chíí dah wiih leezh (washes and drainages)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Radionuclides of Th-232 in SE - Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing(i)}}}$	pCi/g	1.72E+02	9.12E+06	1.44E+05	5.62E+03	1.23E+03	2.14E+02	1.41E+04	1.57E+04
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{\rho_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	--	--	--	--	--
		Chicken Eggs				--	--	--	--	--	--	--	--
		Beef				7.13E+03	3.42E+08	6.52E+06	8.21E+05	5.03E+04	8.63E+03	6.10E+05	6.79E+05
		Milk - Cow				2.94E+06	2.92E+11	9.68E+08	2.73E+08	2.02E+07	3.51E+06	2.55E+09	2.83E+09
		Pig				--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--
		Goat Milk				9.09E+03	--	--	9.09E+03	--	--	--	--
		Sheep				1.14E+03	--	--	3.93E+04	8.28E+03	1.43E+03	6.82E+04	7.59E+04
		Sheep Milk				--	--	--	--	--	--	--	--
		Horse				1.20E+05	6.31E+09	1.61E+08	1.40E+07	8.62E+05	1.45E+05	1.03E+07	1.14E+07
		Domesticated Turkey				--	--	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	--	--	--	--	--
		Deer				2.36E+07	1.26E+12	3.40E+10	2.75E+09	1.70E+08	2.85E+07	2.02E+09	2.25E+09
		Elk				1.19E+08	6.33E+12	1.71E+11	1.38E+10	8.55E+08	1.43E+08	1.02E+10	1.13E+10
		Rabbit				1.42E+03	6.54E+07	1.13E+06	1.63E+05	9.95E+03	1.72E+03	1.22E+05	1.35E+05
		Prairie Dog				2.51E+02	1.10E+07	1.69E+05	2.87E+04	1.74E+03	3.05E+02	2.15E+04	2.40E+04
		Badger				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	SE for U-238	TFs for Secular Equilibrium Progeny Radionuclides of U-238 Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	--	5.00E-01	5.00E-01	1.00E-01	1.26E-02	1.26E-02	2.76E-04	1.95E-02	2.41E-03	2.41E-03	7.13E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	--	138	138	138	138	138	138	138	138	138	138
	Lamda		λ			1/Year	--	5.05E+01	1.83E+04	9.06E+02	3.12E-02	1.36E+04	1.83E+00	4.33E-04	9.19E-06	1.05E+01	2.82E-06
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	--	1	1	1	1	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of U-238 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-01
		Chicken Eggs			Eggs		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00
		Beef			Beef		--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04
		Milk - Cow			Milk		--	1.03E-03	1.03E-03	5.15E-06	1.96E-04	1.96E-04	2.16E-04	3.91E-04	5.15E-06	5.15E-06	1.85E-03
		Pig			Swine		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-02
		Goat			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		--	0.00E+00	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03	0.00E+00	0.00E+00	0.00E+00	1.44E-03
		Sheep			Sheep		--	0.00E+00	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02	5.00E-03	1.00E-03	1.00E-03	2.00E-03
		Sheep Milk			Sheep Milk		--	0.00E+00	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04
		Domesticated Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-01
	Wild	Wild Turkey			Poultry		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-01
		Deer			Beef		--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04
		Elk			Beef		--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04
		Rabbit			Beef		--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04
		Prairie Dog			Beef		--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04
		Badger			Goat		--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for U-238	PRGs for Secular Equilibrium Progeny Radionuclides of U-238 - Custom Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	5.32E-03	7.06E+00	3.46E+02	1.91E+04	2.35E-02	5.71E+01	8.80E-03	5.86E-02	2.53E-01	8.89E-01	2.05E-01
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	3.14E-01	--	--	--	--	--	3.39E-01	--	--	--	7.99E+00
		Chicken Eggs				3.14E-02	--	--	--	--	--	3.39E-02	--	--	--	7.99E-01
		Beef				3.05E-02	1.01E+01	4.94E+02	2.72E+04	1.11E-01	2.70E+02	5.81E-02	2.54E-01	1.10E+00	3.86E+00	1.37E+00
		Milk - Cow				1.45E+00	4.80E+02	2.36E+04	1.30E+06	5.29E+00	1.29E+04	2.77E+00	1.21E+01	5.25E+01	1.84E+02	6.54E+01
		Pig				1.26E+01	--	--	--	--	--	--	--	--	--	2.40E+01
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				9.50E-02	--	--	--	2.91E-01	7.08E+02	1.53E-01	--	--	--	3.60E+00
		Sheep				1.05E-02	--	--	--	3.80E-02	9.25E+01	1.99E-02	8.73E-02	3.77E-01	1.32E+00	4.70E-01
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				3.20E-01	1.06E+02	5.18E+03	2.86E+05	1.16E+00	2.83E+03	6.10E-01	2.67E+00	1.15E+01	4.05E+01	1.44E+01
		Domesticated Turkey				1.88E+01	--	--	--	--	--	2.03E+01	--	--	--	4.79E+02
	Wild	Wild Turkey				7.06E+01	--	--	--	--	--	7.63E+01	--	--	--	1.80E+03
		Deer				2.67E+00	8.80E+02	4.32E+04	2.38E+06	9.70E+00	2.36E+04	5.09E+00	2.23E+01	9.62E+01	3.38E+02	1.20E+02
		Elk				2.67E+00	8.80E+02	4.32E+04	2.38E+06	9.70E+00	2.36E+04	5.09E+00	2.23E+01	9.62E+01	3.38E+02	1.20E+02
		Rabbit				3.20E-01	1.06E+02	5.18E+03	2.86E+05	1.16E+00	2.83E+03	6.10E-01	2.67E+00	1.15E+01	4.05E+01	1.44E+01
		Prairie Dog				1.60E-01	5.28E+01	2.59E+03	1.43E+05	5.82E-01	1.42E+03	3.05E-01	1.34E+00	5.77E+00	2.03E+01	7.19E+00
		Badger				--	--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	SE for U-238	PRGs for Secular Equilibrium Progeny Radionuclides of U-238 - Custom Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE-Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	1.03E-01	4.69E+02	2.30E+04	1.01E+09	5.36E+00	1.30E+04	1.08E-01	1.36E+01	3.51E+02	1.23E+03	8.61E+00
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{T_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	1.91E+00	--	--	--	--	--	1.96E+00	--	--	--	1.45E+02
		Chicken Eggs				1.47E-01	--	--	--	--	--	1.52E-01	--	--	--	9.89E+00
		Beef				4.35E+00	5.39E+02	2.65E+04	1.18E+09	4.41E+01	1.07E+05	5.62E+00	4.08E+01	1.38E+03	4.83E+03	9.96E+02
		Milk - Cow				8.57E+02	2.98E+04	1.46E+06	3.36E+10	4.72E+03	1.15E+07	2.34E+03	5.29E+03	1.84E+06	6.47E+06	6.27E+03
		Pig				1.81E+02	--	--	--	--	--	--	--	--	--	3.45E+02
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				3.81E+01	--	--	--	6.65E+01	1.62E+05	9.36E+01	--	--	--	3.57E+03
		Sheep				4.76E-01	--	--	--	6.87E+00	1.67E+04	5.26E-01	2.21E+01	4.95E+02	1.74E+03	3.05E+02
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				4.57E+01	5.66E+03	2.78E+05	1.24E+10	4.63E+02	1.13E+06	5.90E+01	4.28E+02	1.45E+04	5.07E+04	1.05E+04
		Domesticated Turkey				3.47E+01	--	--	--	--	--	3.56E+01	--	--	--	2.63E+03
	Wild	Wild Turkey				8.16E+03	--	--	--	--	--	8.37E+03	--	--	--	6.29E+05
		Deer				3.13E+04	6.76E+06	3.32E+08	1.02E+13	3.22E+05	7.84E+08	4.00E+04	3.03E+05	9.84E+06	3.45E+07	7.19E+06
		Elk				2.01E+05	5.84E+07	2.86E+09	6.99E+13	2.08E+06	5.06E+09	2.55E+05	1.96E+06	6.30E+07	2.21E+08	4.62E+07
		Rabbit				2.89E+02	4.47E+04	2.19E+06	8.48E+10	2.95E+03	7.18E+06	3.71E+02	2.75E+03	9.11E+04	3.20E+05	6.63E+04
		Prairie Dog				1.44E+02	2.23E+04	1.10E+06	4.24E+10	1.48E+03	3.59E+06	1.86E+02	1.37E+03	4.56E+04	1.60E+05	3.31E+04
		Badger				--	--	--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	U-238	SE for U-238	TFs for Secular Equilibrium Progeny Radionuclides of U-238: Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	7.13E-03	--	5.00E-01	5.00E-01	1.00E-01	1.26E-02	1.26E-02	2.76E-04	1.95E-02	2.41E-03	2.41E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	138	--	138	138	138	138	138	138	138	138	138
	Lamda		λ			1/Year	1.55E-10	--	5.05E+01	1.83E+04	9.06E+02	3.12E-02	1.36E+04	1.83E+00	4.33E-04	9.19E-06	1.05E+01
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	1	--	1	1	1	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of U-238 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00	0.00E+00	0.00E+00
		Chicken Eggs			Eggs		1.10E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00	0.00E+00	0.00E+00	0.00E+00
		Beef			Beef		3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04
		Milk - Cow			Milk		1.85E-03	--	1.03E-03	1.03E-03	5.15E-06	1.96E-04	1.96E-04	2.16E-04	3.91E-04	5.15E-06	5.15E-06
		Pig			Swine		4.40E-02	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		1.44E-03	--	0.00E+00	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03	0.00E+00	0.00E+00	0.00E+00
		Sheep			Sheep		2.00E-03	--	0.00E+00	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02	5.00E-03	1.00E-03	1.00E-03
		Sheep Milk			Sheep Milk		0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04
		Domesticated Turkey			Poultry		7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00	0.00E+00	0.00E+00
	Wild	Wild Turkey			Poultry		7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00	0.00E+00	0.00E+00
		Deer			Beef		3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04
		Elk			Beef		3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04
		Rabbit			Beef		3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04
		Prairie Dog			Beef		3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04	2.30E-04
		Badger			Goat		0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	1.00E+00	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	U-238	SE for U-238	PRGs for Progeny - Kee'da'whii téeh (full-time Navajo residential): Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	**2.27E-01**	**3.06E-03**	**3.70E+00**	**1.82E+02**	**1.00E+04**	**1.25E-02**	**3.05E+01**	**5.32E-03**	**2.99E-02**	**1.29E-01**	**4.53E-01**
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	8.81E+00	1.67E-01	--	--	--	--	--	1.80E-01	--	--	--
		Chicken Eggs				8.81E-01	3.07E-02	--	--	--	--	--	3.32E-02	--	--	--
		Beef				1.51E+00	1.51E-02	5.00E+00	2.45E+02	1.35E+04	5.51E-02	1.34E+02	2.89E-02	1.27E-01	5.46E-01	1.92E+00
		Milk - Cow				7.21E+01	1.51E+00	5.00E+02	2.45E+04	1.35E+06	5.51E+00	1.34E+04	2.89E+00	1.27E+01	5.46E+01	1.92E+02
		Pig				2.64E+01	6.37E+00	--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				3.96E+00	1.07E-01	--	--	--	3.28E-01	7.99E+02	1.72E-01	--	--	--
		Sheep				5.18E-01	5.27E-03	--	--	--	1.91E-02	4.65E+01	1.00E-02	4.39E-02	1.90E-01	6.66E-01
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				1.59E+01	1.88E-01	6.21E+01	3.05E+03	1.68E+05	6.84E-01	1.66E+03	3.59E-01	1.57E+00	6.78E+00	2.38E+01
		Domesticated Turkey				5.29E+02	1.11E+01	--	--	--	--	--	1.20E+01	--	--	--
	Wild	Wild Turkey				1.98E+03	4.15E+01	--	--	--	--	--	4.49E+01	--	--	--
		Deer				1.32E+02	1.57E+00	5.18E+02	2.54E+04	1.40E+06	5.70E+00	1.39E+04	2.99E+00	1.31E+01	5.65E+01	1.98E+02
		Elk				1.32E+02	1.57E+00	5.18E+02	2.54E+04	1.40E+06	5.70E+00	1.39E+04	2.99E+00	1.31E+01	5.65E+01	1.98E+02
		Rabbit				1.59E+01	1.88E-01	6.21E+01	3.05E+03	1.68E+05	6.84E-01	1.66E+03	3.59E-01	1.57E+00	6.78E+00	2.38E+01
		Prairie Dog				7.93E+00	9.40E-02	3.11E+01	1.52E+03	8.41E+04	3.42E-01	8.32E+02	1.79E-01	7.85E-01	3.39E+00	1.19E+01
		Badger				--	--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	U-238	SE for U-238	PRGs for Progeny - Kee'da'whii téeh (full-time Navajo residential): Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE-Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	**9.50E+00**	**1.24E-01**	**1.04E+04**	**5.10E+05**	**1.93E+10**	**5.59E+01**	**1.36E+05**	**1.28E-01**	**3.89E+02**	**1.09E+04**	**3.84E+04**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + ML_{fp})) + (Q_c \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{P_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + ML_{fp})) + (Q_c \times f_p)\right)\right)}$	pCi/g	1.60E+02	1.02E+00	--	--	--	--	--	1.04E+00	--	--	--
		Chicken Eggs				1.09E+01	1.44E-01	--	--	--	--	--	1.49E-01	--	--	--
		Beef				1.10E+03	7.12E+02	1.19E+05	5.85E+06	2.15E+11	7.29E+03	1.77E+07	9.14E+02	6.80E+03	2.24E+05	7.88E+05
		Milk - Cow				6.92E+03	3.73E+05	1.55E+07	7.62E+08	1.56E+13	2.05E+06	5.00E+09	1.01E+06	2.32E+06	7.95E+08	2.79E+09
		Pig				3.81E+02	9.17E+01	--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				3.93E+03	4.30E+01	--	--	--	7.51E+01	1.83E+05	1.06E+02	--	--	--
		Sheep				3.37E+02	2.25E+01	--	--	--	3.25E+02	7.90E+05	2.49E+01	1.04E+03	2.34E+04	8.22E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				1.15E+04	1.61E+04	4.51E+06	2.21E+08	5.56E+12	1.67E+05	4.05E+08	2.05E+04	1.57E+05	5.05E+06	1.77E+07
		Domesticated Turkey				2.90E+03	2.04E+01	--	--	--	--	--	2.09E+01	--	--	--
	Wild	Wild Turkey				6.94E+05	1.71E+06	--	--	--	--	--	1.76E+06	--	--	--
		Deer				7.93E+06	8.02E+06	2.64E+09	1.30E+11	2.87E+15	8.33E+07	2.03E+11	1.02E+07	7.87E+07	2.51E+09	8.83E+09
		Elk				5.10E+07	4.03E+07	1.33E+10	6.52E+11	1.44E+16	4.19E+08	1.02E+12	5.12E+07	3.96E+08	1.26E+10	4.43E+10
		Rabbit				7.31E+04	4.80E+02	8.79E+04	4.31E+06	1.49E+11	4.93E+03	1.20E+07	6.15E+02	4.61E+03	1.51E+05	5.31E+05
		Prairie Dog				3.65E+04	8.49E+01	1.31E+04	6.44E+05	2.49E+10	8.67E+02	2.11E+06	1.09E+02	8.07E+02	2.68E+04	9.40E+04
		Badger				--	--	--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	U-234	U-238	SE for U-238	TFs for Secular Equilibrium Progeny Radionuclides of U-238: Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226	Th-230
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	7.13E-03	7.13E-03	--	5.00E-01	5.00E-01	1.00E-01	1.26E-02	1.26E-02	2.76E-04	1.95E-02	2.41E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	138	138	--	138	138	138	138	138	138	138	138
	Lamda		λ			1/Year	2.82E-06	1.55E-10	--	5.05E+01	1.83E+04	9.06E+02	3.12E-02	1.36E+04	1.83E+00	4.33E-04	9.19E-06
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	1	1	--	1	1	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of U-238 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00	0.00E+00
		Chicken Eggs			Eggs		1.10E+00	1.10E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00	0.00E+00	0.00E+00
		Beef			Beef		3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04
		Milk - Cow			Milk		1.85E-03	1.85E-03	--	1.03E-03	1.03E-03	5.15E-06	1.96E-04	1.96E-04	2.16E-04	3.91E-04	5.15E-06
		Pig			Swine		4.40E-02	4.40E-02	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		1.44E-03	1.44E-03	--	0.00E+00	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03	0.00E+00	0.00E+00
		Sheep			Sheep		2.00E-03	2.00E-03	--	0.00E+00	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02	5.00E-03	1.00E-03
		Sheep Milk			Sheep Milk		0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04
		Domesticated Turkey			Poultry		7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00	0.00E+00
	Wild	Wild Turkey			Poultry		7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00	0.00E+00
		Deer			Beef		3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04
		Elk			Beef		3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04
		Rabbit			Beef		3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04
		Prairie Dog			Beef		3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03	2.30E-04
		Badger			Goat		0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Koǫh bi łii nakai (sheep camp): U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226	Th-230
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a-ing-animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	**1.24E-01**	**1.37E-01**	**3.06E-03**	**3.70E+00**	**1.82E+02**	**1.00E+04**	**1.25E-02**	**3.05E+01**	**5.32E-03**	**2.99E-02**	**1.29E-01**
	Domestic	Chicken	$PRG_{a-ing-animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	4.24E+00	4.68E+00	1.67E-01	--	--	--	--	--	1.80E-01	--	--
		Chicken Eggs				7.82E-01	8.62E-01	3.07E-02	--	--	--	--	--	3.32E-02	--	--
		Beef				6.81E-01	7.51E-01	1.51E-02	5.00E+00	2.45E+02	1.35E+04	5.51E-02	1.34E+02	2.89E-02	1.27E-01	5.46E-01
		Milk - Cow				6.81E+01	7.51E+01	1.51E+00	5.00E+02	2.45E+04	1.35E+06	5.51E+00	1.34E+04	2.89E+00	1.27E+01	5.46E+01
		Pig				1.21E+01	1.34E+01	6.37E+00	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				4.06E+00	4.48E+00	1.07E-01	--	--	--	3.28E-01	7.99E+02	1.72E-01	--	--
		Sheep				2.36E-01	2.61E-01	5.27E-03	--	--	--	1.91E-02	4.65E+01	1.00E-02	4.39E-02	1.90E-01
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				8.45E+00	9.32E+00	1.88E-01	6.21E+01	3.05E+03	1.68E+05	6.84E-01	1.66E+03	3.59E-01	1.57E+00	6.78E+00
		Domesticated Turkey				2.82E+02	3.11E+02	1.11E+01	--	--	--	--	--	1.20E+01	--	--
	Wild	Wild Turkey				1.06E+03	1.17E+03	4.15E+01	--	--	--	--	--	4.49E+01	--	--
		Deer				7.05E+01	7.77E+01	1.57E+00	5.18E+02	2.54E+04	1.40E+06	5.70E+00	1.39E+04	2.99E+00	1.31E+01	5.65E+01
		Elk				7.05E+01	7.77E+01	1.57E+00	5.18E+02	2.54E+04	1.40E+06	5.70E+00	1.39E+04	2.99E+00	1.31E+01	5.65E+01
		Rabbit				8.45E+00	9.32E+00	1.88E-01	6.21E+01	3.05E+03	1.68E+05	6.84E-01	1.66E+03	3.59E-01	1.57E+00	6.78E+00
		Prairie Dog				4.23E+00	4.66E+00	9.40E-02	3.11E+01	1.52E+03	8.41E+04	3.42E-01	8.32E+02	1.79E-01	7.85E-01	3.39E+00
		Badger				--	--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Koǫh bi łii nakai (sheep camp): U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226	Th-230
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE-Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		PRG_{a-ing}	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	**8.13E+00**	**8.96E+00**	**3.04E+01**	**1.12E+04**	**5.48E+05**	**2.07E+10**	**1.70E+02**	**4.14E+05**	**#DIV/0!**	**5.68E+02**	**1.75E+04**
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_c \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{P_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_c \times f_p)\right)\right)}$	pCi/g	7.71E+01	8.50E+01	--	--	--	--	--	--	#DIV/0!	--	--
		Chicken Eggs				9.68E+00	1.07E+01	--	--	--	--	--	--	#DIV/0!	--	--
		Beef				1.63E+05	1.80E+05	2.41E+03	5.07E+05	2.49E+07	7.78E+11	2.49E+04	6.05E+07	3.08E+03	2.33E+04	7.59E+05
		Milk - Cow				2.72E+06	3.00E+06	1.50E+06	7.52E+07	3.69E+09	6.64E+13	8.25E+06	2.01E+10	4.00E+06	9.35E+06	3.17E+09
		Pig				1.75E+02	1.93E+02	--	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				4.03E+03	4.44E+03	1.57E+02	--	--	--	2.75E+02	6.69E+05	3.83E+02	--	--
		Sheep				1.44E+04	1.59E+04	8.16E+01	--	--	--	1.19E+03	2.89E+06	9.01E+01	3.84E+03	8.49E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				3.70E+06	4.08E+06	4.07E+04	1.25E+07	6.12E+08	1.44E+13	4.23E+05	1.03E+09	5.18E+04	3.99E+05	1.28E+07
		Domesticated Turkey				1.55E+03	1.71E+03	--	--	--	--	--	--	#DIV/0!	--	--
	Wild	Wild Turkey				1.33E+08	1.46E+08	1.71E+06	--	--	--	--	--	1.76E+06	--	--
		Deer				1.85E+09	2.04E+09	8.02E+06	2.64E+09	1.30E+11	2.87E+15	8.33E+07	2.03E+11	1.02E+07	7.87E+07	2.51E+09
		Elk				9.28E+09	1.02E+10	4.03E+07	1.33E+10	6.52E+11	1.44E+16	4.19E+08	1.02E+12	5.12E+07	3.96E+08	1.26E+10
		Rabbit				1.10E+05	1.22E+05	4.80E+02	8.79E+04	4.31E+06	1.49E+11	4.93E+03	1.20E+07	6.15E+02	4.61E+03	1.51E+05
		Prairie Dog				1.95E+04	2.15E+04	8.49E+01	1.31E+04	6.44E+05	2.49E+10	8.67E+02	2.11E+06	1.09E+02	8.07E+02	2.68E+04
		Badger				--	--	--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Th-234	U-234	U-238	SE for U-238	TFs for Secular Equilibrium Progeny Radionuclides: Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	2.41E-03	7.13E-03	7.13E-03	--	5.00E-01	5.00E-01	1.00E-01	1.26E-02	1.26E-02	2.76E-04	1.95E-02
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	138	138	138	--	138	138	138	138	138	138	138
	Lamda		λ			1/Year	1.05E+01	2.82E-06	1.55E-10	--	5.05E+01	1.83E+04	9.06E+02	3.12E-02	1.36E+04	1.83E+00	4.33E-04
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	1	1	1	--	1	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of U-238 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	0.00E+00	7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Chicken Eggs			Eggs		0.00E+00	1.10E+00	1.10E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00	0.00E+00
		Beef			Beef		2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Milk - Cow			Milk		5.15E-06	1.85E-03	1.85E-03	--	1.03E-03	1.03E-03	5.15E-06	1.96E-04	1.96E-04	2.16E-04	3.91E-04
		Pig			Swine		0.00E+00	4.40E-02	4.40E-02	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		0.00E+00	1.44E-03	1.44E-03	--	0.00E+00	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03	0.00E+00
		Sheep			Sheep		1.00E-03	2.00E-03	2.00E-03	--	0.00E+00	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02	5.00E-03
		Sheep Milk			Sheep Milk		0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00	0.00E+00
		Horse			Beef		2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Domesticated Turkey			Poultry		0.00E+00	7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
	Wild	Wild Turkey			Poultry		0.00E+00	7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	0.00E+00
		Deer			Beef		2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Elk			Beef		2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Rabbit			Beef		2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Prairie Dog			Beef		2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03	1.70E-03
		Badger			Goat		0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kọọ ei nahaazáh (easy access op): Th-234	U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	**4.53E-01**	**1.24E-01**	**1.37E-01**	**3.06E-03**	**3.70E+00**	**1.82E+02**	**1.00E+04**	**1.25E-02**	**3.05E+01**	**5.32E-03**	**2.99E-02**
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	4.24E+00	4.68E+00	1.67E-01	--	--	--	--	--	1.80E-01	--
		Chicken Eggs				--	7.82E-01	8.62E-01	3.07E-02	--	--	--	--	--	3.32E-02	--
		Beef				1.92E+00	6.81E-01	7.51E-01	1.51E-02	5.00E+00	2.45E+02	1.35E+04	5.51E-02	1.34E+02	2.89E-02	1.27E-01
		Milk - Cow				1.92E+02	6.81E+01	7.51E+01	1.51E+00	5.00E+02	2.45E+04	1.35E+06	5.51E+00	1.34E+04	2.89E+00	1.27E+01
		Pig				--	1.21E+01	1.34E+01	6.37E+00	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	4.06E+00	4.48E+00	1.07E-01	--	--	--	3.28E-01	7.99E+02	1.72E-01	--
		Sheep				6.66E-01	2.36E-01	2.61E-01	5.27E-03	--	--	--	1.91E-02	4.65E+01	1.00E-02	4.39E-02
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				2.38E+01	8.45E+00	9.32E+00	1.88E-01	6.21E+01	3.05E+03	1.68E+05	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Domesticated Turkey				--	2.82E+02	3.11E+02	1.11E+01	--	--	--	--	--	1.20E+01	--
	Wild	Wild Turkey				--	1.06E+03	1.17E+03	4.15E+01	--	--	--	--	--	4.49E+01	--
		Deer				1.98E+02	7.05E+01	7.77E+01	1.57E+00	5.18E+02	2.54E+04	1.40E+06	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Elk				1.98E+02	7.05E+01	7.77E+01	1.57E+00	5.18E+02	2.54E+04	1.40E+06	5.70E+00	1.39E+04	2.99E+00	1.31E+01
		Rabbit				2.38E+01	8.45E+00	9.32E+00	1.88E-01	6.21E+01	3.05E+03	1.68E+05	6.84E-01	1.66E+03	3.59E-01	1.57E+00
		Prairie Dog				1.19E+01	4.23E+00	4.66E+00	9.40E-02	3.11E+01	1.52E+03	8.41E+04	3.42E-01	8.32E+02	1.79E-01	7.85E-01
		Badger				--	--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kọọ ei nahaazáh (easy access op): Th-234	U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE- Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	**6.15E+04**	**#DIV/0!**	**#DIV/0!**	**5.04E+01**	**1.14E+04**	**5.57E+05**	**2.12E+10**	**3.62E+02**	**8.82E+05**	**#DIV/0!**	**6.45E+02**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{Fmilk} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	#DIV/0!	#DIV/0!	--	--	--	--	--	--	#DIV/0!	--
		Chicken Eggs				--	#DIV/0!	#DIV/0!	--	--	--	--	--	--	#DIV/0!	--
		Beef				2.66E+06	5.55E+05	6.12E+05	7.32E+03	1.89E+06	9.29E+07	2.49E+12	7.58E+04	1.84E+08	9.34E+03	7.14E+04
		Milk - Cow				1.11E+10	1.09E+07	1.20E+07	5.26E+06	3.33E+08	1.63E+10	2.48E+14	2.90E+07	7.05E+10	1.39E+07	3.30E+07
		Pig				--	#DIV/0!	#DIV/0!	--	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	1.47E+04	1.62E+04	5.04E+02	--	--	--	8.87E+02	2.16E+06	1.22E+03	--
		Sheep				2.98E+05	5.25E+04	5.79E+04	2.61E+02	--	--	--	3.83E+03	9.32E+06	2.88E+02	1.24E+04
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				4.49E+07	9.39E+06	1.04E+07	1.04E+05	3.34E+07	1.64E+09	3.71E+13	1.08E+06	2.64E+09	1.33E+05	1.02E+06
		Domesticated Turkey				--	#DIV/0!	#DIV/0!	--	--	--	--	--	--	#DIV/0!	--
	Wild	Wild Turkey				--	1.33E+08	1.46E+08	1.71E+06	--	--	--	--	--	1.76E+06	--
		Deer				8.83E+09	1.85E+09	2.04E+09	8.02E+06	2.64E+09	1.30E+11	2.87E+15	8.33E+07	2.03E+11	1.02E+07	7.87E+07
		Elk				4.43E+10	9.28E+09	1.02E+10	4.03E+07	1.33E+10	6.52E+11	1.44E+16	4.19E+08	1.02E+12	5.12E+07	3.96E+08
		Rabbit				5.31E+05	1.10E+05	1.22E+05	4.80E+02	8.79E+04	4.31E+06	1.49E+11	4.93E+03	1.20E+07	6.15E+02	4.61E+03
		Prairie Dog				9.40E+04	1.95E+04	2.15E+04	8.49E+01	1.31E+04	6.44E+05	2.49E+10	8.67E+02	2.11E+06	1.09E+02	8.07E+02
		Badger				--	--	--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	of U-238 Th-230	Th-234	U-234	U-238	SE for U-238	TFs for Secular Equilibrium Progeny I Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	2.41E-03	2.41E-03	7.13E-03	7.13E-03	--	5.00E-01	5.00E-01	1.00E-01	1.26E-02	1.26E-02	2.76E-04
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	138	138	138	138	--	138	138	138	138	138	138
	Lamda		λ			1/Year	9.19E-06	1.05E+01	2.82E-06	1.55E-10	--	5.05E+01	1.83E+04	9.06E+02	3.12E-02	1.36E+04	1.83E+00
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	1	1	1	1	--	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of U-238 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	0.00E+00	0.00E+00	7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00
		Chicken Eggs			Eggs		0.00E+00	0.00E+00	1.10E+00	1.10E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E+00
		Beef			Beef		2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03
		Milk - Cow			Milk		5.15E-06	5.15E-06	1.85E-03	1.85E-03	--	1.03E-03	1.03E-03	5.15E-06	1.96E-04	1.96E-04	2.16E-04
		Pig			Swine		0.00E+00	0.00E+00	4.40E-02	4.40E-02	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		0.00E+00	0.00E+00	1.44E-03	1.44E-03	--	0.00E+00	0.00E+00	0.00E+00	6.18E-03	6.18E-03	2.37E-03
		Sheep			Sheep		1.00E-03	1.00E-03	2.00E-03	2.00E-03	--	0.00E+00	0.00E+00	0.00E+00	7.10E-03	7.10E-03	5.00E-02
		Sheep Milk			Sheep Milk		0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	3.61E-02	3.61E-02	0.00E+00
		Horse			Beef		2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03
		Domesticated Turkey			Poultry		0.00E+00	0.00E+00	7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00
	Wild	Wild Turkey			Poultry		0.00E+00	0.00E+00	7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00
		Deer			Beef		2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03
		Elk			Beef		2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03
		Rabbit			Beef		2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03
		Prairie Dog			Beef		2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04	3.00E-03
		Badger			Goat		0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	pen space) Th-230	Th-234	U-234	U-238	SE for U-238	PRGs for Progeny - Koo ei doo nahaazáh dah Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a-ing-animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	**1.29E-01**	**4.53E-01**	**1.24E-01**	**1.37E-03**	**3.06E-03**	**3.70E+00**	**1.82E+02**	**1.00E+04**	**1.25E-02**	**3.05E+01**	**5.32E-03**
	Domestic	Chicken	$PRG_{a-ing-animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	4.24E+00	4.68E+00	1.67E-01	--	--	--	--	--	1.80E-01
		Chicken Eggs				--	--	7.82E-01	8.62E-01	3.07E-02	--	--	--	--	--	3.32E-02
		Beef				5.46E-01	1.92E+00	6.81E-01	7.51E-01	1.51E-02	5.00E+00	2.45E+02	1.35E+04	5.51E-02	1.34E+02	2.89E-02
		Milk - Cow				5.46E+01	1.92E+02	6.81E+01	7.51E+01	1.51E+00	5.00E+02	2.45E+04	1.35E+06	5.51E+00	1.34E+04	2.89E+00
		Pig				--	--	1.21E+01	1.34E+01	6.37E+00	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	--	4.06E+00	4.48E+00	1.07E-01	--	--	--	3.28E-01	7.99E+02	1.72E-01
		Sheep				1.90E-01	6.66E-01	2.36E-01	2.61E-01	5.27E-03	--	--	--	1.91E-02	4.65E+01	1.00E-02
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				6.78E+00	2.38E+01	8.45E+00	9.32E+00	1.88E-01	6.21E+01	3.05E+03	1.68E+05	6.84E-01	1.66E+03	3.59E-01
		Domesticated Turkey				--	--	2.82E+02	3.11E+02	1.11E+01	--	--	--	--	--	1.20E+01
	Wild	Wild Turkey				--	--	1.06E+03	1.17E+03	4.15E+01	--	--	--	--	--	4.49E+01
		Deer				5.65E+01	1.98E+02	7.05E+01	7.77E+01	1.57E+00	5.18E+02	2.54E+04	1.40E+06	5.70E+00	1.39E+04	2.99E+00
		Elk				5.65E+01	1.98E+02	7.05E+01	7.77E+01	1.57E+00	5.18E+02	2.54E+04	1.40E+06	5.70E+00	1.39E+04	2.99E+00
		Rabbit				6.78E+00	2.38E+01	8.45E+00	9.32E+00	1.88E-01	6.21E+01	3.05E+03	1.68E+05	6.84E-01	1.66E+03	3.59E-01
		Prairie Dog				3.39E+00	1.19E+01	4.23E+00	4.66E+00	9.40E-02	3.11E+01	1.52E+03	8.41E+04	3.42E-01	8.32E+02	1.79E-01
		Badger				--	--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	pen space) Th-230	Th-234	U-234	U-238	SE for U-238	PRGs for Progeny - Koo ei doo nahaazáh dah Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE-Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		PRG_{a-ing}	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	**2.08E+04**	**7.30E+04**	**#DIV/0!**	**#DIV/0!**	**2.36E+02**	**1.49E+05**	**7.32E+06**	**2.08E+11**	**1.28E+03**	**3.11E+06**	**#DIV/0!**
	Domestic	Chicken	$PRG_{a-ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + ML_{f_p})) + (Q_c \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{P_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + ML_{f_p})) + (Q_c \times f_p)\right)\right)}$	pCi/g	--	--	#DIV/0!	#DIV/0!	--	--	--	--	--	--	#DIV/0!
		Chicken Eggs				--	--	#DIV/0!	#DIV/0!	--	--	--	--	--	--	#DIV/0!
		Beef				2.30E+06	8.07E+06	1.69E+06	1.86E+06	1.58E+04	4.53E+06	2.22E+08	5.48E+12	1.64E+05	3.98E+08	2.01E+04
		Milk - Cow				1.10E+10	3.87E+10	3.80E+07	4.19E+07	1.22E+07	8.96E+08	4.39E+10	5.95E+14	6.70E+07	1.63E+11	3.20E+07
		Pig				--	--	#DIV/0!	#DIV/0!	--	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	--	4.71E+04	5.20E+04	1.11E+03	--	--	--	1.96E+03	4.78E+06	2.70E+03
		Sheep				2.72E+05	9.54E+05	1.69E+05	1.86E+05	5.76E+02	--	--	--	8.48E+03	2.06E+07	6.35E+02
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				3.27E+07	1.15E+08	2.40E+07	2.65E+07	2.10E+05	6.84E+07	3.35E+09	7.50E+13	2.19E+06	5.32E+09	2.68E+05
		Domesticated Turkey				--	--	#DIV/0!	#DIV/0!	--	--	--	--	--	--	#DIV/0!
	Wild	Wild Turkey				--	--	1.33E+08	1.46E+08	8.58E+06	--	--	--	--	--	8.79E+06
		Deer				2.51E+09	8.83E+09	1.85E+09	2.04E+09	4.01E+07	1.32E+10	6.50E+11	1.43E+16	4.17E+08	1.01E+12	5.10E+07
		Elk				1.26E+10	4.43E+10	9.28E+09	1.02E+10	2.01E+08	6.65E+10	3.26E+12	7.20E+16	2.09E+09	5.09E+12	2.56E+08
		Rabbit				1.51E+05	5.31E+05	1.10E+05	1.22E+05	3.59E+03	9.55E+05	4.68E+07	1.23E+12	3.71E+04	9.03E+07	4.57E+03
		Prairie Dog				2.68E+04	9.40E+04	1.95E+04	2.15E+04	7.98E+02	1.85E+05	9.06E+06	2.64E+11	8.24E+03	2.00E+07	1.02E+03
		Badger				--	--	--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	Radionuclides of U-238 Ra-226	Th-230	Th-234	U-234	U-238	SE for U-238	TFs for Secular Equilib Bi-210	Bi-214	Pa-234	Pb-210	Pb-214
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	1.95E-02	2.41E-03	2.41E-03	7.13E-03	7.13E-03	--	5.00E-01	5.00E-01	1.00E-01	1.26E-02	1.26E-02
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	138	138	138	138	138	--	138	138	138	138	138
	Lamda		λ			1/Year	4.33E-04	9.19E-06	1.05E+01	2.82E-06	1.55E-10	--	5.05E+01	1.83E+04	9.06E+02	3.12E-02	1.36E+04
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	1	1	1	1	1	--	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of U-238 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chicken Eggs			Eggs		0.00E+00	0.00E+00	0.00E+00	1.10E+00	1.10E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Beef			Beef		1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04
		Milk - Cow			Milk		3.91E-04	5.15E-06	5.15E-06	1.85E-03	1.85E-03	--	1.03E-03	1.03E-03	5.15E-06	1.96E-04	1.96E-04
		Pig			Swine		0.00E+00	0.00E+00	0.00E+00	4.40E-02	4.40E-02	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat			Goat		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		0.00E+00	0.00E+00	0.00E+00	1.44E-03	1.44E-03	--	0.00E+00	0.00E+00	0.00E+00	6.18E-03	6.18E-03
		Sheep			Sheep		5.00E-03	1.00E-03	1.00E-03	2.00E-03	2.00E-03	--	0.00E+00	0.00E+00	0.00E+00	7.10E-03	7.10E-03
		Sheep Milk			Sheep Milk		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	3.61E-02	3.61E-02
		Horse			Beef		1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04
		Domesticated Turkey			Poultry		0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Wild	Wild Turkey			Poultry		0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Deer			Beef		1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04
		Elk			Beef		1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04
		Rabbit			Beef		1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04
		Prairie Dog			Beef		1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04	--	2.00E-03	2.00E-03	5.00E-06	7.00E-04	7.00E-04
		Badger			Goat		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	(difficult access open space) Ra-226	Th-230	Th-234	U-234	U-238	SE for U-238	PRGs for Progeny - Chil d Bi-210	Bi-214	Pa-234	Pb-210	Pb-214
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	**2.99E-02**	**1.29E-01**	**4.53E-01**	**1.24E-01**	**1.37E-01**	**3.06E-03**	**3.70E+00**	**1.82E+02**	**1.00E+04**	**1.25E-02**	**3.05E+01**
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	--	--	--	4.24E+00	4.68E+00	1.67E-01	--	--	--	--	--
		Chicken Eggs				--	--	--	7.82E-01	8.62E-01	3.07E-02	--	--	--	--	--
		Beef				1.27E-01	5.46E-01	1.92E+00	6.81E-01	7.51E-01	1.51E-02	5.00E+00	2.45E+02	1.35E+04	5.51E-02	1.34E+02
		Milk - Cow				1.27E+01	5.46E+01	1.92E+02	6.81E+01	7.51E+01	1.51E+00	5.00E+02	2.45E+04	1.35E+06	5.51E+00	1.34E+04
		Pig				--	--	--	1.21E+01	1.34E+01	6.37E+00	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	--	--	4.06E+00	4.48E+00	1.07E-01	--	--	--	3.28E-01	7.99E+02
		Sheep				4.39E-02	1.90E-01	6.66E-01	2.36E-01	2.61E-01	5.27E-03	--	--	--	1.91E-02	4.65E+01
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				1.57E+00	6.78E+00	2.38E+01	8.45E+00	9.32E+00	1.88E-01	6.21E+01	3.05E+03	1.68E+05	6.84E-01	1.66E+03
		Domesticated Turkey				--	--	--	2.82E+02	3.11E+02	1.11E+01	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	1.06E+03	1.17E+03	4.15E+01	--	--	--	--	--
		Deer				1.31E+01	5.65E+01	1.98E+02	7.05E+01	7.77E+01	1.57E+00	5.18E+02	2.54E+04	1.40E+06	5.70E+00	1.39E+04
		Elk				1.31E+01	5.65E+01	1.98E+02	7.05E+01	7.77E+01	1.57E+00	5.18E+02	2.54E+04	1.40E+06	5.70E+00	1.39E+04
		Rabbit				1.57E+00	6.78E+00	2.38E+01	8.45E+00	9.32E+00	1.88E-01	6.21E+01	3.05E+03	1.68E+05	6.84E-01	1.66E+03
		Prairie Dog				7.85E-01	3.39E+00	1.19E+01	4.23E+00	4.66E+00	9.40E-02	3.11E+01	1.52E+03	8.41E+04	3.42E-01	8.32E+02
		Badger				--	--	--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	(difficult access open space) Ra-226	Th-230	Th-234	U-234	U-238	SE for U-238	PRGs for Progeny - Chil d Bi-210	Bi-214	Pa-234	Pb-210	Pb-214
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE-Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	**4.97E+03**	**1.48E+05**	**5.19E+05**	**#DIV/0!**	**#DIV/0!**	**3.04E+01**	**1.12E+04**	**5.48E+05**	**2.07E+10**	**1.70E+02**	**4.14E+05**
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{r_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry} + MLF_p)) + (Q_s \times f_p)\right)\right)}$	pCi/g	--	--	--	#DIV/0!	#DIV/0!	--	--	--	--	--	--
		Chicken Eggs				--	--	--	#DIV/0!	#DIV/0!	--	--	--	--	--	--
		Beef				1.54E+05	4.95E+06	1.74E+07	3.63E+06	4.01E+06	2.41E+03	5.07E+05	2.49E+07	7.78E+11	2.49E+04	6.05E+07
		Milk - Cow				7.66E+07	2.54E+10	8.92E+10	8.77E+07	9.67E+07	1.50E+06	7.52E+07	3.69E+09	6.64E+13	8.25E+06	2.01E+10
		Pig				--	--	--	#DIV/0!	#DIV/0!	--	--	--	--	--	--
		Goat				--	--	--	--	--	--	--	--	--	--	--
		Goat Milk				--	--	--	1.04E+05	1.15E+05	1.57E+02	--	--	--	2.75E+02	6.69E+05
		Sheep				2.76E+04	6.00E+05	2.10E+06	3.73E+05	4.11E+05	8.16E+01	--	--	--	1.19E+03	2.89E+06
		Sheep Milk				--	--	--	--	--	--	--	--	--	--	--
		Horse				2.07E+06	6.60E+07	2.32E+08	4.85E+07	5.35E+07	4.07E+04	1.25E+07	6.12E+08	1.44E+13	4.23E+05	1.03E+09
		Domesticated Turkey				--	--	--	#DIV/0!	#DIV/0!	--	--	--	--	--	--
	Wild	Wild Turkey				--	--	--	6.63E+08	7.31E+08	1.71E+06	--	--	--	--	--
		Deer				3.94E+08	1.26E+10	4.42E+10	9.25E+09	1.02E+10	8.02E+06	2.64E+09	1.30E+11	2.87E+15	8.33E+07	2.03E+11
		Elk				1.98E+09	6.32E+10	2.22E+11	4.64E+10	5.12E+10	4.03E+07	1.33E+10	6.52E+11	1.44E+16	4.19E+08	1.02E+12
		Rabbit				3.50E+04	1.13E+06	3.95E+06	8.25E+05	9.10E+05	4.80E+02	8.79E+04	4.31E+06	1.49E+11	4.93E+03	1.20E+07
		Prairie Dog				7.74E+03	2.51E+05	8.80E+05	1.84E+05	2.02E+05	8.49E+01	1.31E+04	6.44E+05	2.49E+10	8.67E+02	2.11E+06
		Badger				--	--	--	--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Inputs	Parameter		Symbol	Description		Units	rium Progeny Radionuclides of U-238					
							Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Dry soil-to plant transfer factor		Bv_{dry}	Activity of the radionuclide in dry plant divided by the activity in dry soil.		pCi/g dry plant per pCi/g dry soil	2.76E-04	1.95E-02	2.41E-03	2.41E-03	7.13E-03	7.13E-03
	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.		Years	138	138	138	138	138	138
	Lamda		λ			1/Year	1.83E+00	4.33E-04	9.19E-06	1.05E+01	2.82E-06	1.55E-10
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium		Unitless	1	1	1	1	1	1
Radionuclide Transfer Factors for Animal Products for Progeny Radionuclides of U-238 in SE, by Animal Type	Domestic	Chicken	TF_m	Mass activity density of the radionuclide in pCi/kg divided by the daily intake in pCi/day based on the surrogate animal listed in column F. Transfer factors for milk products are converted from activity density in pCi/L using the default density of milk.	Poultry	pCi/day per pCi/kg	2.40E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Chicken Eggs			Eggs		3.10E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	1.10E+00
		Beef			Beef		3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04
		Milk - Cow			Milk		2.16E-04	3.91E-04	5.15E-06	5.15E-06	1.85E-03	1.85E-03
		Pig			Swine		0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-02	4.40E-02
		Goat			Goat		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Goat Milk			Goat Milk		2.37E-03	0.00E+00	0.00E+00	0.00E+00	1.44E-03	1.44E-03
		Sheep			Sheep		5.00E-02	5.00E-03	1.00E-03	1.00E-03	2.00E-03	2.00E-03
		Sheep Milk			Sheep Milk		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Horse			Beef		3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04
		Domesticated Turkey			Poultry		2.40E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
	Wild	Wild Turkey			Poultry		2.40E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-01	7.50E-01
		Deer			Beef		3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04
		Elk			Beef		3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04
		Rabbit			Beef		3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04
		Prairie Dog			Beef		3.00E-03	1.70E-03	2.30E-04	2.30E-04	3.90E-04	3.90E-04
		Badger			Goat		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium		Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	lah wiih leezh (washes and drainages)					
						Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE - Direct Consumption of Animal Products, by Type	Total Animal Products PRG for Animal Product		$PRG_{a\text{-}ing\text{-}animal}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing-animal} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing-animal}(i)}}$	pCi/g	5.32E-03	2.99E-02	1.29E-01	4.53E-01	1.24E-01	1.37E-01
	Domestic	Chicken	$PRG_{a\text{-}ing\text{-}animal}(i)$	The preliminary remediation goals for each type of animal product consumption. $PRG_{a-ing-animal}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{animal})}$	pCi/g	1.80E-01	--	--	--	4.24E+00	4.68E+00
		Chicken Eggs				3.32E-02	--	--	--	7.82E-01	8.62E-01
		Beef				2.89E-02	1.27E-01	5.46E-01	1.92E+00	6.81E-01	7.51E-01
		Milk - Cow				2.89E+00	1.27E+01	5.46E+01	1.92E+02	6.81E+01	7.51E+01
		Pig				--	--	--	--	1.21E+01	1.34E+01
		Goat				--	--	--	--	--	--
		Goat Milk				1.72E-01	--	--	--	4.06E+00	4.48E+00
		Sheep				1.00E-02	4.39E-02	1.90E-01	6.66E-01	2.36E-01	2.61E-01
		Sheep Milk				--	--	--	--	--	--
		Horse				3.59E-01	1.57E+00	6.78E+00	2.38E+01	8.45E+00	9.32E+00
		Domesticated Turkey				1.20E+01	--	--	--	2.82E+02	3.11E+02
	Wild	Wild Turkey				4.49E+01	--	--	--	1.06E+03	1.17E+03
		Deer				2.99E+00	1.31E+01	5.65E+01	1.98E+02	7.05E+01	7.77E+01
		Elk				2.99E+00	1.31E+01	5.65E+01	1.98E+02	7.05E+01	7.77E+01
		Rabbit				3.59E-01	1.57E+00	6.78E+00	2.38E+01	8.45E+00	9.32E+00
		Prairie Dog				1.79E-01	7.85E-01	3.39E+00	1.19E+01	4.23E+00	4.66E+00
		Badger				--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	lah wiih leezh (washes and drainages)					
						Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Radionuclides of U-238 in SE-Consumption of Animal Products, Back-Calculated to Soil, by Type	Total Animal Products PRG for Soil		$PRG_{a\text{-}ing}$	The preliminary remediation goals for all animal product consumption. $PRG_{a-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{a-ing}(i)}}$	pCi/g	#DIV/0!	5.68E+02	1.75E+04	6.15E+04	#DIV/0!	#DIV/0!
	Domestic	Chicken	$PRG_{a\text{-}ing}(i)$	The preliminary remediation goals for each type of animal product consumption. For meat: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(TF_f \times \left((Q_p \times f_p \times f_s \times (Bv_{dry}+MLF_p))+(Q_s \times f_p)\right)\right)}$ For milk: $PRG_{a-ing}(i) = \frac{PRG_{a-ing-animal}(i)}{\left(\frac{TF_f}{P_{milk}} \times \left((Q_p \times f_p \times f_s \times (Bv_{dry}+MLF_p))+(Q_s \times f_p)\right)\right)}$	pCi/g	#DIV/0!	--	--	--	#DIV/0!	#DIV/0!
		Chicken Eggs				#DIV/0!	--	--	--	#DIV/0!	#DIV/0!
		Beef				3.08E+03	2.33E+04	7.59E+05	2.66E+06	5.55E+05	6.12E+05
		Milk - Cow				4.00E+06	9.35E+06	3.17E+09	1.11E+10	1.09E+07	1.20E+07
		Pig				--	--	--	--	#DIV/0!	#DIV/0!
		Goat				--	--	--	--	--	--
		Goat Milk				3.83E+02	--	--	--	1.47E+04	1.62E+04
		Sheep				9.01E+01	3.84E+03	8.49E+04	2.98E+05	5.25E+04	5.79E+04
		Sheep Milk				--	--	--	--	--	--
		Horse				5.18E+04	3.99E+05	1.28E+07	4.49E+07	9.39E+06	1.04E+07
		Domesticated Turkey				#DIV/0!	--	--	--	#DIV/0!	#DIV/0!
	Wild	Wild Turkey				1.76E+06	--	--	--	1.33E+08	1.46E+08
		Deer				1.02E+07	7.87E+07	2.51E+09	8.83E+09	1.85E+09	2.04E+09
		Elk				5.12E+07	3.96E+08	1.26E+10	4.43E+10	9.28E+09	1.02E+10
		Rabbit				6.15E+02	4.61E+03	1.51E+05	5.31E+05	1.10E+05	1.22E+05
		Prairie Dog				1.09E+02	8.07E+02	2.68E+04	9.40E+04	1.95E+04	2.15E+04
		Badger				--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

9. Animal Consumption

Parameter	Decay Constant	Half-life	Dry Soil-to-plant transfer factor	Poultry Transfer Factor	Egg Transfer Factor	Beef Transfer Factor	Milk Transfer Factor	Swine Transfer Factor	Goat Transfer Factor	Goat Milk Transfer Factor	Sheep Transfer Factor	Sheep Milk Transfer Factor
Symbol	λ			Poultry	Eggs	Beef	Milk	Swine	Goat	Goat Milk	Sheep	Sheep Milk
Units	1/year	years	pCi/g-fresh plant per pCi/g-dry soil	pCi/day per pCi/kg	pCi/day per pCi/kg	pCi/day per pCi/kg	pCi/day per pCi/kg	pCi/day per pCi/kg	pCi/day per pCi/kg	pCi/day per pCi/kg	pCi/day per pCi/kg	pCi/day per pCi/kg
Isotope												
Ac-228	9.87E+02	7.02E-04	1.00E-01	0.00E+00	0.00E+00	2.00E-05	2.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
At-218	1.46E+07	4.76E-08	9.00E-01	0.00E+00	0.00E+00	1.00E-02	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bi-210	5.05E+01	1.37E-02	5.00E-01	0.00E+00	0.00E+00	2.00E-03	1.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bi-212	6.02E+03	1.15E-04	5.00E-01	0.00E+00	0.00E+00	2.00E-03	1.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bi-214	1.83E+04	3.79E-05	5.00E-01	0.00E+00	0.00E+00	2.00E-03	1.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hg-206	4.47E+04	1.55E-05	1.00E+00	3.00E-02	0.00E+00	1.00E-02	5.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
K-40	5.54E-10	1.25E+09	8.51E-01	1.00E-01	1.00E+00	2.00E-02	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pa-234	9.06E+02	7.65E-04	1.00E-01	0.00E+00	0.00E+00	5.00E-06	5.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pa-234m	3.11E+05	2.23E-06	1.00E-01	0.00E+00	0.00E+00	5.00E-06	5.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pb-210	3.12E-02	2.22E+01	1.26E-02	0.00E+00	0.00E+00	7.00E-04	1.90E-04	0.00E+00	0.00E+00	6.00E-03	7.10E-03	3.50E-02
Pb-212	5.71E+02	1.21E-03	1.26E-02	0.00E+00	0.00E+00	7.00E-04	1.90E-04	0.00E+00	0.00E+00	6.00E-03	7.10E-03	3.50E-02
Pb-214	1.36E+04	5.10E-05	1.26E-02	0.00E+00	0.00E+00	7.00E-04	1.90E-04	0.00E+00	0.00E+00	6.00E-03	7.10E-03	3.50E-02
Po-210	1.83E+00	3.79E-01	2.76E-04	2.40E+00	3.10E+00	3.00E-03	2.10E-04	0.00E+00	0.00E+00	2.30E-03	5.00E-02	0.00E+00
Po-212	7.31E+13	9.48E-15	2.76E-04	2.40E+00	3.10E+00	3.00E-03	2.10E-04	0.00E+00	0.00E+00	2.30E-03	5.00E-02	0.00E+00
Po-214	1.33E+11	5.21E-12	2.76E-04	2.40E+00	3.10E+00	3.00E-03	2.10E-04	0.00E+00	0.00E+00	2.30E-03	5.00E-02	0.00E+00
Po-216	1.51E+08	4.60E-09	2.76E-04	2.40E+00	3.10E+00	3.00E-03	2.10E-04	0.00E+00	0.00E+00	2.30E-03	5.00E-02	0.00E+00
Po-218	1.17E+05	5.90E-06	2.76E-04	2.40E+00	3.10E+00	3.00E-03	2.10E-04	0.00E+00	0.00E+00	2.30E-03	5.00E-02	0.00E+00
Ra-224	6.91E+01	1.00E-02	1.95E-02	0.00E+00	0.00E+00	1.70E-03	3.80E-04	0.00E+00	0.00E+00	0.00E+00	5.00E-03	0.00E+00
Ra-226	4.33E-04	1.60E+03	1.95E-02	0.00E+00	0.00E+00	1.70E-03	3.80E-04	0.00E+00	0.00E+00	0.00E+00	5.00E-03	0.00E+00
Ra-228	1.21E-01	5.75E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-03	3.80E-04	0.00E+00	0.00E+00	0.00E+00	5.00E-03	0.00E+00
Rn-218	6.24E+08	1.11E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn-220	3.93E+05	1.76E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn-222	6.62E+01	1.05E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Th-228	3.63E-01	1.91E+00	2.41E-03	0.00E+00	0.00E+00	2.30E-04	5.00E-06	0.00E+00	0.00E+00	0.00E+00	1.00E-03	0.00E+00
Th-230	9.19E-06	7.54E+04	2.41E-03	0.00E+00	0.00E+00	2.30E-04	5.00E-06	0.00E+00	0.00E+00	0.00E+00	1.00E-03	0.00E+00
Th-232	4.93E-11	1.41E+10	2.41E-03	0.00E+00	0.00E+00	2.30E-04	5.00E-06	0.00E+00	0.00E+00	0.00E+00	1.00E-03	0.00E+00
Th-234	1.05E+01	6.60E-02	2.41E-03	0.00E+00	0.00E+00	2.30E-04	5.00E-06	0.00E+00	0.00E+00	0.00E+00	1.00E-03	0.00E+00
Tl-206	8.67E+04	7.99E-06	8.00E-03	0.00E+00	0.00E+00	4.00E-02	2.00E-03	0.00E+00	0.00E+00	0.00E+00	4.00E-01	0.00E+00
Tl-208	1.19E+05	5.81E-06	8.00E-03	0.00E+00	0.00E+00	4.00E-02	2.00E-03	0.00E+00	0.00E+00	0.00E+00	4.00E-01	0.00E+00
Tl-210	2.80E+05	2.47E-06	8.00E-03	0.00E+00	0.00E+00	4.00E-02	2.00E-03	0.00E+00	0.00E+00	0.00E+00	4.00E-01	0.00E+00
U-234	2.82E-06	2.46E+05	7.13E-03	7.50E-01	1.10E+00	3.90E-04	1.80E-03	4.40E-02	0.00E+00	1.40E-03	2.00E-03	0.00E+00
U-238	1.55E-10	4.47E+09	7.13E-03	7.50E-01	1.10E+00	3.90E-04	1.80E-03	4.40E-02	0.00E+00	1.40E-03	2.00E-03	0.00E+00

Notes:

Values reported as zero in the table are generally reported as either zero or "-" from the online EPA PRG calculator. The EPA PRG calculator does not provide PRGs in these cases, so the zeros are used here to indicate that no PRG will be calculated.

Transfer factors for wild animals use surrogates from the domestic animals, as follows:

Chicken, chicken eggs, domestic turkey and wild turkey transfer factors are based on the poultry transfer factors.

Deer, elk, rabbit, prairie dog transfer factors are based on the domestic beef transfer factors based on similar herbivorous diets.

Badger transfer factors are based on the domestic goat transfer factor based on the goat being more omniverous than most other domestic animals.

Source:

USEPA. 2020. Preliminary Remediation Goals for Radionuclides (PRG) Calculator. Downloaded November 2.

Parameter	Poultry Transfer Factor	Egg Transfer Factor	Beef Transfer Factor	Milk Transfer Factor	Swine Transfer Factor
Symbol	Poultry	Eggs	Beef	Milk	Swine
Units	days/kg	days/kg	days/kg	days/kg	days/kg
Metal					
Aluminum	--	--	1.50E-03	2.00E-04	--
Antimony	--	--	1.00E-03	1.00E-04	--
Arsenic	--	--	2.00E-03	6.00E-05	--
Barium	--	--	1.50E-04	3.50E-04	--
Beryllium	--	--	1.00E-03	9.00E-07	--
Cadmium	1.06E-01	2.50E-03	1.20E-04	6.50E-06	1.91E-04
Chromium	--	--	5.50E-03	1.50E-03	--
Cobalt	--	--	2.00E-02	2.00E-03	--
Copper	--	--	1.00E-02	1.50E-03	--
Iron	--	--	2.00E-02	2.50E-04	--
Manganese	--	--	4.00E-04	3.50E-04	--
Mercury	2.39E-02	2.39E-02	5.22E-03	2.26E-03	3.39E-05
Molybdenum	--	--	6.00E-03	1.50E-03	--
Nickel	--	--	6.00E-03	1.00E-03	--
Selenium	1.13E+00	1.13E+00	2.27E-03	5.86E-03	1.88E-01
Silver	--	--	3.00E-03	2.00E-02	--
Thallium	--	--	4.00E-02	2.00E-03	--
Uranium	--	--	2.00E-04	6.00E-04	--
Vanadium	--	--	2.50E-03	2.00E-05	--
Zinc	8.75E-03	8.75E-03	9.00E-05	3.25E-05	1.28E-04

Attachment A - NAUM Calculation Tool
9. Animal Consumption

Notes:
Transfer factors from USEPA 2005 were used when available; when a transfer factor was not available in that source, a transfer factor from Baes 1984 was used (if available).
When neither source had a transfer factor, no value was entered.

Sources:

Baes, C.F., R.D. Sharp, A.L Sjoreen, and R.W Shor. 1984. "A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture." Oak Ridge, TN: Oak Ridge National Laboratory. ORNL, 5786.

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Animal	Home Range in Source Document	Source Document	Home Range in Acres	Comments
Chicken (and Chicken Eggs)	250 ft^2	Manion et al. 2021	0.00574	
Beef and Milk - Cow	3 acres	NRCS 2009	3	Source document gives a range of 1.5 to 2 acres per animal, professional judgment used to adust upward to 3 acres based on arid conditions in the area.
Pig	0.25 acres for 3 pigs	FFL 2021	0.0833	Calculated individual animal minimum to be conservative.
Goat and Milk - Goat	0.5 acres for 2 goats	OSP 2020b	0.25	Calculated individual animal minimum to be conservative.
Sheep and Milk - Sheep	0.5 acres for 2 sheep	CAS 2019	0.25	Calculated individual animal minimum to be conservative.
Horse	30 to 38 acres	USDA NCEF 2019	30	Minimum used to be conservative.
Domesticated Turkey	50 ft^2	OSP 2020a	0.0011	
Wild Turkey	5 to 30 mi^2	AGFD 2021c	3,200	Converted from minimum to be conservative).
Deer	4 mi^2	AGFD 2021b, 2021d	2,560	White-Tailed Deer range used to be conservative.
Elk	20 to 30 mi^2	AGFD 2021a	12,850	Minimum used to be conservative.
Rabbit	1 to 15 acres	DesertUSA 2021	1	Minimum used to be conservative.
Prairie Dog	0.37 to 4.7 acres	UDWR 2007	0.37	Minimum used to be conservative.
Badger	667 to 2,100 acres	USDA 2021	667	Minimum used to be conservative.

Sources:

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AGFD. 2021b. Mule Deer. Undated. https://www.azgfd.com/hunting/species/biggame/muledeer/

AGFD. 2021c. Turkey. Undated. https://www.azgfd.com/hunting/species/biggame/turkey/

AGFD. 2021d. White-Tailed Deer. Undated. https://www.azgfd.com/hunting/species/biggame/whitetaildeer/

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Manion, B., and R.T. Ludlow. 2021. "How to Determine Your Chicken Flock Size and Space Needs." Accessed 11/11/2021. https://www.dummies.com/home-garden/hobby-farming/raising-chickens/how-to-determine-your-flock-size-and-space-requirements/

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Open Sanctuary Project (OSP). 2020a. "Creating A Good Home For Turkeys." August 6. https://opensanctuary.org/article/building-a-good-home-for-turkeys/

OSP. 2020b. "Creating A Good Home For Goats." October 20. https://opensanctuary.org/article/building-a-good-home-for-your-goats/

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Utah Division of Wildlife Resources (UDWR). 2007. Gunnison's Prairie Dog and White-Tailed Prairie Dog Conservation Plan. Final Draft. November. https://wildlife.utah.gov/pdf/prairie_dog_plan.pdf

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

ODL Plant Consumption Exposure Pathway

Selection =	Arsenic	Type = Metal	Concentration =	1	mg/kg

Cleanup Target and Risks [1,6]				User-Specified Scenario	Navajo Nation Reference Scenarios				
Outputs	**Parameter**	**Description**	**Units**	**Custom**	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bí łíí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**
Cleanup Targets	Metal Cancer $PRG_{ODL\text{-}ing}$	Preliminary Remediation Goal based on the cancer toxicity for selected metal	mg/kg	9.36	9.36	9.36	9.56	9.56	11.6
	Metal Noncancer $PRG_{ODL\text{-}ing}$ [2, 3]	Preliminary Remediation Goal based on the noncancer roxicity for selected metal	mg/kg	38.8	38.8	38.8	39.6	39.6	48.2
	Final Metal $PRG_{ODL\text{-}ing}$ [4, 5]	Preliminary Remediation Goal for the selected metal	mg/kg	9.36	9.36	9.36	9.56	9.56	11.6
Risks and Hazards	Cancer Risk - Metals	Lifetime cancer risk for the selected metal	-	1.1E-05	1.1E-05	1.1E-05	1.0E-05	1.0E-05	8.6E-06
	Noncancer Hazard - Metals	Noncancer hazard for the selected metal	-	2.6E-02	2.6E-02	2.6E-02	2.5E-02	2.5E-02	2.1E-02

Inputs	**Parameter**		**Symbol**	**Description**	**Units**	**User-Specified Scenario**	**Navajo Nation Reference Scenarios**				
						Custom	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bí łíí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**
Local Consumption Fraction	Local Consumption Fraction of Produce		$CF_{produce\text{-}a}$	Contaminated Fraction - the average percentage of plants eaten that are grown locally (e.g., from a nearby field or wild collection area vs. from the supermarket or a local community market). Child set equal to adult.	Percent	100%	100%	100%	100%	100%	100%
			$CF_{produce\text{-}c}$			100%	100%	100%	100%	100%	100%
Ingestion Rate by Plant Type - Adult	Herbs and Medicinal	Navajo Tea	IR_a	The amount of plant used by adult receptors using a measure in flour bags. Each flour bag is equivalent to 15 cups of plant material. Source for defaults: NNEPA 2021. Consumption assumed to be zero for corn pollen and other corn in open space areas based on steepness of terrain. Consumption assume to be zero for soaptree yucca in washes and drainages based on...	flour bags/year	1.00	1.00	1.00	1.00	1.00	1.00
		Sumac (skunkbush and other)				1.00	1.00	1.00	1.00	1.00	1.00
		Soaptree Yucca				1.00	1.00	1.00	1.00	1.00	--
		Sagebrush				2.00	2.00	2.00	2.00	2.00	2.00
		Corn Pollen and Other Corn				3.00	3.00	3.00	--	--	3.00
		Other Plant Types				1.00	1.00	1.00	1.00	1.00	1.00
Ingestion Rate by Plant Type - Child	Herbs and Medicinal	Navajo Tea	IR_c	The amount of plant used by child receptors using a measure in flour bags. Each flour bag is equivalent to 15 cups of plant material. Source for defaults: NNEPA 2021.	flour bags/year	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--
Plant Material Density	Herbs and Medicinal	Navajo Tea	-	The density of each plant. Source: NNEPA 2021.	grams/cup	24					
		Sumac (skunkbush and other)				150					
		Soaptree Yucca				150					
		Sagebrush				150					
		Corn Pollen and Other Corn				150					
		Other Plant Types				150					
Conversion Factors	Volume conversion factor		-	Source: NNEPA 2021.	cups/flour bag	15					
	Volume conversion factor 1 for Navajo Tea		-	Source: NNEPA 2021.	bundles/cup	4					
	Volume conversion factor 2 for Navajo Tea		-	Source: NNEPA 2021.	grams/bundle	6					
Ingestion Rate by Plant Type - Adult	Herbs and Medicinal	Navajo Tea	IR_a	The amount of fresh plant used by adult receptors.	g dry plant/day	1.0	1.0	1.0	1.0	1.0	1.0
		Sumac (skunkbush and other)				6.4	6.4	6.4	6.4	6.4	6.4
		Soaptree Yucca				6.4	6.4	6.4	6.4	6.4	0.0
		Sagebrush				12.9	12.9	12.9	12.9	12.9	12.9
		Corn Pollen and Other Corn				19.3	19.3	19.3	0.0	0.0	19.3
		Other Plant Types				6.4	6.4	6.4	6.4	6.4	6.4
Ingestion Rate by Plant Type - Child	Herbs and Medicinal	Navajo Tea	IR_c	The amount of fresh plant used by child receptors. Source: NNEPA 2021.	g dry plant/day	0.0	0.0	0.0	0.0	0.0	0.0
		Sumac (skunkbush and other)				0.0	0.0	0.0	0.0	0.0	0.0
		Soaptree Yucca				0.0	0.0	0.0	0.0	0.0	0.0
		Sagebrush				0.0	0.0	0.0	0.0	0.0	0.0
		Corn Pollen and Other Corn				0.0	0.0	0.0	0.0	0.0	0.0
		Other Plant Types				0.0	0.0	0.0	0.0	0.0	0.0

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Plant Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant transfer factors for specific produce types	Sunflower Leaf	pCi/g-fresh plant per pCi/g-dry soil	--					
		Sumac (skunkbush and other)			Shrub		--					
		Soaptree Yucca			Woody Tree		--					
		Sagebrush			Sunflower Leaf		--					
		Corn Pollen and Other Corn			Maize Stems and Shoots		--					
		Other Plant Types			Sunflower Leaf		--					
Mass Loading Factors for Radionuclides and Metals	Herbs and Medicinal	Navajo Tea	$MLF_{produce}$	Mass loading factors for specific produce types. Sources: Hinton 1992 or Pinder & McLeod 1989).	Sagebrush	g-dry soil per g-fresh plant	2.40E-02					
		Sumac (skunkbush and other)			Sagebrush		2.40E-02					
		Soaptree Yucca			Sagebrush		2.40E-02					
		Sagebrush			Sagebrush		2.40E-02					
		Corn Pollen and Other Corn			Corn		1.70E-03					
		Other Plant Types			Sagebrush		2.40E-02					
Mass Loading Factors for Radionuclides and Metals	Herbs and Medicinal	Navajo Tea	$MLF_{produce}$	Mass loading factors for specific produce types (calculated).	Sagebrush	g-dry soil per g-fresh plant	2.16E-02					
		Sumac (skunkbush and other)			Sagebrush		1.20E-02					
		Soaptree Yucca			Sagebrush		1.56E-02					
		Sagebrush			Sagebrush		1.56E-02					
		Corn Pollen and Other Corn			Corn		1.45E-04					
		Other Plant Types			Sagebrush		1.56E-02					
Conversion Factor for Dry Weight Transfer Factors to Wet Weight for Metals	Herbs and Medicinal	Navajo Tea	$MC_{produce}$	Fresh-to-dry conversion factor. Sources: USU Extension 2001 or EPA 1996.		kg dry plant/kg fresh plant	0.9					
		Sumac (skunkbush and other)					0.5					
		Soaptree Yucca					0.65					
		Sagebrush					0.65					
		Corn Pollen and Other Corn					0.085					
		Other Plant Types					0.65					
Common Exposure Parameters	Exposure Duration - Adult		ED_a	Total years onsite		years	69	69	69	69	69	69
	Exposure Duration - Child		ED_c				6	6	6	6	6	6
	Averaging Time - Cancer		AT_c	Lifetime in days.		days	27,375	27,375	27,375	27,375	27,375	27,375
	Averaging Time - Noncancer - Adult		$AT_{nc,a}$	Exposure duration x 365 days/year		days	25,185	25,185	25,185	25,185	25,185	25,185
	Averaging Time - Noncancer - Child		$AT_{nc,c}$				2,190	2,190	2,190	2,190	2,190	2,190
	Consumption Exposure Frequency - Adult		CEF_a	Number of days per year the receptor consumes plant products collected onsite.		days/year	350	350	350	350	350	350
	Consumption Exposure Frequency - Child		CEF_c				350	350	350	350	350	350
	Body Weight - Adult		BW_a	Average body weight		kg	80	80	80	80	80	80
	Body Weight - Child		BW_c				15	15	15	15	15	15
Risk and Toxicity	Target Risk		TR	The selected target cancer risk.		-	1E-04					
	Target Hazard Quotient		THQ	The selected target noncancer hazard quotient.		-	1					
	Oral Slope Factor - Food		SF_f	The isotope-specific cancer toxicity value for food ingestion pathway.		risk/pCi	--					
				The metal-specific cancer toxicity value for ingestion pathways.		$(mg/kg\text{-}day)^{-1}$	1.50E+00					
	Oral Reference Dose		RfD	The metal-specific non-cancer toxicity value for ingestion pathways.		(mg/kg-day)	3.00E-04					
	Conversion Factor 6		CF6	Convert kilograms to grams		kg/g	1.00E-03					
	Conversion Factor 7		CF7	Convert pCi to Bq		pCi/Bq	27.027					
Age-Adjusted Ingestion Rate for Metals	Herbs and Medicinal	Navajo Tea	$IRF_{p,adj}$	Age-adjusted ingestion rate for metals in plants. $IRF_{p,adj} = \left(EF_c \times ED_c \times \frac{IR_c}{BW_c}\right) + \left(EF_a \times ED_a \times \frac{IR_a}{BW_a}\right)$		g-dry weight of plant per kg-body weight	311	311	311	311	311	311
		Sumac (skunkbush and other)					1,941	1,941	1,941	1,941	1,941	1,941
		Soaptree Yucca					1,941	1,941	1,941	1,941	1,941	--
		Sagebrush					3,881	3,881	3,881	3,881	3,881	3,881
		Corn Pollen and Other Corn					5,822	5,822	5,822	--	--	5,822
		Other Plant Types					1,941	1,941	1,941	1,941	1,941	1,941
Age-Adjusted Ingestion Rate for Radionuclides	Herbs and Medicinal	Navajo Tea	IF_{adj}	Age-adjusted ingestion fractions for radionuclides in plants. $IF_{adj} = (EF_c \times ED_c \times IR_c) + (EF_a \times ED_a \times IR_a)$		grams	24,840	24,840	24,840	24,840	24,840	24,840
		Sumac (skunkbush and other)					155,250	155,250	155,250	155,250	155,250	155,250
		Soaptree Yucca					155,250	155,250	155,250	155,250	155,250	--
		Sagebrush					310,500	310,500	310,500	310,500	310,500	310,500
		Corn Pollen and Other Corn					465,750	465,750	465,750	--	--	465,750
		Other Plant Types					155,250	155,250	155,250	155,250	155,250	155,250

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Notes:

1	The PRGs are calculated for the six scenarios in the tables below the notes (rows 134 through 295), and are looked up in rows 6 through 9 for the selected metal or radionuclide.
2	Pathway-specific radionuclide PRG for ingestion of plants grown in onsite soil.
3	The noncancer PRG is the lower of the child and adult noncancer hazard PRG.
4	Pathway-specific metal PRG for ingestion of plants grown in onsite soil.
5	The final metal PRG is the lower of the cancer risk PRG and the noncancer hazard PRG.
6	The risk and hazards are back-calculated using the selected TR or THQ, the appropriate PRG, and the concentration.
	Note that for radionuclides, only 4 can be selected for summary-level input: Ra-226 in SE, U-238 in SE, Th-232 in SE, and K-40, but detailed calculations are shown for 5 other individual radionuclides.
g/day	Grams per day
g/mg	Grams per milligram
kg	Kilogram
kg/g	Kilogram per gram
mg/day	Milligrams per day
mg/kg	Milligrams per kilogram
mg/kg-day	Milligrams per kilogram per day
ODL	Other Diné Bee'ooliil or Navajo Fundamental Law-based exposure pathways not included in plant or animal consumption pathways, which reflect TEK as referred to by USEPA.
pCi	Picocuries
pCi/g	Picocuries per gram

Equations:

$$PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{soil,produce}(i)}}$$

$$Risk = \sum_{i=1}^{n} Risk(i)$$

References for the above section:

NNEPA Superfund Program (NNEPA). 2021. Letter Regarding Navajo Specific Input Parameters—All Other Scenarios. From Dariel Yazzie, Environmental Assistant Director, Navajo Superfund Division. To Sona Chillingaryan, Manager, Tribal Lands Cleanup Section, Superfund Division, U.S. Environmental Protection Agency (USEPA) Region 9, and Sean Hogan, Manager, Tribal Lands Cleanup Section, Superfund Division, USEPA Region 9. September 15.

Formatting guide:		
Type of Worksheet Cell	**Category 1**	**Category 2**
User-editable inputs	**Inputs that can be changed, but only on the current worksheet. Most inputs have limits on the minimum and maximum values.**	**Inputs that can be changed, appear on the current worksheet AND other worksheets, and can be changed on any worksheet they appear on. These will update automatically if changed on any worksheet.**
Non-editable inputs	Inputs that are not receptor-specific. Some are entered on a different worksheet, others are calculated from editable inputs on this worksheet or another worksheet.	Receptor-specific inputs which cannot be edited by the user. Different shades of orange indicate the custom scenario (lightest), Navajo scenarios (lighter) and the USEPA default scenario (darker).
Input headers	In the input receptor column headers, different shades of green in indicate the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	In the input header rows and non-receptor column headers (such as this table), the medium shade indicates summary-level headers, and lightest shade indicates more detailed header information.
Outputs	Different shades of blue indicate outputs for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.
Output headers	Different shades of yellow indicate output headers for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	1.50E+00	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-03	2.87E-02	5.70E-03	2.90E-02	2.32E-03	1.13E-01	4.39E-03	1.80E-02	3.60E-01
		Sumac (skunkbush and other)	Br_{ag}			2.00E-03	1.60E-02	3.17E-03	1.61E-02	1.29E-03	6.25E-02	2.44E-03	1.00E-02	2.00E-01
		Soaptree Yucca	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01
		Sagebrush	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01
		Corn Pollen and Other Corn	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02
		Other Plant Types	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Custom								
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	**9.36E+00**	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	2.15E+02	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	6.20E+01	--	--	--	--	--	--
		Soaptree Yucca				--	--	4.77E+01	--	--	--	--	--	--
		Sagebrush				--	--	2.39E+01	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	4.59E+02	--	--	--	--	--	--
		Other Plant Types				--	--	4.77E+01	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Custom								
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	--	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Custom								
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**1.41E+05**	**2.73E+01**	**3.88E+01**	**1.36E+04**	**2.97E+02**	**2.52E+00**	**2.04E+05**	**2.63E+01**	**3.51E+02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	3.22E+06	6.45E+02	8.91E+02	3.21E+05	6.78E+03	6.05E+01	4.68E+06	6.14E+02	8.50E+03
		Sumac (skunkbush and other)				9.27E+05	1.86E+02	2.57E+02	9.24E+04	1.95E+03	1.74E+01	1.35E+06	1.77E+02	2.45E+03
		Soaptree Yucca				7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03
		Sagebrush				3.57E+05	7.14E+01	9.87E+01	3.55E+04	7.51E+02	6.70E+00	5.19E+05	6.81E+01	9.42E+02
		Corn Pollen and Other Corn				8.93E+06	6.06E+02	1.90E+03	3.00E+05	2.38E+04	4.02E+01	1.16E+07	7.04E+02	5.07E+03
		Other Plant Types				7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03

Outputs	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Custom								
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**1.41E+05**	**2.73E+01**	**3.88E+01**	**1.36E+04**	**2.97E+02**	**2.52E+00**	**2.04E+05**	**2.63E+01**	**3.51E+02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	3.22E+06	6.45E+02	8.91E+02	3.21E+05	6.78E+03	6.05E+01	4.68E+06	6.14E+02	8.50E+03
		Sumac (skunkbush and other)				9.27E+05	1.86E+02	2.57E+02	9.24E+04	1.95E+03	1.74E+01	1.35E+06	1.77E+02	2.45E+03
		Soaptree Yucca				7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03
		Sagebrush				3.57E+05	7.14E+01	9.87E+01	3.55E+04	7.51E+02	6.70E+00	5.19E+05	6.81E+01	9.42E+02
		Corn Pollen and Other Corn				8.93E+06	6.06E+02	1.90E+03	3.00E+05	2.38E+04	4.02E+01	1.16E+07	7.04E+02	5.07E+03
		Other Plant Types				7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	7.00E-01	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.00E-03	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-03	2.25E-01	1.31E-02	2.25E-01	8.38E-03	1.76E-02	1.24E-01	7.72E-04
		Sumac (skunkbush and other)	Br_{ag}			2.00E-03	1.25E-01	7.25E-03	1.25E-01	4.66E-03	9.75E-03	6.90E-02	4.29E-04
		Soaptree Yucca	Br_{ag}			2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04
		Sagebrush	Br_{ag}			2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04
		Corn Pollen and Other Corn	Br_{ag}			3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05
		Other Plant Types	Br_{ag}			2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04

Outputs	Parameter		Symbol	Description	Units	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**9.84E+04**	**3.27E+02**	**3.02E+01**	**6.81E+01**	**2.34E+03**	**4.43E+02**	**1.16E+02**	**1.60E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	2.25E+06	7.89E+03	7.02E+02	1.64E+03	5.41E+04	1.04E+04	2.78E+03	3.63E+01
		Sumac (skunkbush and other)				6.49E+05	2.27E+03	2.02E+02	4.74E+02	1.56E+04	2.98E+03	8.01E+02	1.04E+01
		Soaptree Yucca				4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00
		Sagebrush				2.50E+05	8.74E+02	7.78E+01	1.82E+02	5.99E+03	1.15E+03	3.08E+02	4.02E+00
		Corn Pollen and Other Corn				6.25E+06	4.85E+03	9.42E+02	1.01E+03	9.24E+04	1.20E+04	1.82E+03	1.99E+02
		Other Plant Types				4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00

Outputs	Parameter		Symbol	Description	Units	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**9.84E+04**	**3.27E+02**	**3.02E+01**	**6.81E+01**	**2.34E+03**	**4.43E+02**	**1.16E+02**	**1.60E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	2.25E+06	7.89E+03	7.02E+02	1.64E+03	5.41E+04	1.04E+04	2.78E+03	3.63E+01
		Sumac (skunkbush and other)				6.49E+05	2.27E+03	2.02E+02	4.74E+02	1.56E+04	2.98E+03	8.01E+02	1.04E+01
		Soaptree Yucca				4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00
		Sagebrush				2.50E+05	8.74E+02	7.78E+01	1.82E+02	5.99E+03	1.15E+03	3.08E+02	4.02E+00
		Corn Pollen and Other Corn				6.25E+06	4.85E+03	9.42E+02	1.01E+03	9.24E+04	1.20E+04	1.82E+03	1.99E+02
		Other Plant Types				4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	1.50E+00	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.00E-04	5.00E-03	3.00E-01	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	8.50E-03	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	7.65E-03	4.95E-03	8.73E-02	3.60E-03	2.87E-02	5.70E-03	2.90E-02	2.32E-03	1.13E-01
		Sumac (skunkbush and other)	Br_{ag}			4.25E-03	2.75E-03	4.85E-02	2.00E-03	1.60E-02	3.17E-03	1.61E-02	1.29E-03	6.25E-02
		Soaptree Yucca	Br_{ag}			5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02
		Sagebrush	Br_{ag}			5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02
		Corn Pollen and Other Corn	Br_{ag}			7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02
		Other Plant Types	Br_{ag}			5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Kee'da'whíí tééh (full-time Navajo residential)								
						Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	**9.36E+00**	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	2.15E+02	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	6.20E+01	--	--	--
		Soaptree Yucca				--	--	--	--	--	4.77E+01	--	--	--
		Sagebrush				--	--	--	--	--	2.39E+01	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	4.59E+02	--	--	--
		Other Plant Types				--	--	--	--	--	4.77E+01	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Kee'da'whíí tééh (full-time Navajo residential								
						Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	--	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kee'da'whíí tééh (full-time Navajo residential								
						Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**2.40E+01**	**6.65E+02**	**9.32E+03**	**1.41E+05**	**2.73E+01**	**3.88E+01**	**1.36E+04**	**2.97E+02**	**2.52E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	5.55E+02	1.53E+04	2.23E+05	3.22E+06	6.45E+02	8.91E+02	3.21E+05	6.78E+03	6.05E+01
		Sumac (skunkbush and other)				1.60E+02	4.40E+03	6.44E+04	9.27E+05	1.86E+02	2.57E+02	9.24E+04	1.95E+03	1.74E+01
		Soaptree Yucca				1.23E+02	3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01
		Sagebrush				6.14E+01	1.69E+03	2.48E+04	3.57E+05	7.14E+01	9.87E+01	3.55E+04	7.51E+02	6.70E+00
		Corn Pollen and Other Corn				9.98E+02	3.53E+04	1.55E+05	8.93E+06	6.06E+02	1.90E+03	3.00E+05	2.38E+04	4.02E+01
		Other Plant Types				1.23E+02	3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01

Outputs	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Kee'da'whíí tééh (full-time Navajo residential)								
						Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**2.40E+01**	**6.65E+02**	**9.32E+03**	**1.41E+05**	**2.73E+01**	**3.88E+01**	**1.36E+04**	**2.97E+02**	**2.52E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	5.55E+02	1.53E+04	2.23E+05	3.22E+06	6.45E+02	8.91E+02	3.21E+05	6.78E+03	6.05E+01
		Sumac (skunkbush and other)				1.60E+02	4.40E+03	6.44E+04	9.27E+05	1.86E+02	2.57E+02	9.24E+04	1.95E+03	1.74E+01
		Soaptree Yucca				1.23E+02	3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01
		Sagebrush				6.14E+01	1.69E+03	2.48E+04	3.57E+05	7.14E+01	9.87E+01	3.55E+04	7.51E+02	6.70E+00
		Corn Pollen and Other Corn				9.98E+02	3.53E+04	1.55E+05	8.93E+06	6.06E+02	1.90E+03	3.00E+05	2.38E+04	4.02E+01
		Other Plant Types				1.23E+02	3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.50E+00	3.00E-04	4.00E-02	7.00E-01	2.40E-02	3.00E-04	5.00E-03	2.00E-02
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02	2.50E-01	9.31E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02	6.00E-02	8.00E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	4.39E-03	1.80E-02	3.60E-01	3.60E-03	2.25E-01	1.31E-02	2.25E-01	8.38E-03
		Sumac (skunkbush and other)	Br_{ag}			2.44E-03	1.00E-02	2.00E-01	2.00E-03	1.25E-01	7.25E-03	1.25E-01	4.66E-03
		Soaptree Yucca	Br_{ag}			3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03
		Sagebrush	Br_{ag}			3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03
		Corn Pollen and Other Corn	Br_{ag}			4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04
		Other Plant Types	Br_{ag}			3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**2.04E+05**	**2.63E+01**	**3.51E+02**	**9.84E+04**	**3.27E+02**	**3.02E+01**	**6.81E+01**	**2.34E+03**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	4.68E+06	6.14E+02	8.50E+03	2.25E+06	7.89E+03	7.02E+02	1.64E+03	5.41E+04
		Sumac (skunkbush and other)				1.35E+06	1.77E+02	2.45E+03	6.49E+05	2.27E+03	2.02E+02	4.74E+02	1.56E+04
		Soaptree Yucca				1.04E+06	1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04
		Sagebrush				5.19E+05	6.81E+01	9.42E+02	2.50E+05	8.74E+02	7.78E+01	1.82E+02	5.99E+03
		Corn Pollen and Other Corn				1.16E+07	7.04E+02	5.07E+03	6.25E+06	4.85E+03	9.42E+02	1.01E+03	9.24E+04
		Other Plant Types				1.04E+06	1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04

Outputs	Parameter		Symbol	Description	Units	Chromium	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**2.04E+05**	**2.63E+01**	**3.51E+02**	**9.84E+04**	**3.27E+02**	**3.02E+01**	**6.81E+01**	**2.34E+03**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	4.68E+06	6.14E+02	8.50E+03	2.25E+06	7.89E+03	7.02E+02	1.64E+03	5.41E+04
		Sumac (skunkbush and other)				1.35E+06	1.77E+02	2.45E+03	6.49E+05	2.27E+03	2.02E+02	4.74E+02	1.56E+04
		Soaptree Yucca				1.04E+06	1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04
		Sagebrush				5.19E+05	6.81E+01	9.42E+02	2.50E+05	8.74E+02	7.78E+01	1.82E+02	5.99E+03
		Corn Pollen and Other Corn				1.16E+07	7.04E+02	5.07E+03	6.25E+06	4.85E+03	9.42E+02	1.01E+03	9.24E+04
		Other Plant Types				1.04E+06	1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--	1.50E+00
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01	1.00E+00	4.00E-04	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	1.76E-02	1.24E-01	7.72E-04	7.65E-03	4.95E-03	8.73E-02	3.60E-03	2.87E-02	5.70E-03
		Sumac (skunkbush and other)	Br_{ag}			9.75E-03	6.90E-02	4.29E-04	4.25E-03	2.75E-03	4.85E-02	2.00E-03	1.60E-02	3.17E-03
		Soaptree Yucca	Br_{ag}			1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03
		Sagebrush	Br_{ag}			1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03
		Corn Pollen and Other Corn	Br_{ag}			1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04
		Other Plant Types	Br_{ag}			1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03

Outputs	Parameter		Symbol	Description	Units	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic
												Cancer PRG for Specific Metals - Kọọh bi lii		
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	**9.36E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--	2.15E+02
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	6.20E+01
		Soaptree Yucca				--	--	--	--	--	--	--	--	4.77E+01
		Sagebrush				--	--	--	--	--	--	--	--	2.39E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	4.59E+02
		Other Plant Types				--	--	--	--	--	--	--	--	4.77E+01

Outputs	Parameter		Symbol	Description	Units	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic
												Noncancer Child PRG for Specific Metals - K		
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	--	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic
												Noncancer Adult PRG for Specific Metals - K		
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**4.43E+02**	**1.16E+02**	**1.60E+00**	**2.40E+01**	**6.65E+02**	**9.32E+03**	**1.41E+05**	**2.73E+01**	**3.88E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	1.04E+04	2.78E+03	3.63E+01	5.55E+02	1.53E+04	2.23E+05	3.22E+06	6.45E+02	8.91E+02
		Sumac (skunkbush and other)				2.98E+03	8.01E+02	1.04E+01	1.60E+02	4.40E+03	6.44E+04	9.27E+05	1.86E+02	2.57E+02
		Soaptree Yucca				2.29E+03	6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02
		Sagebrush				1.15E+03	3.08E+02	4.02E+00	6.14E+01	1.69E+03	2.48E+04	3.57E+05	7.14E+01	9.87E+01
		Corn Pollen and Other Corn				1.20E+04	1.82E+03	1.99E+02	9.98E+02	3.53E+04	1.55E+05	8.93E+06	6.06E+02	1.90E+03
		Other Plant Types				2.29E+03	6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02

Outputs	Parameter		Symbol	Description	Units	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic
												Noncancer PRG for Specific Metals - Kọọh b		
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**4.43E+02**	**1.16E+02**	**1.60E+00**	**2.40E+01**	**6.65E+02**	**9.32E+03**	**1.41E+05**	**2.73E+01**	**3.88E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	1.04E+04	2.78E+03	3.63E+01	5.55E+02	1.53E+04	2.23E+05	3.22E+06	6.45E+02	8.91E+02
		Sumac (skunkbush and other)				2.98E+03	8.01E+02	1.04E+01	1.60E+02	4.40E+03	6.44E+04	9.27E+05	1.86E+02	2.57E+02
		Soaptree Yucca				2.29E+03	6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02
		Sagebrush				1.15E+03	3.08E+02	4.02E+00	6.14E+01	1.69E+03	2.48E+04	3.57E+05	7.14E+01	9.87E+01
		Corn Pollen and Other Corn				1.20E+04	1.82E+03	1.99E+02	9.98E+02	3.53E+04	1.55E+05	8.93E+06	6.06E+02	1.90E+03
		Other Plant Types				2.29E+03	6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01	2.40E-02	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	3.22E-02	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.50E-02	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.90E-02	2.32E-03	1.13E-01	4.39E-03	1.80E-02	3.60E-01	3.60E-03	2.25E-01	1.31E-02
		Sumac (skunkbush and other)	Br_{ag}			1.61E-02	1.29E-03	6.25E-02	2.44E-03	1.00E-02	2.00E-01	2.00E-03	1.25E-01	7.25E-03
		Soaptree Yucca	Br_{ag}			2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Sagebrush	Br_{ag}			2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Corn Pollen and Other Corn	Br_{ag}			2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Other Plant Types	Br_{ag}			2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03

Outputs	Parameter		Symbol	Description	Units	nakai (sheep camp) Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Kọọh bí łíí nakaí (sheep camp) Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Kọọh bí łíí nakaí (sheep camp) Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**1.36E+04**	**2.97E+02**	**2.52E+00**	**2.04E+05**	**2.63E+01**	**3.51E+02**	**9.84E+04**	**3.27E+02**	**3.02E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above $-$ ground plants and $Br = Br_{root}$ for below $-$ ground plants	mg/kg	3.21E+05	6.78E+03	6.05E+01	4.68E+06	6.14E+02	8.50E+03	2.25E+06	7.89E+03	7.02E+02
		Sumac (skunkbush and other)				9.24E+04	1.95E+03	1.74E+01	1.35E+06	1.77E+02	2.45E+03	6.49E+05	2.27E+03	2.02E+02
		Soaptree Yucca				7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02
		Sagebrush				3.55E+04	7.51E+02	6.70E+00	5.19E+05	6.81E+01	9.42E+02	2.50E+05	8.74E+02	7.78E+01
		Corn Pollen and Other Corn				3.00E+05	2.38E+04	4.02E+01	1.16E+07	7.04E+02	5.07E+03	6.25E+06	4.85E+03	9.42E+02
		Other Plant Types				7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02

Outputs	Parameter		Symbol	Description	Units	bí łíí nakaí (sheep camp) Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**1.36E+04**	**2.97E+02**	**2.52E+00**	**2.04E+05**	**2.63E+01**	**3.51E+02**	**9.84E+04**	**3.27E+02**	**3.02E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	3.21E+05	6.78E+03	6.05E+01	4.68E+06	6.14E+02	8.50E+03	2.25E+06	7.89E+03	7.02E+02
		Sumac (skunkbush and other)				9.24E+04	1.95E+03	1.74E+01	1.35E+06	1.77E+02	2.45E+03	6.49E+05	2.27E+03	2.02E+02
		Soaptree Yucca				7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02
		Sagebrush				3.55E+04	7.51E+02	6.70E+00	5.19E+05	6.81E+01	9.42E+02	2.50E+05	8.74E+02	7.78E+01
		Corn Pollen and Other Corn				3.00E+05	2.38E+04	4.02E+01	1.16E+07	7.04E+02	5.07E+03	6.25E+06	4.85E+03	9.42E+02
		Other Plant Types				7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01	1.00E+00
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02	4.00E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01	6.50E-04
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.25E-01	8.38E-03	1.76E-02	1.24E-01	7.72E-04	7.65E-03	4.95E-03	8.73E-02	3.60E-03
		Sumac (skunkbush and other)	Br_{ag}			1.25E-01	4.66E-03	9.75E-03	6.90E-02	4.29E-04	4.25E-03	2.75E-03	4.85E-02	2.00E-03
		Soaptree Yucca	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03
		Sagebrush	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03
		Corn Pollen and Other Corn	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04
		Other Plant Types	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc	Cancer PRG fo Aluminum
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc	Noncancer Ch Aluminum
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc	Noncancer Ad Aluminum
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**6.81E+01**	**2.34E+03**	**4.43E+02**	**1.16E+02**	**1.60E+00**	**2.40E+01**	**6.65E+02**	**9.32E+03**	**1.43E+05**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	1.64E+03	5.41E+04	1.04E+04	2.78E+03	3.63E+01	5.55E+02	1.53E+04	2.23E+05	3.22E+06
		Sumac (skunkbush and other)				4.74E+02	1.56E+04	2.98E+03	8.01E+02	1.04E+01	1.60E+02	4.40E+03	6.44E+04	9.27E+05
		Soaptree Yucca				3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	7.13E+05
		Sagebrush				1.82E+02	5.99E+03	1.15E+03	3.08E+02	4.02E+00	6.14E+01	1.69E+03	2.48E+04	3.57E+05
		Corn Pollen and Other Corn				1.01E+03	9.24E+04	1.20E+04	1.82E+03	1.99E+02	9.98E+02	3.53E+04	1.55E+05	--
		Other Plant Types				3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	7.13E+05

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc	Noncancer PR Aluminum
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**6.81E+01**	**2.34E+03**	**4.43E+02**	**1.16E+02**	**1.60E+00**	**2.40E+01**	**6.65E+02**	**9.32E+03**	**1.43E+05**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	1.64E+03	5.41E+04	1.04E+04	2.78E+03	3.63E+01	5.55E+02	1.53E+04	2.23E+05	3.22E+06
		Sumac (skunkbush and other)				4.74E+02	1.56E+04	2.98E+03	8.01E+02	1.04E+01	1.60E+02	4.40E+03	6.44E+04	9.27E+05
		Soaptree Yucca				3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	7.13E+05
		Sagebrush				1.82E+02	5.99E+03	1.15E+03	3.08E+02	4.02E+00	6.14E+01	1.69E+03	2.48E+04	3.57E+05
		Corn Pollen and Other Corn				1.01E+03	9.24E+04	1.20E+04	1.82E+03	1.99E+02	9.98E+02	3.53E+04	1.55E+05	--
		Other Plant Types				3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	7.13E+05

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	1.50E+00	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.87E-02	5.70E-03	2.90E-02	2.32E-03	1.13E-01	4.39E-03	1.80E-02	3.60E-01	3.60E-03
		Sumac (skunkbush and other)	Br_{ag}			1.60E-02	3.17E-03	1.61E-02	1.29E-03	6.25E-02	2.44E-03	1.00E-02	2.00E-01	2.00E-03
		Soaptree Yucca	Br_{ag}			2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03
		Sagebrush	Br_{ag}			2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03
		Corn Pollen and Other Corn	Br_{ag}			2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04
		Other Plant Types	Br_{ag}			2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03

Outputs	Parameter		Symbol	Description	Units	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
						r Specific Metals - Kǫǫ ei nahaazáh (easy access open space)								
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	**9.56E+00**	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	2.15E+02	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	6.20E+01	--	--	--	--	--	--	--
		Soaptree Yucca				--	4.77E+01	--	--	--	--	--	--	--
		Sagebrush				--	2.39E+01	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	4.77E+01	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
						ild PRG for Specific Metals - Kǫǫ ei nahaazáh (easy access open space)								
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	--	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
						ult PRG for Specific Metals - Kǫǫ ei nahaazáh (easy access open space)								
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**2.86E+01**	**3.96E+01**	**1.42E+04**	**3.01E+02**	**2.68E+00**	**2.08E+05**	**2.73E+01**	**3.77E+02**	**1.00E+05**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	6.45E+02	8.91E+02	3.21E+05	6.78E+03	6.05E+01	4.68E+06	6.14E+02	8.50E+03	2.25E+06
		Sumac (skunkbush and other)				1.86E+02	2.57E+02	9.24E+04	1.95E+03	1.74E+01	1.35E+06	1.77E+02	2.45E+03	6.49E+05
		Soaptree Yucca				1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03	4.99E+05
		Sagebrush				7.14E+01	9.87E+01	3.55E+04	7.51E+02	6.70E+00	5.19E+05	6.81E+01	9.42E+02	2.50E+05
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03	4.99E+05

Outputs	Parameter		Symbol	Description	Units	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
						G for Specific Metals - Kǫǫ ei nahaazáh (easy access open space)								
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**2.86E+01**	**3.96E+01**	**1.42E+04**	**3.01E+02**	**2.68E+00**	**2.08E+05**	**2.73E+01**	**3.77E+02**	**1.00E+05**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	6.45E+02	8.91E+02	3.21E+05	6.78E+03	6.05E+01	4.68E+06	6.14E+02	8.50E+03	2.25E+06
		Sumac (skunkbush and other)				1.86E+02	2.57E+02	9.24E+04	1.95E+03	1.74E+01	1.35E+06	1.77E+02	2.45E+03	6.49E+05
		Soaptree Yucca				1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03	4.99E+05
		Sagebrush				7.14E+01	9.87E+01	3.55E+04	7.51E+02	6.70E+00	5.19E+05	6.81E+01	9.42E+02	2.50E+05
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03	4.99E+05

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.25E-01	1.31E-02	2.25E-01	8.38E-03	1.76E-02	1.24E-01	7.72E-04	7.65E-03
		Sumac (skunkbush and other)	Br_{ag}			1.25E-01	7.25E-03	1.25E-01	4.66E-03	9.75E-03	6.90E-02	4.29E-04	4.25E-03
		Soaptree Yucca	Br_{ag}			1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03
		Sagebrush	Br_{ag}			1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03
		Corn Pollen and Other Corn	Br_{ag}			2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04
		Other Plant Types	Br_{ag}			1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**3.50E+02**	**3.12E+01**	**7.30E+01**	**2.40E+03**	**4.60E+02**	**1.23E+02**	**1.61E+00**	**2.46E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	7.89E+03	7.02E+02	1.64E+03	5.41E+04	1.04E+04	2.78E+03	3.63E+01	5.55E+02
		Sumac (skunkbush and other)				2.27E+03	2.02E+02	4.74E+02	1.56E+04	2.98E+03	8.01E+02	1.04E+01	1.60E+02
		Soaptree Yucca				1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00	1.23E+02
		Sagebrush				8.74E+02	7.78E+01	1.82E+02	5.99E+03	1.15E+03	3.08E+02	4.02E+00	6.14E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00	1.23E+02

Outputs	Parameter		Symbol	Description	Units	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**3.50E+02**	**3.12E+01**	**7.30E+01**	**2.40E+03**	**4.60E+02**	**1.23E+02**	**1.61E+00**	**2.46E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	7.89E+03	7.02E+02	1.64E+03	5.41E+04	1.04E+04	2.78E+03	3.63E+01	5.55E+02
		Sumac (skunkbush and other)				2.27E+03	2.02E+02	4.74E+02	1.56E+04	2.98E+03	8.01E+02	1.04E+01	1.60E+02
		Soaptree Yucca				1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00	1.23E+02
		Sagebrush				8.74E+02	7.78E+01	1.82E+02	5.99E+03	1.15E+03	3.08E+02	4.02E+00	6.14E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00	1.23E+02

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	1.50E+00	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	3.00E-01	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01	4.88E-03
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02	4.50E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	4.95E-03	8.73E-02	3.60E-03	2.87E-02	5.70E-03	2.90E-02	2.32E-03	1.13E-01	4.39E-03
		Sumac (skunkbush and other)	Br_{ag}			2.75E-03	4.85E-02	2.00E-03	1.60E-02	3.17E-03	1.61E-02	1.29E-03	6.25E-02	2.44E-03
		Soaptree Yucca	Br_{ag}			3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03
		Sagebrush	Br_{ag}			3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03
		Corn Pollen and Other Corn	Br_{ag}			4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04
		Other Plant Types	Br_{ag}			3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03

Outputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium
						Cancer PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)								
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	**9.56E+00**	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	2.15E+02	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	6.20E+01	--	--	--	--
		Soaptree Yucca				--	--	--	--	4.77E+01	--	--	--	--
		Sagebrush				--	--	--	--	2.39E+01	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	4.77E+01	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium
						Noncancer Child PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)								
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	--	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium
						Noncancer Adult PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)								
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**6.78E+02**	**9.92E+03**	**1.43E+05**	**2.86E+01**	**3.96E+01**	**1.42E+04**	**3.01E+02**	**2.68E+00**	**2.08E+05**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	1.53E+04	2.23E+05	3.22E+06	6.45E+02	8.91E+02	3.21E+05	6.78E+03	6.05E+01	4.68E+06
		Sumac (skunkbush and other)				4.40E+03	6.44E+04	9.27E+05	1.86E+02	2.57E+02	9.24E+04	1.95E+03	1.74E+01	1.35E+06
		Soaptree Yucca				3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06
		Sagebrush				1.69E+03	2.48E+04	3.57E+05	7.14E+01	9.87E+01	3.55E+04	7.51E+02	6.70E+00	5.19E+05
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06

Outputs	Parameter		Symbol	Description	Units	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium
						Noncancer PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)								
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**6.78E+02**	**9.92E+03**	**1.43E+05**	**2.86E+01**	**3.96E+01**	**1.42E+04**	**3.01E+02**	**2.68E+00**	**2.08E+05**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	1.53E+04	2.23E+05	3.22E+06	6.45E+02	8.91E+02	3.21E+05	6.78E+03	6.05E+01	4.68E+06
		Sumac (skunkbush and other)				4.40E+03	6.44E+04	9.27E+05	1.86E+02	2.57E+02	9.24E+04	1.95E+03	1.74E+01	1.35E+06
		Soaptree Yucca				3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06
		Sagebrush				1.69E+03	2.48E+04	3.57E+05	7.14E+01	9.87E+01	3.55E+04	7.51E+02	6.70E+00	5.19E+05
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02	7.11E+04	1.50E+03	1.34E+01	1.04E+06

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	3.00E-04	4.00E-02	7.00E-01	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	1.80E-02	3.60E-01	3.60E-03	2.25E-01	1.31E-02	2.25E-01	8.38E-03	1.76E-02
		Sumac (skunkbush and other)	Br_{ag}			1.00E-02	2.00E-01	2.00E-03	1.25E-01	7.25E-03	1.25E-01	4.66E-03	9.75E-03
		Soaptree Yucca	Br_{ag}			1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02
		Sagebrush	Br_{ag}			1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02
		Corn Pollen and Other Corn	Br_{ag}			1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03
		Other Plant Types	Br_{ag}			1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02

Outputs	Parameter		Symbol	Description	Units	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**2.73E+01**	**3.77E+02**	**1.00E+05**	**3.50E+02**	**3.12E+01**	**7.30E+01**	**2.40E+03**	**4.60E+02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	6.14E+02	8.50E+03	2.25E+06	7.89E+03	7.02E+02	1.64E+03	5.41E+04	1.04E+04
		Sumac (skunkbush and other)				1.77E+02	2.45E+03	6.49E+05	2.27E+03	2.02E+02	4.74E+02	1.56E+04	2.98E+03
		Soaptree Yucca				1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03
		Sagebrush				6.81E+01	9.42E+02	2.50E+05	8.74E+02	7.78E+01	1.82E+02	5.99E+03	1.15E+03
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03

Outputs	Parameter		Symbol	Description	Units	Cobalt	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**2.73E+01**	**3.77E+02**	**1.00E+05**	**3.50E+02**	**3.12E+01**	**7.30E+01**	**2.40E+03**	**4.60E+02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	6.14E+02	8.50E+03	2.25E+06	7.89E+03	7.02E+02	1.64E+03	5.41E+04	1.04E+04
		Sumac (skunkbush and other)				1.77E+02	2.45E+03	6.49E+05	2.27E+03	2.02E+02	4.74E+02	1.56E+04	2.98E+03
		Soaptree Yucca				1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03
		Sagebrush				6.81E+01	9.42E+02	2.50E+05	8.74E+02	7.78E+01	1.82E+02	5.99E+03	1.15E+03
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02	3.64E+02	1.20E+04	2.29E+03

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	1.50E+00	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01	1.00E+00	4.00E-04	3.00E-04	2.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	1.24E-01	7.72E-04	7.65E-03	4.95E-03	8.73E-02	3.60E-03	2.87E-02	5.70E-03	2.90E-02
		Sumac (skunkbush and other)	Br_{ag}			6.90E-02	4.29E-04	4.25E-03	2.75E-03	4.85E-02	2.00E-03	1.60E-02	3.17E-03	1.61E-02
		Soaptree Yucca	Br_{ag}			8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Sagebrush	Br_{ag}			8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Corn Pollen and Other Corn	Br_{ag}			1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Other Plant Types	Br_{ag}			8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02

Outputs	Parameter		Symbol	Description	Units	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
											Cancer PRG for Specific Metals - Chíí dah wiih łeezh (wash			
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	**1.16E+01**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	2.15E+02	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	6.20E+01	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	2.39E+01	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	4.59E+02	--
		Other Plant Types				--	--	--	--	--	--	--	4.77E+01	--

Outputs	Parameter		Symbol	Description	Units	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
											Noncancer Child PRG for Specific Metals - Chíí dah wiih łe			
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	--	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
											Noncancer Adult PRG for Specific Metals - Chíí dah wiih łe			
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**1.23E+02**	**1.61E+00**	**2.46E+01**	**6.78E+02**	**9.92E+03**	**1.75E+05**	**3.38E+01**	**4.82E+01**	**1.68E+04**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above − ground plants and $Br = Br_{root}$ for below − ground plants	mg/kg	2.78E+03	3.63E+01	5.55E+02	1.53E+04	2.23E+05	3.22E+06	6.45E+02	8.91E+02	3.21E+05
		Sumac (skunkbush and other)				8.01E+02	1.04E+01	1.60E+02	4.40E+03	6.44E+04	9.27E+05	1.86E+02	2.57E+02	9.24E+04
		Soaptree Yucca				6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	--	--	--	--
		Sagebrush				3.08E+02	4.02E+00	6.14E+01	1.69E+03	2.48E+04	3.57E+05	7.14E+01	9.87E+01	3.55E+04
		Corn Pollen and Other Corn				--	--	--	--	--	8.93E+06	6.06E+02	1.90E+03	3.00E+05
		Other Plant Types				6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02	7.11E+04

Outputs	Parameter		Symbol	Description	Units	Silver	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
											Noncancer PRG for Specific Metals - Chíí dah wiih łeezh (v			
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**1.23E+02**	**1.61E+00**	**2.46E+01**	**6.78E+02**	**9.92E+03**	**1.75E+05**	**3.38E+01**	**4.82E+01**	**1.68E+04**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	2.78E+03	3.63E+01	5.55E+02	1.53E+04	2.23E+05	3.22E+06	6.45E+02	8.91E+02	3.21E+05
		Sumac (skunkbush and other)				8.01E+02	1.04E+01	1.60E+02	4.40E+03	6.44E+04	9.27E+05	1.86E+02	2.57E+02	9.24E+04
		Soaptree Yucca				6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	--	--	--	--
		Sagebrush				3.08E+02	4.02E+00	6.14E+01	1.69E+03	2.48E+04	3.57E+05	7.14E+01	9.87E+01	3.55E+04
		Corn Pollen and Other Corn				--	--	--	--	--	8.93E+06	6.06E+02	1.90E+03	3.00E+05
		Other Plant Types				6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04	7.13E+05	1.43E+02	1.97E+02	7.11E+04

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01	2.40E-02	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.32E-03	1.13E-01	4.39E-03	1.80E-02	3.60E-01	3.60E-03	2.25E-01	1.31E-02
		Sumac (skunkbush and other)	Br_{ag}			1.29E-03	6.25E-02	2.44E-03	1.00E-02	2.00E-01	2.00E-03	1.25E-01	7.25E-03
		Soaptree Yucca	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Sagebrush	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Corn Pollen and Other Corn	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Other Plant Types	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						...es and drainages)							
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						...ezh (washes and drainages)							
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						...ezh (washes and drainages)							
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**3.71E+02**	**3.10E+00**	**2.54E+05**	**3.25E+01**	**4.32E+02**	**1.23E+05**	**4.02E+02**	**3.74E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IR_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	6.78E+03	6.05E+01	4.68E+06	6.14E+02	8.50E+03	2.25E+06	7.89E+03	7.02E+02
		Sumac (skunkbush and other)				1.95E+03	1.74E+01	1.35E+06	1.77E+02	2.45E+03	6.49E+05	2.27E+03	2.02E+02
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				7.51E+02	6.70E+00	5.19E+05	6.81E+01	9.42E+02	2.50E+05	8.74E+02	7.78E+01
		Corn Pollen and Other Corn				2.38E+04	4.02E+01	1.16E+07	7.04E+02	5.07E+03	6.25E+06	4.85E+03	9.42E+02
		Other Plant Types				1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						...ashes and drainages)							
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**3.71E+02**	**3.10E+00**	**2.54E+05**	**3.25E+01**	**4.32E+02**	**1.23E+05**	**4.02E+02**	**3.74E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	6.78E+03	6.05E+01	4.68E+06	6.14E+02	8.50E+03	2.25E+06	7.89E+03	7.02E+02
		Sumac (skunkbush and other)				1.95E+03	1.74E+01	1.35E+06	1.77E+02	2.45E+03	6.49E+05	2.27E+03	2.02E+02
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				7.51E+02	6.70E+00	5.19E+05	6.81E+01	9.42E+02	2.50E+05	8.74E+02	7.78E+01
		Corn Pollen and Other Corn				2.38E+04	4.02E+01	1.16E+07	7.04E+02	5.07E+03	6.25E+06	4.85E+03	9.42E+02
		Other Plant Types				1.50E+03	1.34E+01	1.04E+06	1.36E+02	1.88E+03	4.99E+05	1.75E+03	1.56E+02

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Metal-Specific Toxicity Parameters	Slope Factor		Sfo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.25E-01	8.38E-03	1.76E-02	1.24E-01	7.72E-04	7.65E-03	4.95E-03	8.73E-02
		Sumac (skunkbush and other)	Br_{ag}			1.25E-01	4.66E-03	9.75E-03	6.90E-02	4.29E-04	4.25E-03	2.75E-03	4.85E-02
		Soaptree Yucca	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Sagebrush	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Corn Pollen and Other Corn	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Other Plant Types	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Consumption of Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for cancer for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for cancer for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{TR \times AT_c}{(SF_o \times CF_{produce} \times IRF_{p,adj} \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_c \times ED_c \times IR_c \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	mg/kg	**8.37E+01**	**2.91E+03**	**5.49E+02**	**1.42E+02**	**1.99E+00**	**2.99E+01**	**8.28E+02**	**1.15E+04**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{THQ \times AT_{nc} \times BW \times RfD}{(CF_{produce} \times EF_a \times ED_a \times IRF_a \times CF_6 \times (Br + MLF_{produce}))}$ where $Br = Br_{ag}$ for above-ground plants and $Br = Br_{root}$ for below-ground plants	mg/kg	1.64E+03	5.41E+04	1.04E+04	2.78E+03	3.63E+01	5.55E+02	1.53E+04	2.23E+05
		Sumac (skunkbush and other)				4.74E+02	1.56E+04	2.98E+03	8.01E+02	1.04E+01	1.60E+02	4.40E+03	6.44E+04
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.82E+02	5.99E+03	1.15E+03	3.08E+02	4.02E+00	6.14E+01	1.69E+03	2.48E+04
		Corn Pollen and Other Corn				1.01E+03	9.24E+04	1.20E+04	1.82E+03	1.99E+02	9.98E+02	3.53E+04	1.55E+05
		Other Plant Types				3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The noncancer preliminary remediation goals for all plant consumption, back-calculated to soil.	mg/kg	**8.37E+01**	**2.91E+03**	**5.49E+02**	**1.42E+02**	**1.99E+00**	**2.99E+01**	**8.28E+02**	**1.15E+04**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The noncancer preliminary remediation goals for each type of plant consumption, back-calculated to soil.	mg/kg	1.64E+03	5.41E+04	1.04E+04	2.78E+03	3.63E+01	5.55E+02	1.53E+04	2.23E+05
		Sumac (skunkbush and other)				4.74E+02	1.56E+04	2.98E+03	8.01E+02	1.04E+01	1.60E+02	4.40E+03	6.44E+04
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.82E+02	5.99E+03	1.15E+03	3.08E+02	4.02E+00	6.14E+01	1.69E+03	2.48E+04
		Corn Pollen and Other Corn				1.01E+03	9.24E+04	1.20E+04	1.82E+03	1.99E+02	9.98E+02	3.53E+04	1.55E+05
		Other Plant Types				3.64E+02	1.20E+04	2.29E+03	6.16E+02	8.03E+00	1.23E+02	3.38E+03	4.95E+04

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniculides					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	--	--	--	75	75	75	75	75	75
	Decay Constant		λ		1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00	1.00
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				--	--	--	3.00E-01	2.80E-03	1.80E-02	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Secular Equilibrium Radionuclides - Custom**			**PRGs for non-SE Radionuclides - Custom**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**1.99E-02**	**1.84E-02**	**3.99E-02**	**2.31E+00**	**6.69E-02**	**1.54E-01**	**6.63E-01**	**8.27E-01**	**9.12E-01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.02E+00	9.38E-01	2.03E+00	1.18E+02	3.41E+00	7.83E+00	3.38E+01	4.22E+01	4.65E+01
		Sumac (skunkbush and other)				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Soaptree Yucca				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Sagebrush				8.14E-02	7.50E-02	1.63E-01	9.42E+00	2.73E-01	6.27E-01	2.71E+00	3.37E+00	3.72E+00
		Corn Pollen and Other Corn				5.42E-02	5.00E-02	1.09E-01	6.28E+00	1.82E-01	4.18E-01	1.80E+00	2.25E+00	2.48E+00
		Other Plant Types				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
Parameter			**Symbol**	**Description**	**Units**	**PRGs for Secular Equilibrium Radionuclides - Custom**			**PRGs for non-SE Radionuclides - Custom**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**4.51E-01**	**4.29E-01**	**2.58E-01**	**3.31E+00**	**3.93E+00**	**8.61E-01**	**6.12E+01**	**2.06E+01**	**2.27E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	9.73E+00	9.27E+00	5.42E+00	8.91E+01	8.70E+01	1.80E+01	1.48E+03	4.55E+02	5.02E+02
		Sumac (skunkbush and other)				9.73E+00	9.14E+00	1.57E+01	6.04E+01	6.42E+01	5.79E+01	4.33E+02	5.19E+02	5.72E+02
		Soaptree Yucca				8.01E+00	7.49E+00	1.34E+01	5.97E+01	5.52E+01	4.98E+01	3.36E+02	4.06E+02	4.48E+02
		Sagebrush				8.26E-01	7.89E-01	4.41E-01	7.16E+00	7.39E+00	1.46E+00	1.61E+02	3.89E+01	4.29E+01
		Corn Pollen and Other Corn				1.43E+01	1.28E+01	6.96E+00	2.09E+01	1.60E+02	2.34E+01	9.28E+02	2.83E+02	3.12E+02
		Other Plant Types				1.65E+00	1.58E+00	8.82E-01	1.43E+01	1.48E+01	2.92E+00	3.22E+02	7.79E+01	8.59E+01

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for Secular Equilibrium Progeny Radionuclides of Ra-226							
						SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226	SE for Ra-226
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01	--
		Sumac (skunkbush and other)				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04	1.00E-02	--
		Soaptree Yucca				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04	1.00E-02	--
		Sagebrush				--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01	--
		Corn Pollen and Other Corn				--	1.00E-01	1.00E-01	2.80E-03	2.80E-03	2.40E-04	1.80E-02	--
		Other Plant Types				--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01	--
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Progeny - Custom**							
						SE for Ra-226	**Bi-210**	**Bi-214**	**Pb-210**	**Pb-214**	**Po-210**	**Ra-226**	**SE for Ra-226**
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**1.99E-02**	**6.07E+00**	**2.98E+02**	**6.69E-02**	**1.63E+02**	**3.51E-02**	**1.54E-01**	**1.99E-02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.02E+00	3.10E+02	1.52E+04	3.41E+00	8.30E+03	1.79E+00	7.83E+00	1.02E+00
		Sumac (skunkbush and other)				1.63E-01	4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00	1.63E-01
		Soaptree Yucca				1.63E-01	4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00	1.63E-01
		Sagebrush				8.14E-02	2.48E+01	1.22E+03	2.73E-01	6.64E+02	1.43E-01	6.27E-01	8.14E-02
		Corn Pollen and Other Corn				5.42E-02	1.65E+01	8.10E+02	1.82E-01	4.43E+02	9.54E-02	4.18E-01	5.42E-02
		Other Plant Types				1.63E-01	4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00	1.63E-01
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Progeny - Custom**							
						SE for Ra-226	**Bi-210**	**Bi-214**	**Pb-210**	**Pb-214**	**Po-210**	**Ra-226**	**SE for Ra-226**
Preliminary Remediation Goals for Progeny of Ra-226 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**4.51E-01**	**5.54E+01**	**2.72E+03**	**1.52E+00**	**3.69E+03**	**2.78E+00**	**8.47E-01**	**4.51E-01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	9.73E+00	2.55E+03	1.25E+05	3.36E+01	8.17E+04	6.17E+01	1.77E+01	9.73E+00
		Sumac (skunkbush and other)				9.73E+00	4.42E+02	2.17E+04	2.48E+01	6.04E+04	2.35E+01	5.70E+01	9.73E+00
		Soaptree Yucca				8.01E+00	4.29E+02	2.10E+04	2.13E+01	5.19E+04	1.81E+01	4.90E+01	8.01E+00
		Sagebrush				8.26E-01	2.14E+02	1.05E+04	2.85E+00	6.95E+03	6.22E+00	1.44E+00	8.26E-01
		Corn Pollen and Other Corn				1.43E+01	1.65E+02	8.09E+03	6.18E+01	1.50E+05	2.48E+02	2.30E+01	1.43E+01
		Other Plant Types				1.65E+00	4.29E+02	2.10E+04	5.71E+00	1.39E+04	1.24E+01	2.88E+00	1.65E+00

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniculides					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	--	--	--	75	75	75	75	75	75
	Decay Constant		λ		1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00	1.00
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				--	--	--	3.00E-01	2.80E-03	1.80E-02	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Secular Equilibrium Radionuclides - Kee'da'whíí tééh (full-time Navajo residential)**			**PRGs for non-SE Radionuclides - Kee'da'whíí tééh (full-time Navajo residential)**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**1.99E-02**	**1.84E-02**	**3.99E-02**	**2.31E+00**	**6.69E-02**	**1.54E-01**	**6.63E-01**	**8.27E-01**	**9.12E-01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.02E+00	9.38E-01	2.03E+00	1.18E+02	3.41E+00	7.83E+00	3.38E+01	4.22E+01	4.65E+01
		Sumac (skunkbush and other)				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Soaptree Yucca				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Sagebrush				8.14E-02	7.50E-02	1.63E-01	9.42E+00	2.73E-01	6.27E-01	2.71E+00	3.37E+00	3.72E+00
		Corn Pollen and Other Corn				5.42E-02	5.00E-02	1.09E-01	6.28E+00	1.82E-01	4.18E-01	1.80E+00	2.25E+00	2.48E+00
		Other Plant Types				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
Parameter			**Symbol**	**Description**	**Units**	**Radionuclides - Kee'da'whíí tééh (full-time Navajo residential)**			**PRGs for non-SE Radionuclides - Kee'da'whíí tééh (full-time Navajo residential)**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**4.51E-01**	**4.29E-01**	**2.58E-01**	**3.31E+00**	**3.93E+00**	**8.61E-01**	**6.12E+01**	**2.06E+01**	**2.27E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	9.73E+00	9.27E+00	5.42E+00	8.91E+01	8.70E+01	1.80E+01	1.48E+03	4.55E+02	5.02E+02
		Sumac (skunkbush and other)				9.73E+00	9.14E+00	1.57E+01	6.04E+01	6.42E+01	5.79E+01	4.33E+02	5.19E+02	5.72E+02
		Soaptree Yucca				8.01E+00	7.49E+00	1.34E+01	5.97E+01	5.52E+01	4.98E+01	3.36E+02	4.06E+02	4.48E+02
		Sagebrush				8.26E-01	7.89E-01	4.41E-01	7.16E+00	7.39E+00	1.46E+00	1.61E+02	3.89E+01	4.29E+01
		Corn Pollen and Other Corn				1.43E+01	1.28E+01	6.96E+00	2.09E+01	1.60E+02	2.34E+01	9.28E+02	2.83E+02	3.12E+02
		Other Plant Types				1.65E+00	1.58E+00	8.82E-01	1.43E+01	1.48E+01	2.92E+00	3.22E+02	7.79E+01	8.59E+01

Inputs	Parameter		Symbol	Description	Units	r Factors for Secular Equilibrium Progeny Radionuclides of Ra-226					SE for Ra-226	Transfer Factors for Secular Equilibri		
						Bi-214	Pb-210	Pb-214	Po-210	Ra-226		Bi-210	Bi-214	Pb-210
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02
		Sumac (skunkbush and other)				1.00E-01	1.00E-02	1.00E-02	2.00E-04	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02
		Soaptree Yucca				1.00E-01	1.00E-02	1.00E-02	2.00E-04	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02
		Sagebrush				1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02
		Corn Pollen and Other Corn				1.00E-01	2.80E-03	2.80E-03	2.40E-04	1.80E-02	--	1.00E-01	1.00E-01	2.80E-03
		Other Plant Types				1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**Gs for Progeny - Kee'da'whíí tééh (full-time Navajo residential)**						**PRGs for Progeny - Kọọh**		
						Bi-214	**Pb-210**	**Pb-214**	**Po-210**	**Ra-226**	**SE for Ra-226**	**Bi-210**	**Bi-214**	**Pb-210**
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**2.98E+02**	**6.69E-02**	**1.63E+02**	**3.51E-02**	**1.54E-01**	**1.99E-02**	**6.07E+00**	**2.98E+02**	**6.69E-02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.52E+04	3.41E+00	8.30E+03	1.79E+00	7.83E+00	1.02E+00	3.10E+02	1.52E+04	3.41E+00
		Sumac (skunkbush and other)				2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00	1.63E-01	4.95E+01	2.43E+03	5.46E-01
		Soaptree Yucca				2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00	1.63E-01	4.95E+01	2.43E+03	5.46E-01
		Sagebrush				1.22E+03	2.73E-01	6.64E+02	1.43E-01	6.27E-01	8.14E-02	2.48E+01	1.22E+03	2.73E-01
		Corn Pollen and Other Corn				8.10E+02	1.82E-01	4.43E+02	9.54E-02	4.18E-01	5.42E-02	1.65E+01	8.10E+02	1.82E-01
		Other Plant Types				2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00	1.63E-01	4.95E+01	2.43E+03	5.46E-01
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**Gs for Progeny - Kee'da'whíí tééh (full-time Navajo residential)**						**PRGs for Progeny - Kọọh**		
						Bi-214	**Pb-210**	**Pb-214**	**Po-210**	**Ra-226**	**SE for Ra-226**	**Bi-210**	**Bi-214**	**Pb-210**
Preliminary Remediation Goals for Progeny of Ra-226 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**2.72E+03**	**1.52E+00**	**3.69E+03**	**2.78E+00**	**8.47E-01**	**4.51E-01**	**5.54E+01**	**2.72E+03**	**1.52E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	1.25E+05	3.36E+01	8.17E+04	6.17E+01	1.77E+01	9.73E+00	2.55E+03	1.25E+05	3.36E+01
		Sumac (skunkbush and other)				2.17E+04	2.48E+01	6.04E+04	2.35E+01	5.70E+01	9.73E+00	4.42E+02	2.17E+04	2.48E+01
		Soaptree Yucca				2.10E+04	2.13E+01	5.19E+04	1.81E+01	4.90E+01	8.01E+00	4.29E+02	2.10E+04	2.13E+01
		Sagebrush				1.05E+04	2.85E+00	6.95E+03	6.22E+00	1.44E+00	8.26E-01	2.14E+02	1.05E+04	2.85E+00
		Corn Pollen and Other Corn				8.09E+03	6.18E+01	1.50E+05	2.48E+02	2.30E+01	1.43E+01	1.65E+02	8.09E+03	6.18E+01
		Other Plant Types				2.10E+04	5.71E+00	1.39E+04	1.24E+01	2.88E+00	1.65E+00	4.29E+02	2.10E+04	5.71E+00

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniclides					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	--	--	--	75	75	75	75	75	75
	Decay Constant		λ		1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00	1.00
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				--	--	--	3.00E-01	2.80E-03	1.80E-02	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Secular Equilibrium Radionuclides - Kọọh bí łíí nakaí (sheep camp)**			**PRGs for non-SE Radionuclides - Kọọh bí łíí nakaí (sheep camp)**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**1.99E-02**	**1.84E-02**	**3.99E-02**	**2.31E+00**	**6.69E-02**	**1.54E-01**	**6.63E-01**	**8.27E-01**	**9.12E-01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.02E+00	9.38E-01	2.03E+00	1.18E+02	3.41E+00	7.83E+00	3.38E+01	4.22E+01	4.65E+01
		Sumac (skunkbush and other)				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Soaptree Yucca				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Sagebrush				8.14E-02	7.50E-02	1.63E-01	9.42E+00	2.73E-01	6.27E-01	2.71E+00	3.37E+00	3.72E+00
		Corn Pollen and Other Corn				5.42E-02	5.00E-02	1.09E-01	6.28E+00	1.82E-01	4.18E-01	1.80E+00	2.25E+00	2.48E+00
		Other Plant Types				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
Parameter			**Symbol**	**Description**	**Units**	**Radionuclides - Kọọh bí łíí nakaí (sheep camp)**			**PRGs for non-SE Radionuclides - Kọọh bí łíí nakaí (sheep camp)**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**4.51E-01**	**4.29E-01**	**2.58E-01**	**3.31E+00**	**3.93E+00**	**8.61E-01**	**6.12E+01**	**2.06E+01**	**2.27E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	9.73E+00	9.27E+00	5.42E+00	8.91E+01	8.70E+01	1.80E+01	1.48E+03	4.55E+02	5.02E+02
		Sumac (skunkbush and other)				9.73E+00	9.14E+00	1.57E+01	6.04E+01	6.42E+01	5.79E+01	4.33E+02	5.19E+02	5.72E+02
		Soaptree Yucca				8.01E+00	7.49E+00	1.34E+01	5.97E+01	5.52E+01	4.98E+01	3.36E+02	4.06E+02	4.48E+02
		Sagebrush				8.26E-01	7.89E-01	4.41E-01	7.16E+00	7.39E+00	1.46E+00	1.61E+02	3.89E+01	4.29E+01
		Corn Pollen and Other Corn				1.43E+01	1.28E+01	6.96E+00	2.09E+01	1.60E+02	2.34E+01	9.28E+02	2.83E+02	3.12E+02
		Other Plant Types				1.65E+00	1.58E+00	8.82E-01	1.43E+01	1.48E+01	2.92E+00	3.22E+02	7.79E+01	8.59E+01

Inputs	Parameter		Symbol	Description	Units	um Progeny Radionuclides of Ra-226				Transfer Factors for Secular Equilibrium Progeny Radionuclides o				
						Pb-214	Po-210	Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	8.00E-02	7.40E-03	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
		Sumac (skunkbush and other)				1.00E-02	2.00E-04	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Soaptree Yucca				1.00E-02	2.00E-04	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Sagebrush				8.00E-02	7.40E-03	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
		Corn Pollen and Other Corn				2.80E-03	2.40E-04	1.80E-02	--	1.00E-01	1.00E-01	2.80E-03	2.80E-03	2.40E-04
		Other Plant Types				8.00E-02	7.40E-03	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**bí łíí nakaí (sheep camp)**				**PRGs for Progeny - Kọọ eí nahaazáh (easy access open spac**				
						Pb-214	**Po-210**	**Ra-226**	**SE for Ra-226**	**Bi-210**	**Bi-214**	**Pb-210**	**Pb-214**	**Po-210**
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**1.63E+02**	**3.51E-02**	**1.54E-01**	**3.15E-02**	**9.60E+00**	**4.71E+02**	**1.06E-01**	**2.57E+02**	**5.55E-02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	8.30E+03	1.79E+00	7.83E+00	1.02E+00	3.10E+02	1.52E+04	3.41E+00	8.30E+03	1.79E+00
		Sumac (skunkbush and other)				1.33E+03	2.86E-01	1.25E+00	1.63E-01	4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01
		Soaptree Yucca				1.33E+03	2.86E-01	1.25E+00	1.63E-01	4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01
		Sagebrush				6.64E+02	1.43E-01	6.27E-01	8.14E-02	2.48E+01	1.22E+03	2.73E-01	6.64E+02	1.43E-01
		Corn Pollen and Other Corn				4.43E+02	9.54E-02	4.18E-01	--	--	--	--	--	--
		Other Plant Types				1.33E+03	2.86E-01	1.25E+00	1.63E-01	4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**bí łíí nakaí (sheep camp)**				**PRGs for Progeny - Kọọ eí nahaazáh (easy access open spac**				
						Pb-214	**Po-210**	**Ra-226**	**SE for Ra-226**	**Bi-210**	**Bi-214**	**Pb-210**	**Pb-214**	**Po-210**
Preliminary Remediation Goals for Progeny of Ra-226 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**3.69E+03**	**2.78E+00**	**8.47E-01**	**4.66E-01**	**8.34E+01**	**4.09E+03**	**1.56E+00**	**3.79E+03**	**2.82E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	8.17E+04	6.17E+01	1.77E+01	9.73E+00	2.55E+03	1.25E+05	3.36E+01	8.17E+04	6.17E+01
		Sumac (skunkbush and other)				6.04E+04	2.35E+01	5.70E+01	9.73E+00	4.42E+02	2.17E+04	2.48E+01	6.04E+04	2.35E+01
		Soaptree Yucca				5.19E+04	1.81E+01	4.90E+01	8.01E+00	4.29E+02	2.10E+04	2.13E+01	5.19E+04	1.81E+01
		Sagebrush				6.95E+03	6.22E+00	1.44E+00	8.26E-01	2.14E+02	1.05E+04	2.85E+00	6.95E+03	6.22E+00
		Corn Pollen and Other Corn				1.50E+05	2.48E+02	2.30E+01	--	--	--	--	--	--
		Other Plant Types				1.39E+04	1.24E+01	2.88E+00	1.65E+00	4.29E+02	2.10E+04	5.71E+00	1.39E+04	1.24E+01

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniclides					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	--	--	--	75	75	75	75	75	75
	Decay Constant		λ		1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00	1.00
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				--	--	--	3.00E-01	2.80E-03	1.80E-02	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Secular Equilibrium Radionuclides - Kọọ ei nahaazáh (easy access open space)**			**PRGs for non-SE Radionuclides - Kọọ ei nahaazáh (easy access open space)**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**3.15E-02**	**2.91E-02**	**6.31E-02**	**3.65E+00**	**1.06E-01**	**2.43E-01**	**1.05E+00**	**1.31E+00**	**1.44E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.02E+00	9.38E-01	2.03E+00	1.18E+02	3.41E+00	7.83E+00	3.38E+01	4.22E+01	4.65E+01
		Sumac (skunkbush and other)				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Soaptree Yucca				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Sagebrush				8.14E-02	7.50E-02	1.63E-01	9.42E+00	2.73E-01	6.27E-01	2.71E+00	3.37E+00	3.72E+00
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
Parameter			**Symbol**	**Description**	**Units**	**Radionuclides - Kọọ ei nahaazáh (easy access open space)**			**PRGs for non-SE Radionuclides - Kọọ ei nahaazáh (easy access open space)**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**4.66E-01**	**4.44E-01**	**2.68E-01**	**3.94E+00**	**4.03E+00**	**8.94E-01**	**6.55E+01**	**2.22E+01**	**2.44E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	9.73E+00	9.27E+00	5.42E+00	8.91E+01	8.70E+01	1.80E+01	1.48E+03	4.55E+02	5.02E+02
		Sumac (skunkbush and other)				9.73E+00	9.14E+00	1.57E+01	6.04E+01	6.42E+01	5.79E+01	4.33E+02	5.19E+02	5.72E+02
		Soaptree Yucca				8.01E+00	7.49E+00	1.34E+01	5.97E+01	5.52E+01	4.98E+01	3.36E+02	4.06E+02	4.48E+02
		Sagebrush				8.26E-01	7.89E-01	4.41E-01	7.16E+00	7.39E+00	1.46E+00	1.61E+02	3.89E+01	4.29E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				1.65E+00	1.58E+00	8.82E-01	1.43E+01	1.48E+01	2.92E+00	3.22E+02	7.79E+01	8.59E+01

Inputs	Parameter		Symbol	Description	Units	f Ra-226		Transfer Factors for Secular Equilibrium Progeny Radionuclides of Ra-226						
						Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226	SE for Ra-226
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01	--
		Sumac (skunkbush and other)				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04	1.00E-02	--
		Soaptree Yucca				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04	1.00E-02	--
		Sagebrush				4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01	--
		Corn Pollen and Other Corn				1.80E-02	--	1.00E-01	1.00E-01	2.80E-03	2.80E-03	2.40E-04	1.80E-02	--
		Other Plant Types				4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01	--
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**e)**		**PRGs for Progeny - Kọọ ei doo nahaazáh dah (difficult access open space)**						
						Ra-226	**SE for Ra-226**	**Bi-210**	**Bi-214**	**Pb-210**	**Pb-214**	**Po-210**	**Ra-226**	**SE for Ra-226**
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**2.43E-01**	**3.15E-02**	**9.60E+00**	**4.71E+02**	**1.06E-01**	**2.57E+02**	**5.55E-02**	**2.43E-01**	**2.27E-02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	7.83E+00	1.02E+00	3.10E+02	1.52E+04	3.41E+00	8.30E+03	1.79E+00	7.83E+00	1.02E+00
		Sumac (skunkbush and other)				1.25E+00	1.63E-01	4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00	1.63E-01
		Soaptree Yucca				1.25E+00	1.63E-01	4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00	--
		Sagebrush				6.27E-01	8.14E-02	2.48E+01	1.22E+03	2.73E-01	6.64E+02	1.43E-01	6.27E-01	8.14E-02
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	5.42E-02
		Other Plant Types				1.25E+00	1.63E-01	4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00	1.63E-01
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**e)**		**PRGs for Progeny - Kọọ ei doo nahaazáh dah (difficult access open space)**						
						Ra-226	**SE for Ra-226**	**Bi-210**	**Bi-214**	**Pb-210**	**Pb-214**	**Po-210**	**Ra-226**	**SE for Ra-226**
Preliminary Remediation Goals for Progeny of Ra-226 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**8.79E-01**	**4.66E-01**	**8.34E+01**	**4.09E+03**	**1.56E+00**	**3.79E+03**	**2.82E+00**	**8.79E-01**	**4.78E-01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	1.77E+01	9.73E+00	2.55E+03	1.25E+05	3.36E+01	8.17E+04	6.17E+01	1.77E+01	9.73E+00
		Sumac (skunkbush and other)				5.70E+01	9.73E+00	4.42E+02	2.17E+04	2.48E+01	6.04E+04	2.35E+01	5.70E+01	9.73E+00
		Soaptree Yucca				4.90E+01	8.01E+00	4.29E+02	2.10E+04	2.13E+01	5.19E+04	1.81E+01	4.90E+01	--
		Sagebrush				1.44E+00	8.26E-01	2.14E+02	1.05E+04	2.85E+00	6.95E+03	6.22E+00	1.44E+00	8.26E-01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	1.43E+01
		Other Plant Types				2.88E+00	1.65E+00	4.29E+02	2.10E+04	5.71E+00	1.39E+04	1.24E+01	2.88E+00	1.65E+00

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniculides					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	--	--	--	75	75	75	75	75	75
	Decay Constant		λ		1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00	1.00
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				--	--	--	3.00E-01	2.80E-03	1.80E-02	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Secular Equilibrium Radionuclides - Kọọ eí doo nahaazáh dah (difficult access open space)**			**PRGs for non-SE Radionuclides - Kọọ eí doo nahaazáh dah (difficult access open space)**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**3.15E-02**	**2.91E-02**	**6.31E-02**	**3.65E+00**	**1.06E-01**	**2.43E-01**	**1.05E+00**	**1.31E+00**	**1.44E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.02E+00	9.38E-01	2.03E+00	1.18E+02	3.41E+00	7.83E+00	3.38E+01	4.22E+01	4.65E+01
		Sumac (skunkbush and other)				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Soaptree Yucca				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Sagebrush				8.14E-02	7.50E-02	1.63E-01	9.42E+00	2.73E-01	6.27E-01	2.71E+00	3.37E+00	3.72E+00
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
Parameter			**Symbol**	**Description**	**Units**	**Radionuclides - Kọọ eí doo nahaazáh dah (difficult access open space)**			**PRGs for non-SE Radionuclides - Kọọ eí doo nahaazáh dah (difficult access open space)**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**4.66E-01**	**4.44E-01**	**2.68E-01**	**3.94E+00**	**4.03E+00**	**8.94E-01**	**6.55E+01**	**2.22E+01**	**2.44E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	9.73E+00	9.27E+00	5.42E+00	8.91E+01	8.70E+01	1.80E+01	1.48E+03	4.55E+02	5.02E+02
		Sumac (skunkbush and other)				9.73E+00	9.14E+00	1.57E+01	6.04E+01	6.42E+01	5.79E+01	4.33E+02	5.19E+02	5.72E+02
		Soaptree Yucca				8.01E+00	7.49E+00	1.34E+01	5.97E+01	5.52E+01	4.98E+01	3.36E+02	4.06E+02	4.48E+02
		Sagebrush				8.26E-01	7.89E-01	4.41E-01	7.16E+00	7.39E+00	1.46E+00	1.61E+02	3.89E+01	4.29E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--	--
		Other Plant Types				1.65E+00	1.58E+00	8.82E-01	1.43E+01	1.48E+01	2.92E+00	3.22E+02	7.79E+01	8.59E+01

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for Secular Equilibrium Progeny Radionuclides of Ra-226					
						Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Ra-226
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Sumac (skunkbush and other)				1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Soaptree Yucca				1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Sagebrush				1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Corn Pollen and Other Corn				1.00E-01	1.00E-01	2.80E-03	2.80E-03	2.40E-04	1.80E-02
		Other Plant Types				1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	4.20E-01
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Progeny - Chíí dah wiih leezh (washes and drainages)**					
						Bi-210	**Bi-214**	**Pb-210**	**Pb-214**	**Po-210**	**Ra-226**
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**6.92E+00**	**3.39E+02**	**7.62E-02**	**1.85E+02**	**4.00E-02**	**1.75E-01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	3.10E+02	1.52E+04	3.41E+00	8.30E+03	1.79E+00	7.83E+00
		Sumac (skunkbush and other)				4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				2.48E+01	1.22E+03	2.73E-01	6.64E+02	1.43E-01	6.27E-01
		Corn Pollen and Other Corn				1.65E+01	8.10E+02	1.82E-01	4.43E+02	9.54E-02	4.18E-01
		Other Plant Types				4.95E+01	2.43E+03	5.46E-01	1.33E+03	2.86E-01	1.25E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Progeny - Chíí dah wiih leezh (washes and drainages)**					
						Bi-210	**Bi-214**	**Pb-210**	**Pb-214**	**Po-210**	**Ra-226**
Preliminary Remediation Goals for Progeny of Ra-226 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**6.36E+01**	**3.12E+03**	**1.63E+00**	**3.98E+03**	**3.29E+00**	**8.62E-01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	2.55E+03	1.25E+05	3.36E+01	8.17E+04	6.17E+01	1.77E+01
		Sumac (skunkbush and other)				4.42E+02	2.17E+04	2.48E+01	6.04E+04	2.35E+01	5.70E+01
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				2.14E+02	1.05E+04	2.85E+00	6.95E+03	6.22E+00	1.44E+00
		Corn Pollen and Other Corn				1.65E+02	8.09E+03	6.18E+01	1.50E+05	2.48E+02	2.30E+01
		Other Plant Types				4.29E+02	2.10E+04	5.71E+00	1.39E+04	1.24E+01	2.88E+00

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniculides					
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	75	75	75	75	75	75	75	75
	Decay Constant		λ		1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		PRG_{decay}	Half-life decay function to account for the fact that the radionuclide decays over time. Set to 1 for secular equilibrium cases.	Unitless	1.00	1.00	1.00	1.00	2.59	1.02	1.00	1.00	1.00
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				--	--	--	3.00E-01	2.80E-03	1.80E-02	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Secular Equilibrium Radionuclides - Chíí dah wiih łeezh (washes and drainages)**			**PRGs for non-SE Radionuclides - Chíí dah wiih łeezh (washes and drainages)**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - Direct ODL Plant Ingestion, by Plant Type	**Plant PRG for Total ODL Plant Ingestion**		$PRG_{ODL-ing-plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**2.27E-02**	**2.10E-02**	**4.55E-02**	**2.63E+00**	**7.62E-02**	**1.75E-01**	**7.56E-01**	**9.42E-01**	**1.04E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-ing-plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	1.02E+00	9.38E-01	2.03E+00	1.18E+02	3.41E+00	7.83E+00	3.38E+01	4.22E+01	4.65E+01
		Sumac (skunkbush and other)				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				8.14E-02	7.50E-02	1.63E-01	9.42E+00	2.73E-01	6.27E-01	2.71E+00	3.37E+00	3.72E+00
		Corn Pollen and Other Corn				5.42E-02	5.00E-02	1.09E-01	6.28E+00	1.82E-01	4.18E-01	1.80E+00	2.25E+00	2.48E+00
		Other Plant Types				1.63E-01	1.50E-01	3.26E-01	1.88E+01	5.46E-01	1.25E+00	5.41E+00	6.74E+00	7.44E+00
Parameter			**Symbol**	**Description**	**Units**	**Radionuclides - Chíí dah wiih łeezh (washes and drainages)**			**PRGs for non-SE Radionuclides - Chíí dah wiih łeezh (washes and drainages)**					
						Ra-226 in SE	**U-238 in SE**	**Th-232 in SE**	**K-40**	**Pb-210**	**Ra-226**	**Th-230**	**U-234**	**U-238**
Preliminary Remediation Goals - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	**Soil PRG for Total ODL Plant Ingestion**		$PRG_{ODL-ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**4.78E-01**	**4.55E-01**	**2.64E-01**	**3.51E+00**	**4.23E+00**	**8.76E-01**	**7.48E+01**	**2.17E+01**	**2.39E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	9.73E+00	9.27E+00	5.42E+00	8.91E+01	8.70E+01	1.80E+01	1.48E+03	4.55E+02	5.02E+02
		Sumac (skunkbush and other)				9.73E+00	9.14E+00	1.57E+01	6.04E+01	6.42E+01	5.79E+01	4.33E+02	5.19E+02	5.72E+02
		Soaptree Yucca				--	--	--	--	--	--	--	--	--
		Sagebrush				8.26E-01	7.89E-01	4.41E-01	7.16E+00	7.39E+00	1.46E+00	1.61E+02	3.89E+01	4.29E+01
		Corn Pollen and Other Corn				1.43E+01	1.28E+01	6.96E+00	2.09E+01	1.60E+02	2.34E+01	9.28E+02	2.83E+02	3.12E+02
		Other Plant Types				1.65E+00	1.58E+00	8.82E-01	1.43E+01	1.48E+01	2.92E+00	3.22E+02	7.79E+01	8.59E+01

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	SE for Th-232	Transfer Factors for SE Progeny Radionuclides of Th-232						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Sumac (skunkbush and other)				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Soaptree Yucca				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Sagebrush				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Corn Pollen and Other Corn				--	1.00E-03	1.00E-01	2.80E-03	1.80E-02	1.80E-02	1.80E-03	1.80E-03
		Other Plant Types				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Custom						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant(i)}}}$	pCi/g	3.99E-02	2.89E+01	7.82E+01	2.21E+00	3.32E-01	5.56E-02	5.33E-01	5.94E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant(i)}$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant(i)} = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	2.03E+00	1.47E+03	3.99E+03	1.13E+02	1.69E+01	2.84E+00	2.72E+01	3.03E+01
		Sumac (skunkbush and other)				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Soaptree Yucca				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Sagebrush				1.63E-01	1.18E+02	3.19E+02	9.02E+00	1.35E+00	2.27E-01	2.18E+00	2.42E+00
		Corn Pollen and Other Corn				1.09E-01	7.86E+01	2.13E+02	6.01E+00	9.02E-01	1.51E-01	1.45E+00	1.61E+00
		Other Plant Types				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Custom						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny of Th-232 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing(i)}}}$	pCi/g	2.58E-01	2.73E+03	7.13E+02	5.02E+01	1.83E+00	3.07E-01	4.92E+01	5.47E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing(i)}$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing(i)} = \frac{PRG_{ODL-ing-plant(i)}}{(Br_{wet} + MLF_{produce})}$	pCi/g	5.42E+00	6.52E+04	3.28E+04	1.11E+03	3.83E+01	6.42E+00	1.19E+03	1.33E+03
		Sumac (skunkbush and other)				1.57E+01	1.81E+04	5.69E+03	8.20E+02	1.23E+02	2.06E+01	3.48E+02	3.87E+02
		Soaptree Yucca				1.34E+01	1.42E+04	5.52E+03	7.05E+02	1.06E+02	1.77E+01	2.70E+02	3.01E+02
		Sagebrush				4.41E-01	7.11E+03	2.76E+03	9.44E+01	3.11E+00	5.21E-01	1.30E+02	1.44E+02
		Corn Pollen and Other Corn				6.96E+00	6.87E+04	2.12E+03	2.04E+03	4.97E+01	8.33E+00	7.46E+02	8.30E+02
		Other Plant Types				8.82E-01	1.42E+04	5.52E+03	1.89E+02	6.21E+00	1.04E+00	2.59E+02	2.88E+02

Inputs	Parameter		Symbol	Description	Units	SE for U-238	Transfer Factors for SE Progeny Radionuclides of						
							Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Sumac (skunkbush and other)				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Soaptree Yucca				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Sagebrush				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Corn Pollen and Other Corn				--	1.00E-01	1.00E-01	1.00E-02	2.80E-03	2.80E-03	2.40E-04	1.80E-02
		Other Plant Types				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
Fractional Contribution of Progeny			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for U-238	PRGs for Progeny - Custom						
							Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant(i)}}}$	pCi/g	1.84E-02	6.07E+00	2.98E+02	2.63E+01	6.69E-02	1.63E+02	3.51E-02	1.54E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant(i)}$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant(i)} = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	9.38E-01	3.10E+02	1.52E+04	1.34E+03	3.41E+00	8.30E+03	1.79E+00	7.83E+00
		Sumac (skunkbush and other)				1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01	1.33E+03	2.86E-01	1.25E+00
		Soaptree Yucca				1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01	1.33E+03	2.86E-01	1.25E+00
		Sagebrush				7.50E-02	2.48E+01	1.22E+03	1.07E+02	2.73E-01	6.64E+02	1.43E-01	6.27E-01
		Corn Pollen and Other Corn				5.00E-02	1.65E+01	8.10E+02	7.16E+01	1.82E-01	4.43E+02	9.54E-02	4.18E-01
		Other Plant Types				1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01	1.33E+03	2.86E-01	1.25E+00

Outputs	Parameter		Symbol	Description	Units	SE for U-238	PRGs for Progeny - Custom						
							Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing(i)}}}$	pCi/g	4.29E-01	5.54E+01	2.72E+03	1.34E+03	1.52E+00	3.69E+03	2.78E+00	8.47E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing(i)}$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing(i)} = \frac{PRG_{ODL-ing-plant(i)}}{(Br_{wet} + MLF_{produce})}$	pCi/g	9.27E+00	2.55E+03	1.25E+05	4.25E+04	3.36E+01	8.17E+04	6.17E+01	1.77E+01
		Sumac (skunkbush and other)				9.14E+00	4.42E+02	2.17E+04	9.76E+03	2.48E+01	6.04E+04	2.35E+01	5.70E+01
		Soaptree Yucca				7.49E+00	4.29E+02	2.10E+04	8.39E+03	2.13E+01	5.19E+04	1.81E+01	4.90E+01
		Sagebrush				7.89E-01	2.14E+02	1.05E+04	4.19E+03	2.85E+00	6.95E+03	6.22E+00	1.44E+00
		Corn Pollen and Other Corn				1.28E+01	1.65E+02	8.09E+03	7.05E+03	6.18E+01	1.50E+05	2.48E+02	2.30E+01
		Other Plant Types				1.58E+00	4.29E+02	2.10E+04	8.39E+03	5.71E+00	1.39E+04	1.24E+01	2.88E+00

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units		Transfer Factors for SE Progeny Radionuclides of Th-232					
						SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Sumac (skunkbush and other)				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Soaptree Yucca				--	1.00E-03	1.00E-01	1.00E-01	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Sagebrush				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Corn Pollen and Other Corn				--	1.00E-03	1.00E-01	2.80E-03	1.80E-02	1.80E-02	1.80E-03	1.80E-03
		Other Plant Types				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units		PRGs for Progeny - Kee'da'whíí tééh (full-time Navajo residential)					
						SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant(i)}}}$	pCi/g	3.99E-02	2.89E+01	7.82E+01	2.21E+00	3.32E-01	5.56E-02	5.33E-01	5.94E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant(i)}$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant(i)} = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	2.03E+00	1.47E+03	3.99E+03	1.13E+02	1.69E+01	2.84E+00	2.72E+01	3.03E+01
		Sumac (skunkbush and other)				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Soaptree Yucca				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Sagebrush				1.63E-01	1.18E+02	3.19E+02	9.02E+00	1.35E+00	2.27E-01	2.18E+00	2.42E+00
		Corn Pollen and Other Corn				1.09E-01	7.86E+01	2.13E+02	6.01E+00	9.02E-01	1.51E-01	1.45E+00	1.61E+00
		Other Plant Types				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00

Outputs	Parameter		Symbol	Description	Units		PRGs for Progeny - Kee'da'whíí tééh (full-time Navajo residential)					
						SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny of Th-232 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing(i)}}}$	pCi/g	2.58E-01	2.73E+03	7.13E+02	5.02E+01	1.83E+00	3.07E-01	4.92E+01	5.47E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing(i)}$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing(i)} = \frac{PRG_{ODL-ing-plant(i)}}{(Br_{wet} + MLF_{produce})}$	pCi/g	5.42E+00	6.52E+04	3.28E+04	1.11E+03	3.83E+01	6.42E+00	1.19E+03	1.33E+03
		Sumac (skunkbush and other)				1.57E+01	1.81E+04	5.69E+03	8.20E+02	1.23E+02	2.06E+01	3.48E+02	3.87E+02
		Soaptree Yucca				1.34E+01	1.42E+04	5.52E+03	7.05E+02	1.06E+02	1.77E+01	2.70E+02	3.01E+02
		Sagebrush				4.41E-01	7.11E+03	2.76E+03	9.44E+01	3.11E+00	5.21E-01	1.30E+02	1.44E+02
		Corn Pollen and Other Corn				6.96E+00	6.87E+04	2.12E+03	2.04E+03	4.97E+01	8.33E+00	7.46E+02	8.30E+02
		Other Plant Types				8.82E-01	1.42E+04	5.52E+03	1.89E+02	6.21E+00	1.04E+00	2.59E+02	2.88E+02

Inputs	Parameter		Symbol	Description	Units	U-238							
						Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02
		Sumac (skunkbush and other)				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01	1.00E-01	1.00E-02
		Soaptree Yucca				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01	1.00E-01	1.00E-02
		Sagebrush				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02
		Corn Pollen and Other Corn				1.80E-03	1.80E-03	7.80E-03	7.80E-03	--	1.00E-01	1.00E-01	1.00E-02
		Other Plant Types				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02
Fractional Contribution of Progeny			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.60E-03

Outputs	Parameter		Symbol	Description	Units							
						Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant(i)}}}$	pCi/g	6.63E-01	2.33E+00	8.27E-01	9.12E-01	1.84E-02	6.07E+00	2.98E+02	2.63E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant(i)}$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant(i)} = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	3.38E+01	1.19E+02	4.22E+01	4.65E+01	9.38E-01	3.10E+02	1.52E+04	1.34E+03
		Sumac (skunkbush and other)				5.41E+00	1.90E+01	6.74E+00	7.44E+00	1.50E-01	4.95E+01	2.43E+03	2.15E+02
		Soaptree Yucca				5.41E+00	1.90E+01	6.74E+00	7.44E+00	1.50E-01	4.95E+01	2.43E+03	2.15E+02
		Sagebrush				2.71E+00	9.50E+00	3.37E+00	3.72E+00	7.50E-02	2.48E+01	1.22E+03	1.07E+02
		Corn Pollen and Other Corn				1.80E+00	6.33E+00	2.25E+00	2.48E+00	5.00E-02	1.65E+01	8.10E+02	7.16E+01
		Other Plant Types				5.41E+00	1.90E+01	6.74E+00	7.44E+00	1.50E-01	4.95E+01	2.43E+03	2.15E+02

Outputs	Parameter		Symbol	Description	Units							
						Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing(i)}}}$	pCi/g	6.12E+01	2.15E+02	2.06E+01	2.27E+01	4.29E-01	5.54E+01	2.72E+03	1.34E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing(i)}$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing(i)} = \frac{PRG_{ODl-ing-plant(i)}}{(Br_{wet} + MLF_{produce})}$	pCi/g	1.48E+03	5.21E+03	4.55E+02	5.02E+02	9.27E+00	2.55E+03	1.25E+05	4.25E+04
		Sumac (skunkbush and other)				4.33E+02	1.52E+03	5.19E+02	5.72E+02	9.14E+00	4.42E+02	2.17E+04	9.76E+03
		Soaptree Yucca				3.36E+02	1.18E+03	4.06E+02	4.48E+02	7.49E+00	4.29E+02	2.10E+04	8.39E+03
		Sagebrush				1.61E+02	5.65E+02	3.89E+01	4.29E+01	7.89E-01	2.14E+02	1.05E+04	4.19E+03
		Corn Pollen and Other Corn				9.28E+02	3.26E+03	2.83E+02	3.12E+02	1.28E+01	1.65E+02	8.09E+03	7.05E+03
		Other Plant Types				3.22E+02	1.13E+03	7.79E+01	8.59E+01	1.58E+00	4.29E+02	2.10E+04	8.39E+03

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of Th-232						
						SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Sumac (skunkbush and other)				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Soaptree Yucca				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Sagebrush				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Corn Pollen and Other Corn				--	1.00E-03	1.00E-01	2.80E-03	1.80E-02	1.80E-02	1.80E-03	1.80E-03
		Other Plant Types				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**		PRGs for Progeny - Kǫǫh bi łíí nakaí (sheep camp)						
						SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	3.99E-02	2.89E+01	7.82E+01	2.21E+00	3.32E-01	5.56E-02	5.33E-01	5.94E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	2.03E+00	1.47E+03	3.99E+03	1.13E+02	1.69E+01	2.84E+00	2.72E+01	3.03E+01
		Sumac (skunkbush and other)				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Soaptree Yucca				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Sagebrush				1.63E-01	1.18E+02	3.19E+02	9.02E+00	1.35E+00	2.27E-01	2.18E+00	2.42E+00
		Corn Pollen and Other Corn				1.09E-01	7.86E+01	2.13E+02	6.01E+00	9.02E-01	1.51E-01	1.45E+00	1.61E+00
		Other Plant Types				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**		PRGs for Progeny - Kǫǫh bi łíí nakaí (sheep camp)						
						SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny of Th-232 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	2.58E-01	2.73E+03	7.13E+02	5.02E+01	1.83E+00	3.07E-01	4.92E+01	5.47E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	5.42E+00	6.52E+04	3.28E+04	1.11E+03	3.83E+01	6.42E+00	1.19E+03	1.33E+03
		Sumac (skunkbush and other)				1.57E+01	1.81E+04	5.69E+03	8.20E+02	1.23E+02	2.06E+01	3.48E+02	3.87E+02
		Soaptree Yucca				1.34E+01	1.42E+04	5.52E+03	7.05E+02	1.06E+02	1.77E+01	2.70E+02	3.01E+02
		Sagebrush				4.41E-01	7.11E+03	2.76E+03	9.44E+01	3.11E+00	5.21E-01	1.30E+02	1.44E+02
		Corn Pollen and Other Corn				6.96E+00	6.87E+04	2.12E+03	2.04E+03	4.97E+01	8.33E+00	7.46E+02	8.30E+02
		Other Plant Types				8.82E-01	1.42E+04	5.52E+03	1.89E+02	6.21E+00	1.04E+00	2.59E+02	2.88E+02

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of U-238							
						Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	8.00E-02	8.00E-02	7.40E-03	4.20E-01	1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				1.00E-02	1.00E-02	2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				1.00E-02	1.00E-02	2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				8.00E-02	8.00E-02	7.40E-03	4.20E-01	1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				2.80E-03	2.80E-03	2.40E-04	1.80E-02	1.80E-03	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				8.00E-02	8.00E-02	7.40E-03	4.20E-01	1.20E-03	1.20E-03	7.10E-02	7.10E-02
Fractional Contribution of Progeny			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	PRGs for Progeny - Kee'da'whíí tééh (full-time Navajo residential)							
						Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	6.69E-02	1.63E+02	3.51E-02	1.54E-01	6.63E-01	2.33E+00	8.27E-01	9.12E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	3.41E+00	8.30E+03	1.79E+00	7.83E+00	3.38E+01	1.19E+02	4.22E+01	4.65E+01
		Sumac (skunkbush and other)				5.46E-01	1.33E+03	2.86E-01	1.25E+00	5.41E+00	1.90E+01	6.74E+00	7.44E+00
		Soaptree Yucca				5.46E-01	1.33E+03	2.86E-01	1.25E+00	5.41E+00	1.90E+01	6.74E+00	7.44E+00
		Sagebrush				2.73E-01	6.64E+02	1.43E-01	6.27E-01	2.71E+00	9.50E+00	3.37E+00	3.72E+00
		Corn Pollen and Other Corn				1.82E-01	4.43E+02	9.54E-02	4.18E-01	1.80E+00	6.33E+00	2.25E+00	2.48E+00
		Other Plant Types				5.46E-01	1.33E+03	2.86E-01	1.25E+00	5.41E+00	1.90E+01	6.74E+00	7.44E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	PRGs for Progeny - Kee'da'whíí tééh (full-time Navajo residential)							
						Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	1.52E+00	3.69E+03	2.78E+00	8.47E-01	6.12E+01	2.15E+02	2.06E+01	2.27E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	3.36E+01	8.17E+04	6.17E+01	1.77E+01	1.48E+03	5.21E+03	4.55E+02	5.02E+02
		Sumac (skunkbush and other)				2.48E+01	6.04E+04	2.35E+01	5.70E+01	4.33E+02	1.52E+03	5.19E+02	5.72E+02
		Soaptree Yucca				2.13E+01	5.19E+04	1.81E+01	4.90E+01	3.36E+02	1.18E+03	4.06E+02	4.48E+02
		Sagebrush				2.85E+00	6.95E+03	6.22E+00	1.44E+00	1.61E+02	5.65E+02	3.89E+01	4.29E+01
		Corn Pollen and Other Corn				6.18E+01	1.50E+05	2.48E+02	2.30E+01	9.28E+02	3.26E+03	2.83E+02	3.12E+02
		Other Plant Types				5.71E+00	1.39E+04	1.24E+01	2.88E+00	3.22E+02	1.13E+03	7.79E+01	8.59E+01

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	SE for Th-232	Transfer Factors for SE Progeny Radionuclides of Th-232						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Sumac (skunkbush and other)				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Soaptree Yucca				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Sagebrush				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Corn Pollen and Other Corn				--	1.00E-03	1.00E-01	2.80E-03	1.80E-02	1.80E-02	1.80E-03	1.80E-03
		Other Plant Types				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kǫǫ eí nahaazáh (easy access open space)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL-ing-plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	6.31E-02	4.57E+01	1.24E+02	3.50E+00	5.24E-01	8.79E-02	8.43E-01	9.39E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-ing-plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	2.03E+00	1.47E+03	3.99E+03	1.13E+02	1.69E+01	2.84E+00	2.72E+01	3.03E+01
		Sumac (skunkbush and other)				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Soaptree Yucca				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Sagebrush				1.63E-01	1.18E+02	3.19E+02	9.02E+00	1.35E+00	2.27E-01	2.18E+00	2.42E+00
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kǫǫ eí nahaazáh (easy access open space)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny of Th-232 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL-ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	2.68E-01	2.84E+03	1.07E+03	5.15E+01	1.90E+00	3.18E-01	5.27E+01	5.86E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	5.42E+00	6.52E+04	3.28E+04	1.11E+03	3.83E+01	6.42E+00	1.19E+03	1.33E+03
		Sumac (skunkbush and other)				1.57E+01	1.81E+04	5.69E+03	8.20E+02	1.23E+02	2.06E+01	3.48E+02	3.87E+02
		Soaptree Yucca				1.34E+01	1.42E+04	5.52E+03	7.05E+02	1.06E+02	1.77E+01	2.70E+02	3.01E+02
		Sagebrush				4.41E-01	7.11E+03	2.76E+03	9.44E+01	3.11E+00	5.21E-01	1.30E+02	1.44E+02
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				8.82E-01	1.42E+04	5.52E+03	1.89E+02	6.21E+00	1.04E+00	2.59E+02	2.88E+02

Inputs	Parameter		Symbol	Description	Units	SE for U-238	Transfer Factors for SE Progeny Radionuclides of						
							Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Sumac (skunkbush and other)				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Soaptree Yucca				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Sagebrush				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Corn Pollen and Other Corn				--	1.00E-01	1.00E-01	1.00E-02	2.80E-03	2.80E-03	2.40E-04	1.80E-02
		Other Plant Types				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
Fractional Contribution of Progeny			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for U-238	PRGs for Progeny - Kǫǫh bí líí nakaí (sheep car						
							Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL-ing-plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	1.84E-02	6.07E+00	2.98E+02	2.63E+01	6.69E-02	1.63E+02	3.51E-02	1.54E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-ing-plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	9.38E-01	3.10E+02	1.52E+04	1.34E+03	3.41E+00	8.30E+03	1.79E+00	7.83E+00
		Sumac (skunkbush and other)				1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01	1.33E+03	2.86E-01	1.25E+00
		Soaptree Yucca				1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01	1.33E+03	2.86E-01	1.25E+00
		Sagebrush				7.50E-02	2.48E+01	1.22E+03	1.07E+02	2.73E-01	6.64E+02	1.43E-01	6.27E-01
		Corn Pollen and Other Corn				5.00E-02	1.65E+01	8.10E+02	7.16E+01	1.82E-01	4.43E+02	9.54E-02	4.18E-01
		Other Plant Types				1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01	1.33E+03	2.86E-01	1.25E+00

Outputs	Parameter		Symbol	Description	Units	SE for U-238	PRGs for Progeny - Kǫǫh bí líí nakaí (sheep car						
							Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL-ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	4.29E-01	5.54E+01	2.72E+03	1.34E+03	1.52E+00	3.69E+03	2.78E+00	8.47E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODl-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	9.27E+00	2.55E+03	1.25E+05	4.25E+04	3.36E+01	8.17E+04	6.17E+01	1.77E+01
		Sumac (skunkbush and other)				9.14E+00	4.42E+02	2.17E+04	9.76E+03	2.48E+01	6.04E+04	2.35E+01	5.70E+01
		Soaptree Yucca				7.49E+00	4.29E+02	2.10E+04	8.39E+03	2.13E+01	5.19E+04	1.81E+01	4.90E+01
		Sagebrush				7.89E-01	2.14E+02	1.05E+04	4.19E+03	2.85E+00	6.95E+03	6.22E+00	1.44E+00
		Corn Pollen and Other Corn				1.28E+01	1.65E+02	8.09E+03	7.05E+03	6.18E+01	1.50E+05	2.48E+02	2.30E+01
		Other Plant Types				1.58E+00	4.29E+02	2.10E+04	8.39E+03	5.71E+00	1.39E+04	1.24E+01	2.88E+00

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	SE for Th-232	Transfer Factors for SE Progeny Radionuclides of Th-232						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Sumac (skunkbush and other)				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Soaptree Yucca				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Sagebrush				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Corn Pollen and Other Corn				--	1.00E-03	1.00E-01	2.80E-03	1.80E-02	1.80E-02	1.80E-03	1.80E-03
		Other Plant Types				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kǫǫ ei doo nahaazáh dah (difficult access open space)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant(i)}}}$	pCi/g	6.31E-02	4.57E+01	1.24E+02	3.50E+00	5.24E-01	8.79E-02	8.43E-01	9.39E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant(i)}$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant(i)} = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	2.03E+00	1.47E+03	3.99E+03	1.13E+02	1.69E+01	2.84E+00	2.72E+01	3.03E+01
		Sumac (skunkbush and other)				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Soaptree Yucca				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Sagebrush				1.63E-01	1.18E+02	3.19E+02	9.02E+00	1.35E+00	2.27E-01	2.18E+00	2.42E+00
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Kǫǫ ei doo nahaazáh dah (difficult access open space)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny of Th-232 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing(i)}}}$	pCi/g	2.68E-01	2.84E+03	1.07E+03	5.15E+01	1.90E+00	3.18E-01	5.27E+01	5.86E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing(i)}$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing(i)} = \frac{PRG_{ODL-ing-plant(i)}}{(Br_{wet} + MLF_{produce})}$	pCi/g	5.42E+00	6.52E+04	3.28E+04	1.11E+03	3.83E+01	6.42E+00	1.19E+03	1.33E+03
		Sumac (skunkbush and other)				1.57E+01	1.81E+04	5.69E+03	8.20E+02	1.23E+02	2.06E+01	3.48E+02	3.87E+02
		Soaptree Yucca				1.34E+01	1.42E+04	5.52E+03	7.05E+02	1.06E+02	1.77E+01	2.70E+02	3.01E+02
		Sagebrush				4.41E-01	7.11E+03	2.76E+03	9.44E+01	3.11E+00	5.21E-01	1.30E+02	1.44E+02
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				8.82E-01	1.42E+04	5.52E+03	1.89E+02	6.21E+00	1.04E+00	2.59E+02	2.88E+02

Inputs	Parameter		Symbol	Description	Units	U-238				SE for U-238			
						Th-230	Th-234	U-234	U-238		Bi-210	Bi-214	Pa-234
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02
		Sumac (skunkbush and other)				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01	1.00E-01	1.00E-02
		Soaptree Yucca				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01	1.00E-01	1.00E-02
		Sagebrush				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02
		Corn Pollen and Other Corn				1.80E-03	1.80E-03	7.80E-03	7.80E-03	--	1.00E-01	1.00E-01	1.00E-02
		Other Plant Types				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02
Fractional Contribution of Progeny			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.60E-03

Outputs	Parameter		Symbol	Description	Units	np)							
						Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant(i)}}}$	pCi/g	6.63E-01	2.33E+00	8.27E-01	9.12E-01	2.91E-02	9.60E+00	4.71E+02	4.16E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant(i)}$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant(i)} = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	3.38E+01	1.19E+02	4.22E+01	4.65E+01	9.38E-01	3.10E+02	1.52E+04	1.34E+03
		Sumac (skunkbush and other)				5.41E+00	1.90E+01	6.74E+00	7.44E+00	1.50E-01	4.95E+01	2.43E+03	2.15E+02
		Soaptree Yucca				5.41E+00	1.90E+01	6.74E+00	7.44E+00	1.50E-01	4.95E+01	2.43E+03	2.15E+02
		Sagebrush				2.71E+00	9.50E+00	3.37E+00	3.72E+00	7.50E-02	2.48E+01	1.22E+03	1.07E+02
		Corn Pollen and Other Corn				1.80E+00	6.33E+00	2.25E+00	2.48E+00	--	--	--	--
		Other Plant Types				5.41E+00	1.90E+01	6.74E+00	7.44E+00	1.50E-01	4.95E+01	2.43E+03	2.15E+02

Outputs	Parameter		Symbol	Description	Units	np)							
						Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing(i)}}}$	pCi/g	6.12E+01	2.15E+02	2.06E+01	2.27E+01	4.44E-01	8.34E+01	4.09E+03	1.66E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing(i)}$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing(i)} = \frac{PRG_{ODl-ing-plant(i)}}{(Br_{wet} + MLF_{produce})}$	pCi/g	1.48E+03	5.21E+03	4.55E+02	5.02E+02	9.27E+00	2.55E+03	1.25E+05	4.25E+04
		Sumac (skunkbush and other)				4.33E+02	1.52E+03	5.19E+02	5.72E+02	9.14E+00	4.42E+02	2.17E+04	9.76E+03
		Soaptree Yucca				3.36E+02	1.18E+03	4.06E+02	4.48E+02	7.49E+00	4.29E+02	2.10E+04	8.39E+03
		Sagebrush				1.61E+02	5.65E+02	3.89E+01	4.29E+01	7.89E-01	2.14E+02	1.05E+04	4.19E+03
		Corn Pollen and Other Corn				9.28E+02	3.26E+03	2.83E+02	3.12E+02	--	--	--	--
		Other Plant Types				3.22E+02	1.13E+03	7.79E+01	8.59E+01	1.58E+00	4.29E+02	2.10E+04	8.39E+03

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	SE for Th-232	Transfer Factors for SE Progeny Radionuclides of Th-232						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Sumac (skunkbush and other)				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Soaptree Yucca				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	5.00E-04	5.00E-04
		Sagebrush				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
		Corn Pollen and Other Corn				--	1.00E-03	1.00E-01	2.80E-03	1.80E-02	1.80E-02	1.80E-03	1.80E-03
		Other Plant Types				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	1.20E-03	1.20E-03
Fractional Contribution of Progeny for Th-232			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Chíí dah wiih leezh (washes and drainages)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Direct ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	4.55E-02	3.30E+01	8.91E+01	2.52E+00	3.78E-01	6.34E-02	6.08E-01	6.76E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	2.03E+00	1.47E+03	3.99E+03	1.13E+02	1.69E+01	2.84E+00	2.72E+01	3.03E+01
		Sumac (skunkbush and other)				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.63E-01	1.18E+02	3.19E+02	9.02E+00	1.35E+00	2.27E-01	2.18E+00	2.42E+00
		Corn Pollen and Other Corn				1.09E-01	7.86E+01	2.13E+02	6.01E+00	9.02E-01	1.51E-01	1.45E+00	1.61E+00
		Other Plant Types				3.26E-01	2.36E+02	6.38E+02	1.80E+01	2.71E+00	4.54E-01	4.35E+00	4.84E+00

Outputs	Parameter		Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Chíí dah wiih leezh (washes and drainages)						
							Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Th-228	Th-232
Preliminary Remediation Goals for Progeny of Th-232 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	2.64E-01	3.38E+03	8.19E+02	5.40E+01	1.86E+00	3.12E-01	6.01E+01	6.69E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil.. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	5.42E+00	6.52E+04	3.28E+04	1.11E+03	3.83E+01	6.42E+00	1.19E+03	1.33E+03
		Sumac (skunkbush and other)				1.57E+01	1.81E+04	5.69E+03	8.20E+02	1.23E+02	2.06E+01	3.48E+02	3.87E+02
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				4.41E-01	7.11E+03	2.76E+03	9.44E+01	3.11E+00	5.21E-01	1.30E+02	1.44E+02
		Corn Pollen and Other Corn				6.96E+00	6.87E+04	2.12E+03	2.04E+03	4.97E+01	8.33E+00	7.46E+02	8.30E+02
		Other Plant Types				8.82E-01	1.42E+04	5.52E+03	1.89E+02	6.21E+00	1.04E+00	2.59E+02	2.88E+02

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of U-238							
						Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	8.00E-02	8.00E-02	7.40E-03	4.20E-01	1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				1.00E-02	1.00E-02	2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				1.00E-02	1.00E-02	2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				8.00E-02	8.00E-02	7.40E-03	4.20E-01	1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				2.80E-03	2.80E-03	2.40E-04	1.80E-02	1.80E-03	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				8.00E-02	8.00E-02	7.40E-03	4.20E-01	1.20E-03	1.20E-03	7.10E-02	7.10E-02
Fractional Contribution of Progeny			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kǫǫ eí nahaazáh (easy access open space)							
						Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	1.06E-01	2.57E+02	5.55E-02	2.43E-01	1.05E+00	3.68E+00	1.31E+00	1.44E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	3.41E+00	8.30E+03	1.79E+00	7.83E+00	3.38E+01	1.19E+02	4.22E+01	4.65E+01
		Sumac (skunkbush and other)				5.46E-01	1.33E+03	2.86E-01	1.25E+00	5.41E+00	1.90E+01	6.74E+00	7.44E+00
		Soaptree Yucca				5.46E-01	1.33E+03	2.86E-01	1.25E+00	5.41E+00	1.90E+01	6.74E+00	7.44E+00
		Sagebrush				2.73E-01	6.64E+02	1.43E-01	6.27E-01	2.71E+00	9.50E+00	3.37E+00	3.72E+00
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				5.46E-01	1.33E+03	2.86E-01	1.25E+00	5.41E+00	1.90E+01	6.74E+00	7.44E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Kǫǫ eí nahaazáh (easy access open space)							
						Pb-210	Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	1.56E+00	3.79E+03	2.82E+00	8.79E-01	6.55E+01	2.30E+02	2.22E+01	2.44E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	3.36E+01	8.17E+04	6.17E+01	1.77E+01	1.48E+03	5.21E+03	4.55E+02	5.02E+02
		Sumac (skunkbush and other)				2.48E+01	6.04E+04	2.35E+01	5.70E+01	4.33E+02	1.52E+03	5.19E+02	5.72E+02
		Soaptree Yucca				2.13E+01	5.19E+04	1.81E+01	4.90E+01	3.36E+02	1.18E+03	4.06E+02	4.48E+02
		Sagebrush				2.85E+00	6.95E+03	6.22E+00	1.44E+00	1.61E+02	5.65E+02	3.89E+01	4.29E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				5.71E+00	1.39E+04	1.24E+01	2.88E+00	3.22E+02	1.13E+03	7.79E+01	8.59E+01

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	SE for U-238	Transfer Factors for SE Progeny Radionuclides of Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Sumac (skunkbush and other)				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Soaptree Yucca				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	1.00E-02
		Sagebrush				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
		Corn Pollen and Other Corn				--	1.00E-01	1.00E-01	1.00E-02	2.80E-03	2.80E-03	2.40E-04	1.80E-02
		Other Plant Types				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	4.20E-01
Fractional Contribution of Progeny			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	SE for U-238	PRGs for Progeny - Kǫǫ eí doo nahaazáh dah (difficult acces Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL-ing-plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**2.91E-02**	**9.60E+00**	**4.71E+02**	**4.16E+01**	**1.06E-01**	**2.57E+02**	**5.55E-02**	**2.43E-01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-ing-plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	9.38E-01	3.10E+02	1.52E+04	1.34E+03	3.41E+00	8.30E+03	1.79E+00	7.83E+00
		Sumac (skunkbush and other)				1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01	1.33E+03	2.86E-01	1.25E+00
		Soaptree Yucca				1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01	1.33E+03	2.86E-01	1.25E+00
		Sagebrush				7.50E-02	2.48E+01	1.22E+03	1.07E+02	2.73E-01	6.64E+02	1.43E-01	6.27E-01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01	1.33E+03	2.86E-01	1.25E+00

Outputs	Parameter		Symbol	Description	Units	SE for U-238	PRGs for Progeny - Kǫǫ eí doo nahaazáh dah (difficult acces Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL-ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**4.44E-01**	**8.34E+01**	**4.09E+03**	**1.66E+03**	**1.56E+00**	**3.79E+03**	**2.82E+00**	**8.79E-01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	9.27E+00	2.55E+03	1.25E+05	4.25E+04	3.36E+01	8.17E+04	6.17E+01	1.77E+01
		Sumac (skunkbush and other)				9.14E+00	4.42E+02	2.17E+04	9.76E+03	2.48E+01	6.04E+04	2.35E+01	5.70E+01
		Soaptree Yucca				7.49E+00	4.29E+02	2.10E+04	8.39E+03	2.13E+01	5.19E+04	1.81E+01	4.90E+01
		Sagebrush				7.89E-01	2.14E+02	1.05E+04	4.19E+03	2.85E+00	6.95E+03	6.22E+00	1.44E+00
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.58E+00	4.29E+02	2.10E+04	8.39E+03	5.71E+00	1.39E+04	1.24E+01	2.88E+00

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	U-238				SE for U-238	Trans			
						Th-230	Th-234	U-234	U-238		Bi-210	Bi-214	Pa-234	Pb-210
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02
		Sumac (skunkbush and other)				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02
		Soaptree Yucca				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02
		Sagebrush				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02
		Corn Pollen and Other Corn				1.80E-03	1.80E-03	7.80E-03	7.80E-03	--	1.00E-01	1.00E-01	1.00E-02	2.80E-03
		Other Plant Types				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02
Fractional Contribution of Progeny			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00

Outputs	Parameter		Symbol	Description	Units	ss open space)				SE for U-238				PRGs for I
						Th-230	Th-234	U-234	U-238		Bi-210	Bi-214	Pa-234	Pb-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	**1.05E+00**	**3.68E+00**	**1.31E+00**	**1.44E+00**	**2.10E-02**	**6.92E+00**	**3.39E+02**	**3.00E+01**	**7.62E-02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$		3.38E+01	1.19E+02	4.22E+01	4.65E+01	9.38E-01	3.10E+02	1.52E+04	1.34E+03	3.41E+00
		Sumac (skunkbush and other)				5.41E+00	1.90E+01	6.74E+00	7.44E+00	1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01
		Soaptree Yucca				5.41E+00	1.90E+01	6.74E+00	7.44E+00	--	--	--	--	--
		Sagebrush				2.71E+00	9.50E+00	3.37E+00	3.72E+00	7.50E-02	2.48E+01	1.22E+03	1.07E+02	2.73E-01
		Corn Pollen and Other Corn				--	--	--	--	5.00E-02	1.65E+01	8.10E+02	7.16E+01	1.82E-01
		Other Plant Types				5.41E+00	1.90E+01	6.74E+00	7.44E+00	1.50E-01	4.95E+01	2.43E+03	2.15E+02	5.46E-01

Outputs	Parameter		Symbol	Description	Units	ss open space)				SE for U-238				PRGs for I
						Th-230	Th-234	U-234	U-238		Bi-210	Bi-214	Pa-234	Pb-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	**6.55E+01**	**2.30E+02**	**2.22E+01**	**2.44E+01**	**4.55E-01**	**6.36E+01**	**3.12E+03**	**1.60E+03**	**1.63E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$		1.48E+03	5.21E+03	4.55E+02	5.02E+02	9.27E+00	2.55E+03	1.25E+05	4.25E+04	3.36E+01
		Sumac (skunkbush and other)				4.33E+02	1.52E+03	5.19E+02	5.72E+02	9.14E+00	4.42E+02	2.17E+04	9.76E+03	2.48E+01
		Soaptree Yucca				3.36E+02	1.18E+03	4.06E+02	4.48E+02	--	--	--	--	--
		Sagebrush				1.61E+02	5.65E+02	3.89E+01	4.29E+01	7.89E-01	2.14E+02	1.05E+04	4.19E+03	2.85E+00
		Corn Pollen and Other Corn				--	--	--	--	1.28E+01	1.65E+02	8.09E+03	7.05E+03	6.18E+01
		Other Plant Types				3.22E+02	1.13E+03	7.79E+01	8.59E+01	1.58E+00	4.29E+02	2.10E+04	8.39E+03	5.71E+00

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of U-238						
						Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	8.00E-02	7.40E-03	4.20E-01	1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				1.00E-02	2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				1.00E-02	2.00E-04	1.00E-02	5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				8.00E-02	7.40E-03	4.20E-01	1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				2.80E-03	2.40E-04	1.80E-02	1.80E-03	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				8.00E-02	7.40E-03	4.20E-01	1.20E-03	1.20E-03	7.10E-02	7.10E-02
Fractional Contribution of Progeny			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**Progeny - Chíí dah wiih leezh (washes and drainages)**						
						Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion, by Plant Type	Plant PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing\text{-}plant}$	The preliminary remediation goals for all plant consumption. $PRG_{ODL-ing-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing-plant}(i)}}$	pCi/g	1.85E+02	4.00E-02	1.75E-01	7.56E-01	2.65E+00	9.42E-01	1.04E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing\text{-}plant}(i)$	The preliminary remediation goals for each type of plant consumption. $PRG_{ODL-ing-plant}(i) = \frac{TR}{(SF_f \times IF_{adj} \times CF_{produce})}$	pCi/g	8.30E+03	1.79E+00	7.83E+00	3.38E+01	1.19E+02	4.22E+01	4.65E+01
		Sumac (skunkbush and other)				1.33E+03	2.86E-01	1.25E+00	5.41E+00	1.90E+01	6.74E+00	7.44E+00
		Soaptree Yucca				--	--	--	--	--	--	--
		Sagebrush				6.64E+02	1.43E-01	6.27E-01	2.71E+00	9.50E+00	3.37E+00	3.72E+00
		Corn Pollen and Other Corn				4.43E+02	9.54E-02	4.18E-01	1.80E+00	6.33E+00	2.25E+00	2.48E+00
		Other Plant Types				1.33E+03	2.86E-01	1.25E+00	5.41E+00	1.90E+01	6.74E+00	7.44E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**Progeny - Chíí dah wiih leezh (washes and drainages)**						
						Pb-214	Po-210	Ra-226	Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - ODL Plant Ingestion Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Plant Ingestion		$PRG_{ODL\text{-}ing}$	The preliminary remediation goals for all plant consumption, back-calculated to soil. $PRG_{ODL-ing} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-ing}(i)}}$	pCi/g	3.98E+03	3.29E+00	8.62E-01	7.48E+01	2.63E+02	2.17E+01	2.39E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}ing}(i)$	The preliminary remediation goals for each type of plant consumption, back-calculated to soil. $PRG_{ODL-ing}(i) = \frac{PRG_{ODL-ing-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	8.17E+04	6.17E+01	1.77E+01	1.48E+03	5.21E+03	4.55E+02	5.02E+02
		Sumac (skunkbush and other)				6.04E+04	2.35E+01	5.70E+01	4.33E+02	1.52E+03	5.19E+02	5.72E+02
		Soaptree Yucca				--	--	--	--	--	--	--
		Sagebrush				6.95E+03	6.22E+00	1.44E+00	1.61E+02	5.65E+02	3.89E+01	4.29E+01
		Corn Pollen and Other Corn				1.50E+05	2.48E+02	2.30E+01	9.28E+02	3.26E+03	2.83E+02	3.12E+02
		Other Plant Types				1.39E+04	1.24E+01	2.88E+00	3.22E+02	1.13E+03	7.79E+01	8.59E+01

Attachment A - NAUM Calculation Tool

10 - ODL Plant Ingestion

Chemical-Specific Values

Parameter	Decay Constant	Half-life	Dry Soil-to-plant transfer factor	Wet Soil-to-plant transfer factor Woody tree	Wet Soil-to-plant transfer factor Leaf	Wet Soil-to-plant transfer factor Root	Wet Soil-to-plant transfer factor Shrub	Wet Soil-to-plant transfer factor Non-leafy fruit	Wet Soil-to-plant transfer factor Maize grain	Wet Soil-to-plant transfer factor Legume seed	Wet Soil-to-plant transfer factor Tuber	Wet Soil-to-plant transfer factor Herbaceous	Wet Soil-to-plant transfer factor Sunflower Leaf	Wet Soil-to-plant transfer factor Maize Stems and Shoots	Wet Soil-to-plant transfer factor Cereal Grains
Symbol	λ			Woody Tree	Leaf	Root	Shrub	Non-Leafy Fruit	Maize Grain	Legume Seed	Tuber	Herbaceous	Sunflower Leafe	Stems and Sh	Cereal
Units	1/year	years	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil
Isotope															
Ac-228	9.87E+02	7.02E-04		1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03
At-218	1.46E+07	4.76E-08		2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01
Bi-210	5.05E+01	1.37E-02		1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Bi-212	6.02E+03	1.15E-04		1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Bi-214	1.83E+04	3.79E-05		1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Hg-206	4.47E+04	1.55E-05		3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01
K-40	5.54E-10	1.25E+09		3.00E-01	1.30E+00	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	1.30E+00	3.00E-01	7.40E-01
Pa-234	9.06E+02	7.65E-04		1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
Pa-234m	3.11E+05	2.23E-06		1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
Pb-210	3.12E-02	2.22E+01		1.00E-02	8.00E-02	1.50E-02	1.00E-02	1.50E-02	1.20E-03	5.30E-03	1.50E-03	1.00E-02	8.00E-02	2.80E-03	1.10E-02
Pb-212	5.71E+02	1.21E-03		1.00E-02	8.00E-02	1.50E-02	1.00E-02	1.50E-02	1.20E-03	5.30E-03	1.50E-03	1.00E-02	8.00E-02	2.80E-03	1.10E-02
Pb-214	1.36E+04	5.10E-05		1.00E-02	8.00E-02	1.50E-02	1.00E-02	1.50E-02	1.20E-03	5.30E-03	1.50E-03	1.00E-02	8.00E-02	2.80E-03	1.10E-02
Po-210	1.83E+00	3.79E-01		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-212	7.31E+13	9.48E-15		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-214	1.33E+11	5.21E-12		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-216	1.51E+08	4.60E-09		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-218	1.17E+05	5.90E-06		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Ra-224	6.91E+01	1.00E-02		1.00E-02	9.10E-02	7.00E-02	1.00E-02	1.70E-02	2.40E-03	1.40E-02	1.10E-02	1.00E-02	4.20E-01	1.80E-02	1.70E-02
Ra-226	4.33E-04	1.60E+03		1.00E-02	9.10E-02	7.00E-02	1.00E-02	1.70E-02	2.40E-03	1.40E-02	1.10E-02	1.00E-02	4.20E-01	1.80E-02	1.70E-02
Ra-228	1.21E-01	5.75E+00		1.00E-02	9.10E-02	7.00E-02	1.00E-02	1.70E-02	2.40E-03	1.40E-02	1.10E-02	1.00E-02	4.20E-01	1.80E-02	1.70E-02
Rn-218	6.24E+08	1.11E-09		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn-220	3.93E+05	1.76E-06		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn-222	6.62E+01	1.05E-02		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Th-228	3.63E-01	1.91E+00		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Th-230	9.19E-06	7.54E+04		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Th-232	4.93E-11	1.41E+10		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Th-234	1.05E+01	6.60E-02		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Tl-206	8.67E+04	7.99E-06		8.00E-05	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04
Tl-208	1.19E+05	5.81E-06		8.00E-05	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04
Tl-210	2.80E+05	2.47E-06		8.00E-05	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04
U-234	2.82E-06	2.46E+05		1.00E-03	2.00E-02	8.40E-03	1.00E-03	1.50E-02	1.50E-02	2.20E-03	5.00E-03	1.00E-03	7.10E-02	7.80E-03	6.20E-03
U-238	1.55E-10	4.47E+09		1.00E-03	2.00E-02	8.40E-03	1.00E-03	1.50E-02	1.50E-02	2.20E-03	5.00E-03	1.00E-03	7.10E-02	7.80E-03	6.20E-03

Notes:
All transfer factors are from USEPA 2020, with the following exceptions:
Sunflower leaf transfer factors for Ra and U are taken from IAEA 2010. Transfer factors for all other radionuclides are from USEPA 2020.
Maize stems and shoots transfer factors for Pb, Ra, Th, and U are taken from IAEA 2010. Transfer factors for other radionuclides are based on maize grain from USEPA 2020.

Sources:
USEPA. 2020. Preliminary Remediation Goals for Radionuclides (PRG) Calculator. Downloaded November 2.
IAEA. 2010. Handbook of Parameter Values for the Prediction of Radionuclide Transfer in Terrestrial and Freshwater Environments. Technical Reports Series No. 472.

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

ODL Dermal Contact with Plant Materials

Selection =	Arsenic	Type = Metal	Concentration =	1	mg/kg

Cleanup Target and Risks [1,6]				User-Specified Scenario	Navajo Nation Reference Scenarios				
Outputs	**Parameter**	**Description**	**Units**	**Custom**	**Kee'da'whíí tééh (full-time Navajo residential)**	**Kọọh bí łíí nakaí (sheep camp)**	**Kọọ eí nahaazáh (easy access open space)**	**Kọọ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**
Cleanup Targets	Metal Cancer $PRG_{ODL\text{-}derm}$	Preliminary Remediation Goal based on the cancer toxicity for selected metal	mg/kg	111	111	111	113	113	192
	Metal Noncancer $PRG_{ODL\text{-}derm}$ [2,3]	Preliminary Remediation Goal based on the noncancer roxicity for selected metal	mg/kg	461	461	461	468	468	796
	Final Metal $PRG_{ODL\text{-}derm}$ [4,5]	Preliminary Remediation Goal for the selected metal	mg/kg	111	111	111	113	113	192
Risks and Hazards	Cancer Risk - Metals	Lifetime cancer risk for the selected metal	-	9.0E-07	9.0E-07	9.0E-07	8.8E-07	8.8E-07	5.2E-07
	Noncancer Hazard - Metals	Noncancer hazard for the selected metal	-	2.2E-03	2.2E-03	2.2E-03	2.1E-03	2.1E-03	1.3E-03

Inputs	Parameter		Symbol	Description		Units	User-Specified Scenario	Navajo Nation Reference Scenarios				
							Custom	**Kee'da'whíí tééh (full-time Navajo residential)**	**Kọọh bí łíí nakaí (sheep camp)**	**Kọọ eí nahaazáh (easy access open space)**	**Kọọ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**
Local Dermal Exposure Fraction	Local ODL Dermal Exposure Fraction of Produce		$CF_{produce\text{-}a}$	Contaminated Fraction - the average percentage of plants used that are grown locally (e.g., from a nearby field or wild collection area vs. from the supermarket or a local community market). Child set equal to adult.		Percent	100%	100%	100%	100%	100%	100%
			$CF_{produce\text{-}c}$				100%	100%	100%	100%	100%	100%
Dermal Exposure Rate by Plant Type - Adult	Herbs and Medicinal	Navajo Tea	DER_{adult}	The amount of plant used by adult receptors using a measure in flour bags. Each flour bag is equivalent to 15 cups of plant material. Source for defaults: NNEPA 2021. Consumption assumed to be zero for corn pollen and other corn in open space areas based on steepness of terrain. Consumption assume to be zero for soaptree yucca in washes and drainages based on...		flour bags/year	2.00	2.00	2.00	2.00	2.00	2.00
		Sumac (skunkbush and other)					6.00	6.00	6.00	6.00	6.00	6.00
		Soaptree Yucca					6.00	6.00	6.00	6.00	6.00	--
		Sagebrush					2.00	2.00	2.00	2.00	2.00	2.00
		Corn Pollen and Other Corn					6.00	6.00	6.00	--	--	6.00
		Other Plant Types					1.00	1.00	1.00	1.00	1.00	1.00
Dermal Exposure Rate by Plant Type - Child	Herbs and Medicinal	Navajo Tea	DER_{child}	The amount of plant used by child receptors using a measure in flour bags. Each flour bag is equivalent to 15 cups of plant material. Source for defaults: NNEPA 2021.		flour bags/year	--	--	--	--	--	--
		Sumac (skunkbush and other)					--	--	--	--	--	--
		Soaptree Yucca					--	--	--	--	--	--
		Sagebrush					--	--	--	--	--	--
		Corn Pollen and Other Corn					--	--	--	--	--	--
		Other Plant Types					--	--	--	--	--	--
Plant Material Density	Herbs and Medicinal	Navajo Tea	-	The density of each plant. Source: NNEPA 2021.		grams/cup	24					
		Sumac (skunkbush and other)					150					
		Soaptree Yucca					150					
		Sagebrush					150					
		Corn Pollen and Other Corn					150					
		Other Plant Types					150					
Conversion Factors	Volume conversion factor		-	Source: NNEPA 2021.		cups/flour bag	15					
	Volume conversion factor 1 for Navajo Tea		-	Source: NNEPA 2021.		bundles/cup	4					
	Volume conversion factor 2 for Navajo Tea		-	Source: NNEPA 2021.		grams/bundle	6					
Dermal Exposure Rate by Plant Type - Adult	Herbs and Medicinal	Navajo Tea	DER_{adult}	The amount of plant used by adult receptors.		g dry plant/day	2.1	2.1	2.1	2.1	2.1	2.1
		Sumac (skunkbush and other)					38.6	38.6	38.6	38.6	38.6	38.6
		Soaptree Yucca					38.6	38.6	38.6	38.6	38.6	0.0
		Sagebrush					12.9	12.9	12.9	12.9	12.9	12.9
		Corn Pollen and Other Corn					38.6	38.6	38.6	0.0	0.0	38.6
		Other Plant Types					6.4	6.4	6.4	6.4	6.4	6.4
Dermal Exposure Rate by Plant Type - Child	Herbs and Medicinal	Navajo Tea	DER_{child}	The amount of plant used by child receptors.		g dry plant/day	0.0	0.0	0.0	0.0	0.0	0.0
		Sumac (skunkbush and other)					0.0	0.0	0.0	0.0	0.0	0.0
		Soaptree Yucca					0.0	0.0	0.0	0.0	0.0	0.0
		Sagebrush					0.0	0.0	0.0	0.0	0.0	0.0
		Corn Pollen and Other Corn					0.0	0.0	0.0	0.0	0.0	0.0
		Other Plant Types					0.0	0.0	0.0	0.0	0.0	0.0
Mass Loading Factors for Radionuclides and Metals	Herbs and Medicinal	Navajo Tea	$MLF_{produce}$	Mass loading factors for specific produce types (sources: Hinton 1992 or Pinder & McLeod 1989).	Sagebrush	g-dry soil per g-fresh plant	2.40E-02					
		Sumac (skunkbush and other)			Sagebrush		2.40E-02					
		Soaptree Yucca			Sagebrush		2.40E-02					
		Sagebrush			Sagebrush		2.40E-02					
		Corn Pollen and Other Corn			Corn		1.70E-03					
		Other Plant Types			Sagebrush		2.40E-02					

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Mass Loading Factors for Radionuclides and Metals	Herbs and Medicinal	Navajo Tea	$MLF_{produce}$	Mass loading factors for specific produce types (calculated).	Sagebrush	g-dry soil per g-fresh plant	2.16E-02					
		Sumac (skunkbush and other)			Sagebrush		1.20E-02					
		Soaptree Yucca			Sagebrush		1.56E-02					
		Sagebrush			Sagebrush		1.56E-02					
		Corn Pollen and Other Corn			Corn		1.45E-04					
		Other Plant Types			Sagebrush		1.56E-02					
Conversion Factor for Dry Weight Transfer Factors to Wet Weight for Metals	Herbs and Medicinal	Navajo Tea	$MC_{produce}$	Fresh-to-dry conversion factor (source: USU Extension 2001 or EPA 1996)		kg dry plant/kg fresh plant	0.9					
		Sumac (skunkbush and other)					0.5					
		Soaptree Yucca					0.65					
		Sagebrush					0.65					
		Corn Pollen and Other Corn					0.085					
		Other Plant Types					0.65					
Common Exposure Parameters	Exposure Duration - Adult		ED_a	Total years onsite		years	69	69	69	69	69	69
	Exposure Duration - Child		ED_c				6	6	6	6	6	6
	Averaging Time - Cancer		AT_c	Lifetime in days.		days	27,375	27,375	27,375	27,375	27,375	27,375
	Averaging Time - Noncancer - Adult		$AT_{nc,a}$	Exposure duration x 365 days/year		days	25,185	25,185	25,185	25,185	25,185	25,185
	Averaging Time - Noncancer - Child		$AT_{nc,c}$				2,190	2,190	2,190	2,190	2,190	2,190
	Consumption Exposure Frequency - Adult		CEF_a	Number of days per year the receptor uses plants collected onsite.		days/ year	350	350	350	350	350	350
	Consumption Exposure Frequency - Child		CEF_{ac}				350	350	350	350	350	350
	Body Weight - Adult		BW_a	Average body weight		kg	80	80	80	80	80	80
	Body Weight - Child		BW_c				15	15	15	15	15	15
Risk and Toxicity	Target Risk		TR	The selected target cancer risk.		-	1E-04					
	Target Hazard Quotient		THQ	The selected target noncancer hazard quotient.		-	1					
	Oral Slope Factor - Food		SF_f	The metal-specific cancer toxicity value for ingestion pathways.		$(mg/kg\text{-}day)^{-1}$	1.50E+00					
	Oral Reference Dose		RfD	The metal-specific non-cancer toxicity value for ingestion pathways.		(mg/kg-day)	3.00E-04					
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals		unitless	1.00E+00					
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.		unitless	3.00E-02					
	Conversion Factor 6		CF6	Convert kilograms to grams		kg/g	1.00E-03					
	Conversion Factor 7		CF7	Convert pCi to Bq		pCi/Bq	27.027					
Age-Adjusted Dermal Exposure Rate for Metals	Herbs and Medicinal	Navajo Tea	$DFS_{p,adj}$	Age-adjusted dermal exposure rates for metals in plants. $DFS_{p,adj} = \left(\frac{EF_c \times ED_c \times MU_c}{BW_c}\right) + \left(\frac{EF_a \times ED_a \times MU_a}{BW_a}\right)$		g-dry weight of plant per kg-body weight	621	621	621	621	621	621
		Sumac (skunkbush and other)					11,644	11,644	11,644	11,644	11,644	11,644
		Soaptree Yucca					11,644	11,644	11,644	11,644	11,644	--
		Sagebrush					3,881	3,881	3,881	3,881	3,881	3,881
		Corn Pollen and Other Corn					11,644	11,644	11,644	--	--	11,644
		Other Plant Types					1,941	1,941	1,941	1,941	1,941	1,941

Notes:

1 The PRGs are calculated for the three scenarios in the tables below the notes (rows 122 through 170), and are looked up in rows 6 through 9 for the selected metal or radionuclide.
2 Pathway-specific radionuclide PRG for dermal exposure to plants grown in onsite soil.
3 The noncancer PRG is the lower of the child and adult noncancer hazard PRG.
4 Pathway-specific metal PRG for dermal exposure to plants grown in onsite soil.
5 The final metal PRG is the lower of the cancer risk PRG and the noncancer hazard PRG.
6 The risk and hazards are back-calculated using the selected TR or THQ, the appropriate PRG, and the concentration.

g/day	Grams per day
g/mg	Grams per milligram
kg	Kilogram
kg/g	Kilogram per gram
mg/day	Milligrams per day
mg/kg	Milligrams per kilogram
mg/kg-day	Milligrams per kilogram per day
ODL	Other Diné Bee'ooliil or Navajo Fundamental Law-based exposure pathways not included in plant or animal consumption pathways, which reflect TEK as referred to by USEPA.
pCi	Picocuries
pCi/g	Picocuries per gram

Equations:

$$PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$$

$$Risk = \sum_{i=1}^{n} Risk(i)$$

References for the above section:

NNEPA Superfund Program (NNEPA). 2021. Letter Regarding Navajo Specific Input Parameters—All Other Scenarios. From Dariel Yazzie, Environmental Assistant Director, Navajo Superfund Division. To Sona Chillingaryan, Manager, Tribal Lands Cleanup Section, Superfund Division, U.S. Environmental Protection Agency (USEPA) Region 9, and Sean Hogan, Manager, Tribal Lands Cleanup Section, Superfund Division, USEPA Region 9. September 15.

Formatting guide:		
Type of Worksheet Cell	**Category 1**	**Category 2**
User-editable inputs	**Inputs that can be changed, but only on the current worksheet. Most inputs have limits on the minimum and maximum values.**	**Inputs that can be changed, appear on the current worksheet AND other worksheets, and can be changed on any worksheet they appear on. These will update automatically if changed on any worksheet.**
Non-editable inputs	Inputs that are not receptor-specific. Some are entered on a different worksheet, others are calculated from editable inputs on this worksheet or another worksheet.	Receptor-specific inputs which cannot be edited by the user. Different shades of orange indicate the custom scenario (lightest), Navajo scenarios (lighter) and the USEPA default scenario (darker).
Input headers	In the input receptor column headers, different shades of green in indicate the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	In the input header rows and non-receptor column headers (such as this table), the medium shade indicates summary-level headers, and lightest shade indicates more detailed header information.
Outputs	Different shades of blue indicate outputs for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.
Output headers	Different shades of yellow indicate output headers for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	1.50E+00	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	1.50E-01	1.00E+00	7.00E-02	7.00E-03	2.50E-02	1.30E-02	1.00E+00
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	3.00E-02	--	--	1.00E-03	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01	4.88E-03	2.00E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02	4.50E-03	7.00E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-03	2.87E-02	5.70E-03	2.90E-02	2.32E-03	1.13E-01	4.39E-03	1.80E-02
		Sumac (skunkbush and other)	Br_{ag}			2.00E-03	1.60E-02	3.17E-03	1.61E-02	1.29E-03	6.25E-02	2.44E-03	1.00E-02
		Soaptree Yucca	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Sagebrush	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Other Plant Types	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Custom							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	**1.11E+02**	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	3.59E+03	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	3.45E+02	--	--	--	--	--
		Soaptree Yucca				--	--	2.65E+02	--	--	--	--	--
		Sagebrush				--	--	7.95E+02	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	7.65E+03	--	--	--	--	--
		Other Plant Types				--	--	1.59E+03	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Custom							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Custom							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	**4.61E+02**	--	--	**2.27E+01**	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	1.49E+04	--	--	7.56E+02	--	--
		Sumac (skunkbush and other)				--	--	1.43E+03	--	--	7.26E+01	--	--
		Soaptree Yucca				--	--	1.10E+03	--	--	5.58E+01	--	--
		Sagebrush				--	--	3.29E+03	--	--	1.67E+02	--	--
		Corn Pollen and Other Corn				--	--	3.17E+04	--	--	5.02E+02	--	--
		Other Plant Types				--	--	6.58E+03	--	--	3.35E+02	--	--

Parameter	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Custom							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	**4.61E+02**	--	--	**2.27E+01**	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	1.49E+04	--	--	7.56E+02	--	--
		Sumac (skunkbush and other)				--	--	1.43E+03	--	--	7.26E+01	--	--
		Soaptree Yucca				--	--	1.10E+03	--	--	5.58E+01	--	--
		Sagebrush				--	--	3.29E+03	--	--	1.67E+02	--	--
		Corn Pollen and Other Corn				--	--	3.17E+04	--	--	5.02E+02	--	--
		Other Plant Types				--	--	6.58E+03	--	--	3.35E+02	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	1.00E+00	4.00E-02	7.00E-02	1.00E+00	4.00E-02	1.00E+00	4.00E-02
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	4.00E-02	7.00E-01	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-01	4.00E-03	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02	1.38E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	1.00E-03	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02	1.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-01	3.60E-03	2.25E-01	1.31E-02	2.25E-01	8.38E-03	1.76E-02	1.24E-01
		Sumac (skunkbush and other)	Br_{ag}			2.00E-01	2.00E-03	1.25E-01	7.25E-03	1.25E-01	4.66E-03	9.75E-03	6.90E-02
		Soaptree Yucca	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Sagebrush	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Other Plant Types	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	1.50E+00	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	1.00E+00	2.60E-02	1.00E+00	1.00E+00	1.50E-01	1.00E+00	7.00E-02
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	--	--	--	--	3.00E-02	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E-05	2.00E-04	5.00E-03	3.00E-01	1.00E+00	4.00E-04	3.00E-04	2.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	8.58E-04	8.50E-03	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.00E-04	4.00E-03	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	7.72E-04	7.65E-03	4.95E-03	8.73E-02	3.60E-03	2.87E-02	5.70E-03	2.90E-02
		Sumac (skunkbush and other)	Br_{ag}			4.29E-04	4.25E-03	2.75E-03	4.85E-02	2.00E-03	1.60E-02	3.17E-03	1.61E-02
		Soaptree Yucca	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Sagebrush	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Corn Pollen and Other Corn	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Other Plant Types	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Cancer PRG for Specific Metals - Kee'da'whií tééh (full-time							
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	1.11E+02	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	3.59E+03	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	3.45E+02	--
		Soaptree Yucca				--	--	--	--	--	--	2.65E+02	--
		Sagebrush				--	--	--	--	--	--	7.95E+02	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	7.65E+03	--
		Other Plant Types				--	--	--	--	--	--	1.59E+03	--

Parameter			Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Child PRG for Specific Metals - Kee'da'whií tééh							
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Adult PRG for Specific Metals - Kee'da'whií tééh							
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	4.61E+02	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	1.49E+04	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	1.43E+03	--
		Soaptree Yucca				--	--	--	--	--	--	1.10E+03	--
		Sagebrush				--	--	--	--	--	--	3.29E+03	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	3.17E+04	--
		Other Plant Types				--	--	--	--	--	--	6.58E+03	--

Parameter			Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer PRG for Specific Metals - Kee'da'whií tééh (full-ti							
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	4.61E+02	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	1.49E+04	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	1.43E+03	--
		Soaptree Yucca				--	--	--	--	--	--	1.10E+03	--
		Sagebrush				--	--	--	--	--	--	3.29E+03	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	3.17E+04	--
		Other Plant Types				--	--	--	--	--	--	6.58E+03	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	7.00E-03	2.50E-02	1.30E-02	1.00E+00	1.00E+00	1.00E+00	4.00E-02	7.00E-02
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	1.00E-03	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01	2.40E-02	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.32E-03	1.13E-01	4.39E-03	1.80E-02	3.60E-01	3.60E-03	2.25E-01	1.31E-02
		Sumac (skunkbush and other)	Br_{ag}			1.29E-03	6.25E-02	2.44E-03	1.00E-02	2.00E-01	2.00E-03	1.25E-01	7.25E-03
		Soaptree Yucca	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Sagebrush	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Corn Pollen and Other Corn	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Other Plant Types	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03

Outputs	Parameter		Symbol	Description	Units	Navajo residential) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	(full-time Navajo residential) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	(full-time Navajo residential) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	**2.27E+01**	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	7.56E+02	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	7.26E+01	--	--	--	--	--	--
		Soaptree Yucca				--	5.58E+01	--	--	--	--	--	--
		Sagebrush				--	1.67E+02	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	5.02E+02	--	--	--	--	--	--
		Other Plant Types				--	3.35E+02	--	--	--	--	--	--

Parameter			Symbol	Description	Units	me Navajo residential) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	**2.27E+01**	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	7.56E+02	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	7.26E+01	--	--	--	--	--	--
		Soaptree Yucca				--	5.58E+01	--	--	--	--	--	--
		Sagebrush				--	1.67E+02	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	5.02E+02	--	--	--	--	--	--
		Other Plant Types				--	3.35E+02	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	4.00E-02	1.00E+00	4.00E-02	1.00E+00	1.00E+00	2.60E-02	1.00E+00
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.25E-01	8.38E-03	1.76E-02	1.24E-01	7.72E-04	7.65E-03	4.95E-03	8.73E-02
		Sumac (skunkbush and other)	Br_{ag}			1.25E-01	4.66E-03	9.75E-03	6.90E-02	4.29E-04	4.25E-03	2.75E-03	4.85E-02
		Soaptree Yucca	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Sagebrush	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Corn Pollen and Other Corn	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Other Plant Types	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	1.50E+00	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	1.50E-01	1.00E+00	7.00E-02	7.00E-03	2.50E-02	1.30E-02	1.00E+00
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	3.00E-02	--	--	1.00E-03	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01	4.88E-03	2.00E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02	4.50E-03	7.00E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-03	2.87E-02	5.70E-03	2.90E-02	2.32E-03	1.13E-01	4.39E-03	1.80E-02
		Sumac (skunkbush and other)	Br_{ag}			2.00E-03	1.60E-02	3.17E-03	1.61E-02	1.29E-03	6.25E-02	2.44E-03	1.00E-02
		Soaptree Yucca	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Sagebrush	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Other Plant Types	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Kǫǫh bí łíí nakaí (sheep camp)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	**1.11E+02**	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	3.59E+03	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	3.45E+02	--	--	--	--	--
		Soaptree Yucca				--	--	2.65E+02	--	--	--	--	--
		Sagebrush				--	--	7.95E+02	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	7.65E+03	--	--	--	--	--
		Other Plant Types				--	--	1.59E+03	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Kǫǫh bí łíí nakaí (sheep camp)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kǫǫh bí łíí nakaí (sheep camp)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	**4.61E+02**	--	--	**2.27E+01**	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	1.49E+04	--	--	7.56E+02	--	--
		Sumac (skunkbush and other)				--	--	1.43E+03	--	--	7.26E+01	--	--
		Soaptree Yucca				--	--	1.10E+03	--	--	5.58E+01	--	--
		Sagebrush				--	--	3.29E+03	--	--	1.67E+02	--	--
		Corn Pollen and Other Corn				--	--	3.17E+04	--	--	5.02E+02	--	--
		Other Plant Types				--	--	6.58E+03	--	--	3.35E+02	--	--

Parameter	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Kǫǫh bí łíí nakaí (sheep camp)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	**4.61E+02**	--	--	**2.27E+01**	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	1.49E+04	--	--	7.56E+02	--	--
		Sumac (skunkbush and other)				--	--	1.43E+03	--	--	7.26E+01	--	--
		Soaptree Yucca				--	--	1.10E+03	--	--	5.58E+01	--	--
		Sagebrush				--	--	3.29E+03	--	--	1.67E+02	--	--
		Corn Pollen and Other Corn				--	--	3.17E+04	--	--	5.02E+02	--	--
		Other Plant Types				--	--	6.58E+03	--	--	3.35E+02	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	1.00E+00	4.00E-02	7.00E-02	1.00E+00	4.00E-02	1.00E+00	4.00E-02
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	4.00E-02	7.00E-01	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-01	4.00E-03	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02	1.38E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	1.00E-03	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02	1.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-01	3.60E-03	2.25E-01	1.31E-02	2.25E-01	8.38E-03	1.76E-02	1.24E-01
		Sumac (skunkbush and other)	Br_{ag}			2.00E-01	2.00E-03	1.25E-01	7.25E-03	1.25E-01	4.66E-03	9.75E-03	6.90E-02
		Soaptree Yucca	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Sagebrush	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Other Plant Types	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	1.50E+00	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	1.00E+00	2.60E-02	1.00E+00	1.00E+00	1.50E-01	1.00E+00	7.00E-02
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	--	--	--	--	3.00E-02	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E-05	2.00E-04	5.00E-03	3.00E-01	1.00E+00	4.00E-04	3.00E-04	2.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	8.58E-04	8.50E-03	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.00E-04	4.00E-03	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	7.72E-04	7.65E-03	4.95E-03	8.73E-02	3.60E-03	2.87E-02	5.70E-03	2.90E-02
		Sumac (skunkbush and other)	Br_{ag}			4.29E-04	4.25E-03	2.75E-03	4.85E-02	2.00E-03	1.60E-02	3.17E-03	1.61E-02
		Soaptree Yucca	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Sagebrush	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Corn Pollen and Other Corn	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Other Plant Types	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Cancer PRG for Specific Metals - Kǫǫ ei nahaazáh (easy acc							
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	**1.13E+02**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	3.59E+03	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	3.45E+02	--
		Soaptree Yucca				--	--	--	--	--	--	2.65E+02	--
		Sagebrush				--	--	--	--	--	--	7.95E+02	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	1.59E+03	--

Parameter			Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Child PRG for Specific Metals - Kǫǫ ei nahaazáh							
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Adult PRG for Specific Metals - Kǫǫ ei nahaazáh							
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	**4.68E+02**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	1.49E+04	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	1.43E+03	--
		Soaptree Yucca				--	--	--	--	--	--	1.10E+03	--
		Sagebrush				--	--	--	--	--	--	3.29E+03	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	6.58E+03	--

Parameter			Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer PRG for Specific Metals - Kǫǫ ei nahaazáh (easy							
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	**4.68E+02**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	1.49E+04	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	1.43E+03	--
		Soaptree Yucca				--	--	--	--	--	--	1.10E+03	--
		Sagebrush				--	--	--	--	--	--	3.29E+03	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	6.58E+03	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	7.00E-03	2.50E-02	1.30E-02	1.00E+00	1.00E+00	1.00E+00	4.00E-02	7.00E-02
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	1.00E-03	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01	2.40E-02	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.32E-03	1.13E-01	4.39E-03	1.80E-02	3.60E-01	3.60E-03	2.25E-01	1.31E-02
		Sumac (skunkbush and other)	Br_{ag}			1.29E-03	6.25E-02	2.44E-03	1.00E-02	2.00E-01	2.00E-03	1.25E-01	7.25E-03
		Soaptree Yucca	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Sagebrush	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Corn Pollen and Other Corn	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Other Plant Types	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03

Outputs	Parameter		Symbol	Description	Units	ess open space) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	(easy access open space) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	(easy access open space) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	**2.38E+01**	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	7.56E+02	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	7.26E+01	--	--	--	--	--	--
		Soaptree Yucca				--	5.58E+01	--	--	--	--	--	--
		Sagebrush				--	1.67E+02	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	3.35E+02	--	--	--	--	--	--

Parameter			Symbol	Description	Units	access open space) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	**2.38E+01**	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	7.56E+02	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	7.26E+01	--	--	--	--	--	--
		Soaptree Yucca				--	5.58E+01	--	--	--	--	--	--
		Sagebrush				--	1.67E+02	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	3.35E+02	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	4.00E-02	1.00E+00	4.00E-02	1.00E+00	1.00E+00	2.60E-02	1.00E+00
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.25E-01	8.38E-03	1.76E-02	1.24E-01	7.72E-04	7.65E-03	4.95E-03	8.73E-02
		Sumac (skunkbush and other)	Br_{ag}			1.25E-01	4.66E-03	9.75E-03	6.90E-02	4.29E-04	4.25E-03	2.75E-03	4.85E-02
		Soaptree Yucca	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Sagebrush	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Corn Pollen and Other Corn	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Other Plant Types	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	1.50E+00	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	1.50E-01	1.00E+00	7.00E-02	7.00E-03	2.50E-02	1.30E-02	1.00E+00
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	3.00E-02	--	--	1.00E-03	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E+00	4.00E-04	3.00E-04	2.00E-01	2.00E-03	1.00E-04	1.50E+00	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01	4.88E-03	2.00E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02	4.50E-03	7.00E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-03	2.87E-02	5.70E-03	2.90E-02	2.32E-03	1.13E-01	4.39E-03	1.80E-02
		Sumac (skunkbush and other)	Br_{ag}			2.00E-03	1.60E-02	3.17E-03	1.61E-02	1.29E-03	6.25E-02	2.44E-03	1.00E-02
		Soaptree Yucca	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Sagebrush	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Other Plant Types	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	**1.13E+02**	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	3.59E+03	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	3.45E+02	--	--	--	--	--
		Soaptree Yucca				--	--	2.65E+02	--	--	--	--	--
		Sagebrush				--	--	7.95E+02	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	1.59E+03	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	**4.68E+02**	--	--	**2.38E+01**	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	1.49E+04	--	--	7.56E+02	--	--
		Sumac (skunkbush and other)				--	--	1.43E+03	--	--	7.26E+01	--	--
		Soaptree Yucca				--	--	1.10E+03	--	--	5.58E+01	--	--
		Sagebrush				--	--	3.29E+03	--	--	1.67E+02	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	6.58E+03	--	--	3.35E+02	--	--

Parameter	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	**4.68E+02**	--	--	**2.38E+01**	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	1.49E+04	--	--	7.56E+02	--	--
		Sumac (skunkbush and other)				--	--	1.43E+03	--	--	7.26E+01	--	--
		Soaptree Yucca				--	--	1.10E+03	--	--	5.58E+01	--	--
		Sagebrush				--	--	3.29E+03	--	--	1.67E+02	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	6.58E+03	--	--	3.35E+02	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	1.00E+00	4.00E-02	7.00E-02	1.00E+00	4.00E-02	1.00E+00	4.00E-02
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	4.00E-02	7.00E-01	2.40E-02	3.00E-04	5.00E-03	2.00E-02	5.00E-03	5.00E-03
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-01	4.00E-03	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02	1.38E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	1.00E-03	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02	1.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-01	3.60E-03	2.25E-01	1.31E-02	2.25E-01	8.38E-03	1.76E-02	1.24E-01
		Sumac (skunkbush and other)	Br_{ag}			2.00E-01	2.00E-03	1.25E-01	7.25E-03	1.25E-01	4.66E-03	9.75E-03	6.90E-02
		Soaptree Yucca	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Sagebrush	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Other Plant Types	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	1.50E+00	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	1.00E+00	2.60E-02	1.00E+00	1.00E+00	1.50E-01	1.00E+00	7.00E-02
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	--	--	--	--	3.00E-02	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	1.00E-05	2.00E-04	5.00E-03	3.00E-01	1.00E+00	4.00E-04	3.00E-04	2.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	8.58E-04	8.50E-03	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.00E-04	4.00E-03	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	7.72E-04	7.65E-03	4.95E-03	8.73E-02	3.60E-03	2.87E-02	5.70E-03	2.90E-02
		Sumac (skunkbush and other)	Br_{ag}			4.29E-04	4.25E-03	2.75E-03	4.85E-02	2.00E-03	1.60E-02	3.17E-03	1.61E-02
		Soaptree Yucca	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Sagebrush	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Corn Pollen and Other Corn	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Other Plant Types	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Cancer PRG for Specific Metals - Chíí dah wiih łeezh (washe							
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	**1.92E+02**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	3.59E+03	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	3.45E+02	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	7.95E+02	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	7.65E+03	--
		Other Plant Types				--	--	--	--	--	--	1.59E+03	--

Parameter			Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Child PRG for Specific Metals - Chíí dah wiih łeez							
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Adult PRG for Specific Metals - Chíí dah wiih łeez							
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	**7.96E+02**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	1.49E+04	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	1.43E+03	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	3.29E+03	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	3.17E+04	--
		Other Plant Types				--	--	--	--	--	--	6.58E+03	--

Parameter			Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer PRG for Specific Metals - Chíí dah wiih łeezh (wa							
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	**7.96E+02**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	1.49E+04	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	1.43E+03	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	3.29E+03	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	3.17E+04	--
		Other Plant Types				--	--	--	--	--	--	6.58E+03	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	7.00E-03	2.50E-02	1.30E-02	1.00E+00	1.00E+00	1.00E+00	4.00E-02	7.00E-02
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	1.00E-03	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	2.00E-03	1.00E-04	1.50E+00	3.00E-04	4.00E-02	7.00E-01	2.40E-02	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.32E-03	1.13E-01	4.39E-03	1.80E-02	3.60E-01	3.60E-03	2.25E-01	1.31E-02
		Sumac (skunkbush and other)	Br_{ag}			1.29E-03	6.25E-02	2.44E-03	1.00E-02	2.00E-01	2.00E-03	1.25E-01	7.25E-03
		Soaptree Yucca	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Sagebrush	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Corn Pollen and Other Corn	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Other Plant Types	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03

Outputs	Parameter		Symbol	Description	Units	s and drainages) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	ch (washes and drainages) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	ch (washes and drainages) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	**3.84E+01**	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	7.56E+02	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	7.26E+01	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	1.67E+02	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	5.02E+02	--	--	--	--	--	--
		Other Plant Types				--	3.35E+02	--	--	--	--	--	--

Parameter			Symbol	Description	Units	shes and drainages) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	**3.84E+01**	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	7.56E+02	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	7.26E+01	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	1.67E+02	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	5.02E+02	--	--	--	--	--	--
		Other Plant Types				--	3.35E+02	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

11 - ODL Plant Dermal Exposure

Inputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Metal-Specific Toxicity Parameters	Slope Factor		SFo	Cancer slope factor for metals	$(mg/kg\text{-}day)^{-1}$	--	--	--	--	--	--	--	--
	Gastrointestinal Absorption Factor		GIABS	Gastrointestinal absorption factor for metals	unitless	1.00E+00	4.00E-02	1.00E+00	4.00E-02	1.00E+00	1.00E+00	2.60E-02	1.00E+00
	Dermal Absorption Factor		ABS_d	Dermal absorption factor for metals - assumed to be the same for plant material as for soils.	unitless	--	--	--	--	--	--	--	--
	Reference Dose		RFD	Noncancer reference dose for metals	mg/kg-day	5.00E-03	2.00E-02	5.00E-03	5.00E-03	1.00E-05	2.00E-04	5.00E-03	3.00E-01
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.25E-01	8.38E-03	1.76E-02	1.24E-01	7.72E-04	7.65E-03	4.95E-03	8.73E-02
		Sumac (skunkbush and other)	Br_{ag}			1.25E-01	4.66E-03	9.75E-03	6.90E-02	4.29E-04	4.25E-03	2.75E-03	4.85E-02
		Soaptree Yucca	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Sagebrush	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Corn Pollen and Other Corn	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Other Plant Types	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Dermal Exposure to Plant Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The preliminary remediation goals for cancer for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The preliminary remediation goals for cancer for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{TR \times AT_c}{\left(\frac{SF_o}{GIABS} \times DFS_{p,adj} \times ABS_d \times CF_{plant} \times (Br + MLF_{produce}) \times CF6\right)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_c \times RfD_o \times GIABS}{(EF_c \times ED_c \times ABS_d \times DER_c \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-derm}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil. $PRG_{ODL-derm}(i) = \frac{THQ \times AT_{nc} \times BW_a \times RfD_o \times GIABS}{(EF_a \times ED_a \times ABS_d \times DER_a \times CF_{plant} \times (Br + MLF_{produce}) \times CF)}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Parameter			Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - ODL Dermal Exposure to Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total ODL Dermal Exposure to Plants		$PRG_{ODL\text{-}derm}$	The noncancer preliminary remediation goals for all plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL\text{-}derm}(i)$	The noncancer preliminary remediation goals for each type of plant dermal exposure, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

ODL Inhalation of Plant Materials Exposure Pathway

Selection =	Arsenic	Type = Metal	Concentration =	1	mg/kg

Cleanup Target and Risks [1,6]			Units	User-Specified Scenario	Navajo Nation Reference Scenarios				
Outputs	**Parameter**	**Description**		**Custom**	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bí łíí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**
Cleanup Targets	Metal Cancer $PRG_{ODL\text{-}inh}$	Preliminary Remediation Goal based on the cancer toxicity for selected metal	mg/kg	321	321	321	326	326	321
	Metal Noncancer $PRG_{ODL\text{-}inh}$ [2, 3]	Preliminary Remediation Goal based on the noncancer roxicity for selected metal	mg/kg	191	191	191	193	193	191
	Final Metal $PRG_{ODL\text{-}inh}$ [4, 5]	Preliminary Remediation Goal for the selected metal	mg/kg	191	191	191	193	193	191
Risks and Hazards	Cancer Risk - Metals	Lifetime cancer risk for the selected metal	-	3.1E-07	3.1E-07	3.1E-07	3.1E-07	3.1E-07	3.1E-07
	Noncancer Hazard - Metals	Noncancer hazard for the selected metal	-	5.2E-03	5.2E-03	5.2E-03	5.2E-03	5.2E-03	5.2E-03

Inputs	**Parameter**		**Symbol**	**Description**	**Units**	**User-Specified Scenario**	**Navajo Nation Reference Scenarios**				
						Custom	**Kee'da'whíí téél (full-time Navajo residential)**	**Kǫǫh bí łíí nakaí (sheep camp)**	**Kǫǫ eí nahaazáh (easy access open space)**	**Kǫǫ eí doo nahaazáh dah (difficult access open space)**	**Chíí dah wiih łeezh (washes and drainages)**
Local Inhalation Fraction	Local ODL Inhalation Fraction		$CF_{produce\text{-}a}$	Contaminated Fraction - the average percentage of plants used that are grown locally (e.g., from a nearby field or wild collection area vs. from the supermarket or a local community market). Child set equal to adult.	Percent	100%	100%	100%	100%	100%	100%
			$CF_{produce\text{-}c}$			100%	100%	100%	100%	100%	100%
Mass of Plant Available for Inhalation by Plant Type - Adult [7]	Herbs and Medicinal	Navajo Tea	IM_a	The amount of plant used by adult receptors using a measure in flour bags. Each flour bag is equivalent to 15 cups of plant material. Source for defaults: NNEPA 2021. Consumption assumed to be zero for corn pollen and other corn in open space areas based on steepness of terrain. Consumption assume to be zero for soaptree yucca in washes and drainages based on...	flour bags/year	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				4.00	4.00	4.00	4.00	4.00	4.00
		Corn Pollen and Other Corn				2.00	2.00	2.00	--	--	2.00
		Other Plant Types				1.00	1.00	1.00	1.00	1.00	1.00
Mass of Plant Available for Inhalation by Plant Type - Child	Herbs and Medicinal	Navajo Tea	IM_c	The amount of plant used by children using a measure in flour bags. Each flour bag is equivalent to 15 cups of plant material. The material is assumed to be fresh plant material. Source for defaults: NNEPA 2021.	flour bags/year	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--
Inhalation Fractions for Plants for Radionuclides and Metals	Herbs and Medicinal	Navajo Tea	IF_p	Inhalation fraction - the portion of mass released to the air that is inhaled by the receptor. This value should be set between 0 and 1, and documentation of the rationale for the selected fraction should be provided. Source for defaults: NRC 1986.	unitless	10%	10%	10%	10%	10%	10%
		Sumac (skunkbush and other)				10%	10%	10%	10%	10%	10%
		Soaptree Yucca				10%	10%	10%	10%	10%	10%
		Sagebrush				10%	10%	10%	10%	10%	10%
		Corn Pollen and Other Corn				10%	10%	10%	10%	10%	10%
		Other Plant Types				10%	10%	10%	10%	10%	10%
Mass Available for Inhalation by Plant Type	Herbs and Medicinal	Navajo Tea	-	The density of each plant (assumed to be fresh plant material). Source: NNEPA 2021.	grams/cup	24					
		Sumac (skunkbush and other)				150					
		Soaptree Yucca				150					
		Sagebrush				150					
		Corn Pollen and Other Corn				150					
		Other Plant Types				150					
Conversion Factors	Volume conversion factor		-	Source: NNEPA 2021.	cups/flour bag	15					
	Volume conversion factor 1 for Navajo Tea		-	Source: NNEPA 2021.	bundles/cup	4					
	Volume conversion factor 2 for Navajo Tea		-	Source: NNEPA 2021.	grams/bundle	6					
Mass of Plant Available for Inhalation by Plant Type - Adult	Herbs and Medicinal	Navajo Tea	IM_a	Mass of plant available for inhalation by the receptor.	g dry plant/day	0.0	0.0	0.0	0.0	0.0	0.0
		Sumac (skunkbush and other)				0.0	0.0	0.0	0.0	0.0	0.0
		Soaptree Yucca				0.0	0.0	0.0	0.0	0.0	0.0
		Sagebrush				25.7	25.7	25.7	25.7	25.7	25.7
		Corn Pollen and Other Corn				12.9	12.9	12.9	0.0	0.0	12.9
		Other Plant Types				6.4	6.4	6.4	6.4	6.4	6.4

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Mass of Plant Available for Inhalation by Plant Type - Child	Herbs and Medicinal	Navajo Tea	IM_c	Mass of plant available for inhalation by the receptor.		g dry plant/day	0.0	0.0	0.0	0.0	0.0	0.0
		Sumac (skunkbush and other)					0.0	0.0	0.0	0.0	0.0	0.0
		Soaptree Yucca					0.0	0.0	0.0	0.0	0.0	0.0
		Sagebrush					0.0	0.0	0.0	0.0	0.0	0.0
		Corn Pollen and Other Corn					0.0	0.0	0.0	0.0	0.0	0.0
		Other Plant Types					0.0	0.0	0.0	0.0	0.0	0.0
Plant Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant transfer factors for specific produce types. These are converted later from fresh units to dry units for radionuclide-specific transfer factors.	Sunflower Leaf	pCi/g-fresh plant per pCi/g-dry soil	--					
		Sumac (skunkbush and other)			Shrub		--					
		Soaptree Yucca			Woody Tree		--					
		Sagebrush			Sunflower Leaf		--					
		Corn Pollen and Other Corn			Maize Stems and Shoots		--					
		Other Plant Types			Sunflower Leaf		--					
Mass Loading Factors for Radionuclides and Metals	Herbs and Medicinal	Navajo Tea	$MLF_{produce}$	Mass loading factors for specific produce types (sources: Hinton 1992 or Pinder & McLeod 1989).	Sagebrush	g-dry soil per g-dry plant	2.40E-02					
		Sumac (skunkbush and other)			Sagebrush		2.40E-02					
		Soaptree Yucca			Sagebrush		2.40E-02					
		Sagebrush			Sagebrush		2.40E-02					
		Corn Pollen and Other Corn			Corn		1.70E-03					
		Other Plant Types			Sagebrush		2.40E-02					
Mass Loading Factors for Radionuclides and Metals	Herbs and Medicinal	Navajo Tea	$MLF_{produce}$	Mass loading factors for specific produce types (calculated from the fresh plant MLFs).	Sagebrush	g-dry soil per g-fresh plant	2.16E-02					
		Sumac (skunkbush and other)			Sagebrush		1.20E-02					
		Soaptree Yucca			Sagebrush		1.56E-02					
		Sagebrush			Sagebrush		1.56E-02					
		Corn Pollen and Other Corn			Corn		1.45E-04					
		Other Plant Types			Sagebrush		1.56E-02					
Conversion Factor for Dry Weight Transfer Factors to Wet Weight for Metals	Herbs and Medicinal	Navajo Tea	$MC_{produce}$	Fresh-to-dry conversion factor (source: USU Extension 2001 or EPA 1996)		kg dry plant/kg fresh plant	0.9					
		Sumac (skunkbush and other)					0.5					
		Soaptree Yucca					0.65					
		Sagebrush					0.65					
		Corn Pollen and Other Corn					0.085					
		Other Plant Types					0.65					
Exposure Time	Exposure Time - Adult		ETa	Exposure time per day for adult. Source for default: Professional judgement.		hours/day	1	1	1	1	1	1
	Exposure Time - Child		ETc	Exposure time per day for child, set to adult value.			1	1	1	1	1	1
Common Exposure Parameters	Exposure Duration - Adult		ED_a	Total years onsite		years	69	69	69	69	69	69
	Exposure Duration - Child		ED_c				6	6	6	6	6	6
	Averaging Time - Cancer		AT_c	Lifetime in days.		days	27,375	27,375	27,375	27,375	27,375	27,375
	Averaging Time - Noncancer - Adult		$AT_{nc,a}$	Exposure duration x 365 days/year		days	25,185	25,185	25,185	25,185	25,185	25,185
	Averaging Time - Noncancer - Child		$AT_{nc,c}$				2,190	2,190	2,190	2,190	2,190	2,190
	Consumption Exposure Frequency - Adult		CEF_a	Number of days per year the receptor uses plants collected onsite		days/year	350	350	350	350	350	350
	Consumption Exposure Frequency - Child		CEF_c				350	350	350	350	350	350
	Inhalation Rate - Adult		IR_a	Daily inhalation rate		m^3/day	25	25	25	25	25	25
	Inhalation Rate - Child		IR_c			m^3/day	10	10	10	10	10	10
Risk and Toxicity	Target Risk		TR	The selected target cancer risk.		-	1E-04					
	Target Hazard Quotient		THQ	The selected target noncancer hazard quotient.		-	1					
	Slope Factor - Inhalation		SFi	The isotope-specific cancer toxicity value for inhalation pathway.		risk/pCi	--					
	Inhalation Unit Risk		IUR	The metal-specific cancer toxicity value for the inhalation pathway.		$(mg/kg\text{-}day)^{-1}$	4.30E-03					
	Inalation Reference Concentration		RfD	The metal-specific cancer toxicity value for the inhalation pathway.		(mg/kg-day)	1.50E-05					
	Conversion Factor 6		CF6	Convert kilograms to grams		kg/g	1.00E-03					
	Conversion Factor 7		CF7	Convert pCi to Bq		pCi/Bq	27.027					
Room Dimensions	Room length and width		BS	The length and width of a typical room. Source: Professional judgement.		feet	12					
	Room height		BH	The height of a typical room. Source: Professional judgement.		feet	8					
	Room volume		BV	The calculated volume of the room.		cubic feet	1152					
	Room volume		BV	The calculated volume of the room.		cubic meters	32.6					
Indoor Air Concentration - Adult	Herbs and Medicinal	Navajo Tea	$C_{air\text{-}a}$	Air concentration for plant material for each daily event (adult). $C_{air} = \frac{IM}{BV}$		g plant/m3 air	--	--	--	--	--	--
		Sumac (skunkbush and other)					--	--	--	--	--	--
		Soaptree Yucca					--	--	--	--	--	--
		Sagebrush					0.79	0.79	0.79	0.79	0.79	0.79
		Corn Pollen and Other Corn					0.39	0.39	0.39	--	--	0.39
		Other Plant Types					0.20	0.20	0.20	0.20	0.20	0.20

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Indoor Air Concentration - Child	Herbs and Medicinal	Navajo Tea	C_{air-c}	Air concentration for plant material for each daily event (child). $C_{air} = \frac{IM}{BV}$	g plant/m3 air	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--
Age-Adjusted Inhalation Fraction for Radionuclides	Herbs and Medicinal	Navajo Tea	$IFA_{odl-inh-adj}$	Age-adjusted inhalation fraction for radionuclides in plants. $IFA_{odl-inh-adj} = \left(EF_c \times ED_c \times \frac{ET_{c-odl}}{24hours/day} \times IR_c\right) + \left(EF_a \times ED_a \times \frac{ET_{a-odl}}{24hours/day} \times IR_a\right)$	m3 air	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				26,031	26,031	26,031	26,031	26,031	26,031
		Corn Pollen and Other Corn				26,031	26,031	26,031	--	--	26,031
		Other Plant Types				26,031	26,031	26,031	26,031	26,031	26,031

Notes:

1	The PRGs are calculated for the three scenarios in the tables below the notes (rows 148 through 309), and are looked up in rows 6 through 9 for the selected metal or radionuclide.
2	Pathway-specific radionuclide PRG for inhalation of plants grown in onsite soil.
3	The noncancer PRG is the lower of the child and adult noncancer hazard PRG.
4	Pathway-specific metal PRG for inhalation of plants grown in onsite soil.
5	The final metal PRG is the lower of the cancer risk PRG and the noncancer hazard PRG.
6	The risk and hazards are back-calculated using the selected TR or THQ, the appropriate PRG, and the concentration.
7	The values for inhalation fraction are preliminary and based on professional judgment. These values should change when the USEPA and NNEPA provide documented reference scenario input values for this. Note that for radionuclides, only 4 can be selected for summary-level input: Ra-226 in SE, U-238 in SE, Th-232 in SE, and K-40, but detailed calculations are shown for 5 other individual radionuclides.
g/day	Grams per day
g/mg	Grams per milligram
kg	Kilogram
kg/g	Kilogram per gram
mg/day	Milligrams per day
mg/kg	Milligrams per kilogram
mg/kg-day	Milligrams per kilogram per day
ODL	Other Diné Bee'ooliil or Navajo Fundamental Law-based exposure pathways not included in plant or animal consumption pathways, which reflect TEK as referred to by USEPA.
pCi	Picocuries
pCi/g	Picocuries per gram

Equations:

$$PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$$

$$Risk = \sum_{i=1}^{n} Risk(i)$$

References for the above section:

NNEPA Superfund Program (NNEPA). 2021. Letter Regarding Navajo Specific Input Parameters—All Other Scenarios. From Dariel Yazzie, Environmental Assistant Director, Navajo Superfund Division. To Sona Chillingaryan, Manager, Tribal Lands Cleanup Section, Superfund Division, U.S. Environmental Protection Agency (USEPA) Region 9, and Sean Hogan, Manager, Tribal Lands Cleanup Section, Superfund Division, USEPA Region 9. September 15.

NRC. 1986. Environmental Tobacco Smoke: Measuring Exposures and Assessing Health Effects. The National Academies Press.

Formatting guide:		
Type of Worksheet Cell	**Category 1**	**Category 2**
User-editable inputs	**Inputs that can be changed, but only on the current worksheet. Most inputs have limits on the minimum and maximum values.**	**Inputs that can be changed, appear on the current worksheet AND other worksheets, and can be changed on any worksheet they appear on. These will update automatically if changed on any worksheet.**
Non-editable inputs	Inputs that are not receptor-specific. Some are entered on a different worksheet, others are calculated from editable inputs on this worksheet or another worksheet.	Receptor-specific inputs which cannot be edited by the user. Different shades of orange indicate the custom scenario (lightest), Navajo scenarios (lighter) and the USEPA default scenario (darker).
Input headers	In the input receptor column headers, different shades of green in indicate the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	In the input header rows and non-receptor column headers (such as this table), the medium shade indicates summary-level headers, and lightest shade indicates more detailed header information.
Outputs	Different shades of blue indicate outputs for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.
Output headers	Different shades of yellow indicate output headers for the custom scenario (lightest), Navajo scenarios (medium) and the USEPA default scenario (darkest).	Not applicable.

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	--	4.30E-03	--	2.40E-03	1.80E-03	--	9.00E-03
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	5.00E-03	3.00E-04	1.50E-05	5.00E-04	2.00E-05	1.00E-05	--	6.00E-06
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01	4.88E-03	2.00E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02	4.50E-03	7.00E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-03	2.87E-02	5.70E-03	2.90E-02	2.32E-03	1.13E-01	4.39E-03	1.80E-02
		Sumac (skunkbush and other)	Br_{ag}			2.00E-03	1.60E-02	3.17E-03	1.61E-02	1.29E-03	6.25E-02	2.44E-03	1.00E-02
		Soaptree Yucca	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Sagebrush	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Other Plant Types	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Custom							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	3.21E+02	--	6.60E+02	1.52E+02	--	1.05E+02
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	4.07E+02	--	8.32E+02	1.98E+02	--	1.34E+02
		Corn Pollen and Other Corn				--	--	2.35E+04	--	7.91E+04	3.56E+03	--	4.16E+03
		Other Plant Types				--	--	1.63E+03	--	3.33E+03	7.92E+02	--	5.36E+02

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Custom							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Custom							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**6.90E+04**	**2.03E+03**	**1.91E+02**	**3.37E+03**	**2.92E+02**	**2.51E+01**	**--**	**5.19E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.72E+04	2.62E+03	2.42E+02	4.35E+03	3.68E+02	3.28E+01	--	6.66E+01
		Corn Pollen and Other Corn				6.55E+06	6.67E+04	1.40E+04	1.10E+05	3.49E+04	5.90E+02	--	2.07E+03
		Other Plant Types				3.49E+05	1.05E+04	9.66E+02	1.74E+04	1.47E+03	1.31E+02	--	2.66E+02

Outputs	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Custom							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	**6.90E+04**	**2.03E+03**	**1.91E+02**	**3.37E+03**	**2.92E+02**	**2.51E+01**	**--**	**5.19E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.72E+04	2.62E+03	2.42E+02	4.35E+03	3.68E+02	3.28E+01	--	6.66E+01
		Corn Pollen and Other Corn				6.55E+06	6.67E+04	1.40E+04	1.10E+05	3.49E+04	5.90E+02	--	2.07E+03
		Other Plant Types				3.49E+05	1.05E+04	9.66E+02	1.74E+04	1.47E+03	1.31E+02	--	2.66E+02

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	--	--	--	--	2.60E-04	--	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	--	--	5.00E-05	3.00E-04	2.00E-03	9.00E-05	2.00E-02	--
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-01	4.00E-03	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02	1.38E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	1.00E-03	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02	1.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-01	3.60E-03	2.25E-01	1.31E-02	2.25E-01	8.38E-03	1.76E-02	1.24E-01
		Sumac (skunkbush and other)	Br_{ag}			2.00E-01	2.00E-03	1.25E-01	7.25E-03	1.25E-01	4.66E-03	9.75E-03	6.90E-02
		Soaptree Yucca	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Sagebrush	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Other Plant Types	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	4.82E+03	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	6.13E+03	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	2.84E+05	--	--
		Other Plant Types				--	--	--	--	--	2.45E+04	--	--

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	**6.80E+01**	**2.98E+03**	**2.72E+03**	**1.04E+03**	**1.75E+05**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	8.91E+01	3.81E+03	3.57E+03	1.32E+03	2.25E+05	--
		Corn Pollen and Other Corn				--	--	1.48E+03	1.38E+05	5.94E+04	6.11E+04	7.05E+06	--
		Other Plant Types				--	--	3.57E+02	1.52E+04	1.43E+04	5.28E+03	8.98E+05	--

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	**--**	**--**	**6.80E+01**	**2.98E+03**	**2.72E+03**	**1.04E+03**	**1.75E+05**	**--**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	8.91E+01	3.81E+03	3.57E+03	1.32E+03	2.25E+05	--
		Corn Pollen and Other Corn				--	--	1.48E+03	1.38E+05	5.94E+04	6.11E+04	7.05E+06	--
		Other Plant Types				--	--	3.57E+02	1.52E+04	1.43E+04	5.28E+03	8.98E+05	--

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	--	--	--	--	--	4.30E-03	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	--	4.00E-05	1.00E-04	--	5.00E-03	3.00E-04	1.50E-05	5.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	8.58E-04	8.50E-03	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.00E-04	4.00E-03	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	7.72E-04	7.65E-03	4.95E-03	8.73E-02	3.60E-03	2.87E-02	5.70E-03	2.90E-02
		Sumac (skunkbush and other)	Br_{ag}			4.29E-04	4.25E-03	2.75E-03	4.85E-02	2.00E-03	1.60E-02	3.17E-03	1.61E-02
		Soaptree Yucca	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Sagebrush	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Corn Pollen and Other Corn	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Other Plant Types	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Cancer PRG for Specific Metals - Kee'da'whíí tééh (full-time							
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	3.21E+02	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	4.07E+02	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	2.35E+04	--
		Other Plant Types				--	--	--	--	--	--	1.63E+03	--

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Child PRG for Specific Metals - Kee'da'whíí tééh							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Adult PRG for Specific Metals - Kee'da'whíí tééh							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	4.73E+02	1.31E+03	--	6.90E+04	2.03E+03	1.91E+02	3.37E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	6.01E+02	1.66E+03	--	8.72E+04	2.62E+03	2.42E+02	4.35E+03
		Corn Pollen and Other Corn				--	2.93E+04	1.04E+05	--	6.55E+06	6.67E+04	1.40E+04	1.10E+05
		Other Plant Types				--	2.40E+03	6.62E+03	--	3.49E+05	1.05E+04	9.66E+02	1.74E+04

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer PRG for Specific Metals - Kee'da'whíí tééh (full-t							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	--	4.73E+02	1.31E+03	--	6.90E+04	2.03E+03	1.91E+02	3.37E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	6.01E+02	1.66E+03	--	8.72E+04	2.62E+03	2.42E+02	4.35E+03
		Corn Pollen and Other Corn				--	2.93E+04	1.04E+05	--	6.55E+06	6.67E+04	1.40E+04	1.10E+05
		Other Plant Types				--	2.40E+03	6.62E+03	--	3.49E+05	1.05E+04	9.66E+02	1.74E+04

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	2.40E-03	1.80E-03	--	9.00E-03	--	--	--	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	2.00E-05	1.00E-05	--	6.00E-06	--	--	5.00E-05	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.32E-03	1.13E-01	4.39E-03	1.80E-02	3.60E-01	3.60E-03	2.25E-01	1.31E-02
		Sumac (skunkbush and other)	Br_{ag}			1.29E-03	6.25E-02	2.44E-03	1.00E-02	2.00E-01	2.00E-03	1.25E-01	7.25E-03
		Soaptree Yucca	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Sagebrush	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Corn Pollen and Other Corn	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Other Plant Types	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03

Outputs	Parameter		Symbol	Description	Units	Navajo residential) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	6.60E+02	1.52E+02	--	1.05E+02	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.32E+02	1.98E+02	--	1.34E+02	--	--	--	--
		Corn Pollen and Other Corn				7.91E+04	3.56E+03	--	4.16E+03	--	--	--	--
		Other Plant Types				3.33E+03	7.92E+02	--	5.36E+02	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	(full-time Navajo residential) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	(full-time Navajo residential) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**2.92E+02**	**2.51E+01**	**--**	**5.19E+01**	**--**	**--**	**6.80E+01**	**2.98E+03**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.68E+02	3.28E+01	--	6.66E+01	--	--	8.91E+01	3.81E+03
		Corn Pollen and Other Corn				3.49E+04	5.90E+02	--	2.07E+03	--	--	1.48E+03	1.38E+05
		Other Plant Types				1.47E+03	1.31E+02	--	2.66E+02	--	--	3.57E+02	1.52E+04

Outputs	Parameter		Symbol	Description	Units	ime Navajo residential) Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	**2.92E+02**	**2.51E+01**	**--**	**5.19E+01**	**--**	**--**	**6.80E+01**	**2.98E+03**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.68E+02	3.28E+01	--	6.66E+01	--	--	8.91E+01	3.81E+03
		Corn Pollen and Other Corn				3.49E+04	5.90E+02	--	2.07E+03	--	--	1.48E+03	1.38E+05
		Other Plant Types				1.47E+03	1.31E+02	--	2.66E+02	--	--	3.57E+02	1.52E+04

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	2.60E-04	--	--	--	--	--	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	2.00E-03	9.00E-05	2.00E-02	--	--	4.00E-05	1.00E-04	--
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.25E-01	8.38E-03	1.76E-02	1.24E-01	7.72E-04	7.65E-03	4.95E-03	8.73E-02
		Sumac (skunkbush and other)	Br_{ag}			1.25E-01	4.66E-03	9.75E-03	6.90E-02	4.29E-04	4.25E-03	2.75E-03	4.85E-02
		Soaptree Yucca	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Sagebrush	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Corn Pollen and Other Corn	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Other Plant Types	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	4.82E+03	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	6.13E+03	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	2.84E+05	--	--	--	--	--	--
		Other Plant Types				--	2.45E+04	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**2.72E+03**	**1.04E+03**	**1.75E+05**	--	--	**4.73E+02**	**1.31E+03**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.57E+03	1.32E+03	2.25E+05	--	--	6.01E+02	1.66E+03	--
		Corn Pollen and Other Corn				5.94E+04	6.11E+04	7.05E+06	--	--	2.93E+04	1.04E+05	--
		Other Plant Types				1.43E+04	5.28E+03	8.98E+05	--	--	2.40E+03	6.62E+03	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	**2.72E+03**	**1.04E+03**	**1.75E+05**	--	--	**4.73E+02**	**1.31E+03**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.57E+03	1.32E+03	2.25E+05	--	--	6.01E+02	1.66E+03	--
		Corn Pollen and Other Corn				5.94E+04	6.11E+04	7.05E+06	--	--	2.93E+04	1.04E+05	--
		Other Plant Types				1.43E+04	5.28E+03	8.98E+05	--	--	2.40E+03	6.62E+03	--

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	--	4.30E-03	--	2.40E-03	1.80E-03	--	9.00E-03
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	5.00E-03	3.00E-04	1.50E-05	5.00E-04	2.00E-05	1.00E-05	--	6.00E-06
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01	4.88E-03	2.00E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02	4.50E-03	7.00E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-03	2.87E-02	5.70E-03	2.90E-02	2.32E-03	1.13E-01	4.39E-03	1.80E-02
		Sumac (skunkbush and other)	Br_{ag}			2.00E-03	1.60E-02	3.17E-03	1.61E-02	1.29E-03	6.25E-02	2.44E-03	1.00E-02
		Soaptree Yucca	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Sagebrush	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Other Plant Types	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Kǫǫh bí líí nakaí (sheep camp)							
						Aluminum	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Inhalation of Plants**		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	3.21E+02	--	6.60E+02	1.52E+02	--	1.05E+02
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	4.07E+02	--	8.32E+02	1.98E+02	--	1.34E+02
		Corn Pollen and Other Corn				--	--	2.35E+04	--	7.91E+04	3.56E+03	--	4.16E+03
		Other Plant Types				--	--	1.63E+03	--	3.33E+03	7.92E+02	--	5.36E+02

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Kǫǫh bí líí nakaí (sheep camp)							
						Aluminum	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kǫǫh bí líí nakaí (sheep camp)							
						Aluminum	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**6.90E+04**	**2.03E+03**	**1.91E+02**	**3.37E+03**	**2.92E+02**	**2.51E+01**	**--**	**5.19E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.72E+04	2.62E+03	2.42E+02	4.35E+03	3.68E+02	3.28E+01	--	6.66E+01
		Corn Pollen and Other Corn				6.55E+06	6.67E+04	1.40E+04	1.10E+05	3.49E+04	5.90E+02	--	2.07E+03
		Other Plant Types				3.49E+05	1.05E+04	9.66E+02	1.74E+04	1.47E+03	1.31E+02	--	2.66E+02

Outputs	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Kǫǫh bí líí nakaí (sheep camp)							
						Aluminum	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	**6.90E+04**	**2.03E+03**	**1.91E+02**	**3.37E+03**	**2.92E+02**	**2.51E+01**	**--**	**5.19E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.72E+04	2.62E+03	2.42E+02	4.35E+03	3.68E+02	3.28E+01	--	6.66E+01
		Corn Pollen and Other Corn				6.55E+06	6.67E+04	1.40E+04	1.10E+05	3.49E+04	5.90E+02	--	2.07E+03
		Other Plant Types				3.49E+05	1.05E+04	9.66E+02	1.74E+04	1.47E+03	1.31E+02	--	2.66E+02

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	--	--	--	--	2.60E-04	--	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	--	--	5.00E-05	3.00E-04	2.00E-03	9.00E-05	2.00E-02	--
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-01	4.00E-03	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02	1.38E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	1.00E-03	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02	1.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-01	3.60E-03	2.25E-01	1.31E-02	2.25E-01	8.38E-03	1.76E-02	1.24E-01
		Sumac (skunkbush and other)	Br_{ag}			2.00E-01	2.00E-03	1.25E-01	7.25E-03	1.25E-01	4.66E-03	9.75E-03	6.90E-02
		Soaptree Yucca	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Sagebrush	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Other Plant Types	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	4.82E+03	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	6.13E+03	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	2.84E+05	--	--
		Other Plant Types				--	--	--	--	--	2.45E+04	--	--

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	**6.80E+01**	**2.98E+03**	**2.72E+03**	**1.04E+03**	**1.75E+05**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	8.91E+01	3.81E+03	3.57E+03	1.32E+03	2.25E+05	--
		Corn Pollen and Other Corn				--	--	1.48E+03	1.38E+05	5.94E+04	6.11E+04	7.05E+06	--
		Other Plant Types				--	--	3.57E+02	1.52E+04	1.43E+04	5.28E+03	8.98E+05	--

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	--	--	**6.80E+01**	**2.98E+03**	**2.72E+03**	**1.04E+03**	**1.75E+05**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	8.91E+01	3.81E+03	3.57E+03	1.32E+03	2.25E+05	--
		Corn Pollen and Other Corn				--	--	1.48E+03	1.38E+05	5.94E+04	6.11E+04	7.05E+06	--
		Other Plant Types				--	--	3.57E+02	1.52E+04	1.43E+04	5.28E+03	8.98E+05	--

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	--	--	--	--	--	4.30E-03	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	--	4.00E-05	1.00E-04	--	5.00E-03	3.00E-04	1.50E-05	5.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	8.58E-04	8.50E-03	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.00E-04	4.00E-03	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	7.72E-04	7.65E-03	4.95E-03	8.73E-02	3.60E-03	2.87E-02	5.70E-03	2.90E-02
		Sumac (skunkbush and other)	Br_{ag}			4.29E-04	4.25E-03	2.75E-03	4.85E-02	2.00E-03	1.60E-02	3.17E-03	1.61E-02
		Soaptree Yucca	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Sagebrush	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Corn Pollen and Other Corn	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Other Plant Types	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Cancer PRG for Specific Metals - Kǫǫ eí nahaazáh (easy ac							
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	3.26E+02	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	4.07E+02	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	1.63E+03	--

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Child PRG for Specific Metals - Kǫǫ eí nahaazáh							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Adult PRG for Specific Metals - Kǫǫ eí nahaazáh							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	4.73E+02	1.31E+03	--	6.98E+04	2.10E+03	1.93E+02	3.48E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	6.01E+02	1.66E+03	--	8.72E+04	2.62E+03	2.42E+02	4.35E+03
		Corn Pollen and Other Corn				--	2.93E+04	1.04E+05	--	--	--	--	--
		Other Plant Types				--	2.40E+03	6.62E+03	--	3.49E+05	1.05E+04	9.66E+02	1.74E+04

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer PRG for Specific Metals - Kǫǫ eí nahaazáh (eas							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	--	4.73E+02	1.31E+03	--	6.98E+04	2.10E+03	1.93E+02	3.48E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	6.01E+02	1.66E+03	--	8.72E+04	2.62E+03	2.42E+02	4.35E+03
		Corn Pollen and Other Corn				--	2.93E+04	1.04E+05	--	--	--	--	--
		Other Plant Types				--	2.40E+03	6.62E+03	--	3.49E+05	1.05E+04	9.66E+02	1.74E+04

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	2.40E-03	1.80E-03	--	9.00E-03	--	--	--	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	2.00E-05	1.00E-05	--	6.00E-06	--	--	5.00E-05	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.32E-03	1.13E-01	4.39E-03	1.80E-02	3.60E-01	3.60E-03	2.25E-01	1.31E-02
		Sumac (skunkbush and other)	Br_{ag}			1.29E-03	6.25E-02	2.44E-03	1.00E-02	2.00E-01	2.00E-03	1.25E-01	7.25E-03
		Soaptree Yucca	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Sagebrush	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Corn Pollen and Other Corn	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Other Plant Types	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						cess open space)							
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	6.66E+02	1.58E+02	--	1.07E+02	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.32E+02	1.98E+02	--	1.34E+02	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				3.33E+03	7.92E+02	--	5.36E+02	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						(easy access open space)							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						(easy access open space)							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**2.94E+02**	**2.62E+01**	**--**	**5.33E+01**	**--**	**--**	**7.13E+01**	**3.05E+03**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.68E+02	3.28E+01	--	6.66E+01	--	--	8.91E+01	3.81E+03
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.47E+03	1.31E+02	--	2.66E+02	--	--	3.57E+02	1.52E+04

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						access open space)							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	**2.94E+02**	**2.62E+01**	**--**	**5.33E+01**	**--**	**--**	**7.13E+01**	**3.05E+03**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.68E+02	3.28E+01	--	6.66E+01	--	--	8.91E+01	3.81E+03
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.47E+03	1.31E+02	--	2.66E+02	--	--	3.57E+02	1.52E+04

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	2.60E-04	--	--	--	--	--	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	2.00E-03	9.00E-05	2.00E-02	--	--	4.00E-05	1.00E-04	--
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.25E-01	8.38E-03	1.76E-02	1.24E-01	7.72E-04	7.65E-03	4.95E-03	8.73E-02
		Sumac (skunkbush and other)	Br_{ag}			1.25E-01	4.66E-03	9.75E-03	6.90E-02	4.29E-04	4.25E-03	2.75E-03	4.85E-02
		Soaptree Yucca	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Sagebrush	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Corn Pollen and Other Corn	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Other Plant Types	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	4.90E+03	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	6.13E+03	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	2.45E+04	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**2.85E+03**	**1.06E+03**	**1.80E+05**	--	--	**4.81E+02**	**1.32E+03**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.57E+03	1.32E+03	2.25E+05	--	--	6.01E+02	1.66E+03	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.43E+04	5.28E+03	8.98E+05	--	--	2.40E+03	6.62E+03	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	**2.85E+03**	**1.06E+03**	**1.80E+05**	--	--	**4.81E+02**	**1.32E+03**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.57E+03	1.32E+03	2.25E+05	--	--	6.01E+02	1.66E+03	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.43E+04	5.28E+03	8.98E+05	--	--	2.40E+03	6.62E+03	--

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	--	4.30E-03	--	2.40E-03	1.80E-03	--	9.00E-03
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	5.00E-03	3.00E-04	1.50E-05	5.00E-04	2.00E-05	1.00E-05	--	6.00E-06
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-03	3.19E-02	6.33E-03	3.22E-02	2.58E-03	1.25E-01	4.88E-03	2.00E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.50E-04	3.00E-02	8.00E-03	1.50E-02	1.50E-03	6.40E-02	4.50E-03	7.00E-03
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-03	2.87E-02	5.70E-03	2.90E-02	2.32E-03	1.13E-01	4.39E-03	1.80E-02
		Sumac (skunkbush and other)	Br_{ag}			2.00E-03	1.60E-02	3.17E-03	1.61E-02	1.29E-03	6.25E-02	2.44E-03	1.00E-02
		Soaptree Yucca	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Sagebrush	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-04	2.71E-03	5.38E-04	2.74E-03	2.19E-04	1.06E-02	4.15E-04	1.70E-03
		Other Plant Types	Br_{ag}			2.60E-03	2.07E-02	4.11E-03	2.09E-02	1.68E-03	8.13E-02	3.17E-03	1.30E-02

Outputs	Parameter		Symbol	Description	Units	Cancer PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Inhalation of Plants**		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**--**	**--**	**3.26E+02**	**--**	**6.66E+02**	**1.58E+02**	**--**	**1.07E+02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ *where* $Br = Br_{ag}$ *for aboveground plants and* $Br = Br_{root}$ *for belowground plants*	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	4.07E+02	--	8.32E+02	1.98E+02	--	1.34E+02
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	1.63E+03	--	3.33E+03	7.92E+02	--	5.36E+02

Outputs	Parameter		Symbol	Description	Units	Noncancer Child PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ *where* $Br = Br_{ag}$ *for aboveground plants and* $Br = Br_{root}$ *for belowground plants*	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Noncancer Adult PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**6.98E+04**	**2.10E+03**	**1.93E+02**	**3.48E+03**	**2.94E+02**	**2.62E+01**	**--**	**5.33E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ *where* $Br = Br_{ag}$ *for aboveground plants and* $Br = Br_{root}$ *for belowground plants*	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.72E+04	2.62E+03	2.42E+02	4.35E+03	3.68E+02	3.28E+01	--	6.66E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				3.49E+05	1.05E+04	9.66E+02	1.74E+04	1.47E+03	1.31E+02	--	2.66E+02

Outputs	Parameter		Symbol	Description	Units	Noncancer PRG for Specific Metals - Kǫǫ eí doo nahaazáh dah (difficult access open space)							
						Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	**6.98E+04**	**2.10E+03**	**1.93E+02**	**3.48E+03**	**2.94E+02**	**2.62E+01**	**--**	**5.33E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.72E+04	2.62E+03	2.42E+02	4.35E+03	3.68E+02	3.28E+01	--	6.66E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				3.49E+05	1.05E+04	9.66E+02	1.74E+04	1.47E+03	1.31E+02	--	2.66E+02

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	--	--	--	--	2.60E-04	--	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	--	--	5.00E-05	3.00E-04	2.00E-03	9.00E-05	2.00E-02	--
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	4.00E-01	4.00E-03	2.50E-01	1.45E-02	2.50E-01	9.31E-03	1.95E-02	1.38E-01
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	1.00E-03	5.00E-02	3.60E-02	6.00E-02	8.00E-03	2.20E-02	1.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	3.60E-01	3.60E-03	2.25E-01	1.31E-02	2.25E-01	8.38E-03	1.76E-02	1.24E-01
		Sumac (skunkbush and other)	Br_{ag}			2.00E-01	2.00E-03	1.25E-01	7.25E-03	1.25E-01	4.66E-03	9.75E-03	6.90E-02
		Soaptree Yucca	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Sagebrush	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02
		Corn Pollen and Other Corn	Br_{ag}			3.40E-02	3.40E-04	2.13E-02	1.23E-03	2.13E-02	7.91E-04	1.66E-03	1.17E-02
		Other Plant Types	Br_{ag}			2.60E-01	2.60E-03	1.63E-01	9.43E-03	1.63E-01	6.05E-03	1.27E-02	8.97E-02

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	**4.90E+03**	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	6.13E+03	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	2.45E+04	--	--

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	**7.13E+01**	**3.05E+03**	**2.85E+03**	**1.06E+03**	**1.80E+05**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	8.91E+01	3.81E+03	3.57E+03	1.32E+03	2.25E+05	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	3.57E+02	1.52E+04	1.43E+04	5.28E+03	8.98E+05	--

Outputs	Parameter		Symbol	Description	Units	Copper	Iron	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	--	--	**7.13E+01**	**3.05E+03**	**2.85E+03**	**1.06E+03**	**1.80E+05**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	8.91E+01	3.81E+03	3.57E+03	1.32E+03	2.25E+05	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	3.57E+02	1.52E+04	1.43E+04	5.28E+03	8.98E+05	--

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	--	--	--	--	--	4.30E-03	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	--	4.00E-05	1.00E-04	--	5.00E-03	3.00E-04	1.50E-05	5.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	8.58E-04	8.50E-03	5.50E-03	9.70E-02	4.00E-03	3.19E-02	6.33E-03	3.22E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	4.00E-04	4.00E-03	3.00E-03	9.00E-01	6.50E-04	3.00E-02	8.00E-03	1.50E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	7.72E-04	7.65E-03	4.95E-03	8.73E-02	3.60E-03	2.87E-02	5.70E-03	2.90E-02
		Sumac (skunkbush and other)	Br_{ag}			4.29E-04	4.25E-03	2.75E-03	4.85E-02	2.00E-03	1.60E-02	3.17E-03	1.61E-02
		Soaptree Yucca	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Sagebrush	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02
		Corn Pollen and Other Corn	Br_{ag}			7.29E-05	7.23E-04	4.68E-04	8.25E-03	3.40E-04	2.71E-03	5.38E-04	2.74E-03
		Other Plant Types	Br_{ag}			5.58E-04	5.53E-03	3.58E-03	6.31E-02	2.60E-03	2.07E-02	4.11E-03	2.09E-02

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Cancer PRG for Specific Metals - Chíí dah wiih łeezh (wash							
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	3.21E+02	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	4.07E+02	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	2.35E+04	--
		Other Plant Types				--	--	--	--	--	--	1.63E+03	--

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Child PRG for Specific Metals - Chíí dah wiih łee							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer Adult PRG for Specific Metals - Chíí dah wiih łee							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	4.81E+02	1.32E+03	--	6.90E+04	2.03E+03	1.91E+02	3.37E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	6.01E+02	1.66E+03	--	8.72E+04	2.62E+03	2.42E+02	4.35E+03
		Corn Pollen and Other Corn				--	--	--	--	6.55E+06	6.67E+04	1.40E+04	1.10E+05
		Other Plant Types				--	2.40E+03	6.62E+03	--	3.49E+05	1.05E+04	9.66E+02	1.74E+04

Outputs	Parameter		Symbol	Description	Units	Thallium	Uranium	Vanadium	Zinc	Aluminum	Antimony	Arsenic	Barium
						Noncancer PRG for Specific Metals - Chíí dah wiih łeezh (w							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	--	4.81E+02	1.32E+03	--	6.90E+04	2.03E+03	1.91E+02	3.37E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	6.01E+02	1.66E+03	--	8.72E+04	2.62E+03	2.42E+02	4.35E+03
		Corn Pollen and Other Corn				--	--	--	--	6.55E+06	6.67E+04	1.40E+04	1.10E+05
		Other Plant Types				--	2.40E+03	6.62E+03	--	3.49E+05	1.05E+04	9.66E+02	1.74E+04

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	2.40E-03	1.80E-03	--	9.00E-03	--	--	--	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	2.00E-05	1.00E-05	--	6.00E-06	--	--	5.00E-05	3.00E-04
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.58E-03	1.25E-01	4.88E-03	2.00E-02	4.00E-01	4.00E-03	2.50E-01	1.45E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	1.50E-03	6.40E-02	4.50E-03	7.00E-03	2.50E-01	1.00E-03	5.00E-02	3.60E-02
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.32E-03	1.13E-01	4.39E-03	1.80E-02	3.60E-01	3.60E-03	2.25E-01	1.31E-02
		Sumac (skunkbush and other)	Br_{ag}			1.29E-03	6.25E-02	2.44E-03	1.00E-02	2.00E-01	2.00E-03	1.25E-01	7.25E-03
		Soaptree Yucca	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Sagebrush	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03
		Corn Pollen and Other Corn	Br_{ag}			2.19E-04	1.06E-02	4.15E-04	1.70E-03	3.40E-02	3.40E-04	2.13E-02	1.23E-03
		Other Plant Types	Br_{ag}			1.68E-03	8.13E-02	3.17E-03	1.30E-02	2.60E-01	2.60E-03	1.63E-01	9.43E-03

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						es and drainages)							
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Inhalation of Plants		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**6.60E+02**	**1.52E+02**	**--**	**1.05E+02**	**--**	**--**	**--**	**--**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.32E+02	1.98E+02	--	1.34E+02	--	--	--	--
		Corn Pollen and Other Corn				7.91E+04	3.56E+03	--	4.16E+03	--	--	--	--
		Other Plant Types				3.33E+03	7.92E+02	--	5.36E+02	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						zh (washes and drainages)							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						zh (washes and drainages)							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**2.92E+02**	**2.51E+01**	**--**	**5.19E+01**	**--**	**--**	**6.80E+01**	**2.98E+03**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.68E+02	3.28E+01	--	6.66E+01	--	--	8.91E+01	3.81E+03
		Corn Pollen and Other Corn				3.49E+04	5.90E+02	--	2.07E+03	--	--	1.48E+03	1.38E+05
		Other Plant Types				1.47E+03	1.31E+02	--	2.66E+02	--	--	3.57E+02	1.52E+04

Outputs	Parameter		Symbol	Description	Units	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Manganese	Mercury
						ashes and drainages)							
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	**2.92E+02**	**2.51E+01**	**--**	**5.19E+01**	**--**	**--**	**6.80E+01**	**2.98E+03**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.68E+02	3.28E+01	--	6.66E+01	--	--	8.91E+01	3.81E+03
		Corn Pollen and Other Corn				3.49E+04	5.90E+02	--	2.07E+03	--	--	1.48E+03	1.38E+05
		Other Plant Types				1.47E+03	1.31E+02	--	2.66E+02	--	--	3.57E+02	1.52E+04

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Metal-Specific Toxicity Parameters	Inhalation Unit Rate		IUR	The metal-specific cancer toxicity value for the inhalation pathway.	$(ug/m^3)^{-1}$	--	2.60E-04	--	--	--	--	--	--
	Reference Concentration		RFC	The metal-specific cancer toxicity value for the inhalation pathway.	mg/m^3	2.00E-03	9.00E-05	2.00E-02	--	--	4.00E-05	1.00E-04	--
Bioconcentration Factors for Metals	Bioconcentration Factor for Above-Ground Plants		Br_{ag}	Plant-soil bioconcentration factor - above ground	mg/kg-dry plant per mg/kg dry soil	2.50E-01	9.31E-03	1.95E-02	1.38E-01	8.58E-04	8.50E-03	5.50E-03	9.70E-02
	Bioconcentration Factor for Below-Ground Plants		Br_{root}	Plant-soil bioconcentration factor - below ground	mg/kg-dry plant per mg/kg dry soil	6.00E-02	8.00E-03	2.20E-02	1.00E-01	4.00E-04	4.00E-03	3.00E-03	9.00E-01
Plant-Specific Bioconcentration Factors for Metals	Herbs and Medicinal	Navajo Tea	Br_{ag}	Plant-soil bioconcentration factor - above or below ground	mg/kg-dry plant per mg/kg dry soil	2.25E-01	8.38E-03	1.76E-02	1.24E-01	7.72E-04	7.65E-03	4.95E-03	8.73E-02
		Sumac (skunkbush and other)	Br_{ag}			1.25E-01	4.66E-03	9.75E-03	6.90E-02	4.29E-04	4.25E-03	2.75E-03	4.85E-02
		Soaptree Yucca	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Sagebrush	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02
		Corn Pollen and Other Corn	Br_{ag}			2.13E-02	7.91E-04	1.66E-03	1.17E-02	7.29E-05	7.23E-04	4.68E-04	8.25E-03
		Other Plant Types	Br_{ag}			1.63E-01	6.05E-03	1.27E-02	8.97E-02	5.58E-04	5.53E-03	3.58E-03	6.31E-02

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Cancer Risk - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Inhalation of Plants**		$PRG_{ODL-inh}$	The preliminary remediation goals for cancer for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	**4.82E+03**	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for cancer for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{TR \times AT_c}{IUR \times EF \times (ED_a \times C_{air-a} + ED_c \times C_{air-c}) \times ET \times \frac{1\ day}{24\ hours} \times IF_p \times CF \times (Br + MLF_{produce})}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	6.13E+03	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	2.84E+05	--	--	--	--	--	--
		Other Plant Types				--	2.45E+04	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Child Receptor, Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	--	--	--	--	--	--	--	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_c \times EF_c \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				--	--	--	--	--	--	--	--
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				--	--	--	--	--	--	--	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants by Adult Receptor Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	mg/kg	**2.72E+03**	**1.04E+03**	**1.75E+05**	--	--	**4.73E+02**	**1.31E+03**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{THQ \times AT_{nc}}{\frac{1}{RfC} \times ED_a \times EF_a \times ET \times \frac{1\ day}{24\ hours} \times C_{air} \times IF_p \times CF \times (Br + MLF_{produce}) \times CF6}$ where $Br = Br_{ag}$ for aboveground plants and $Br = Br_{root}$ for belowground plants	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.57E+03	1.32E+03	2.25E+05	--	--	6.01E+02	1.66E+03	--
		Corn Pollen and Other Corn				5.94E+04	6.11E+04	7.05E+06	--	--	2.93E+04	1.04E+05	--
		Other Plant Types				1.43E+04	5.28E+03	8.98E+05	--	--	2.40E+03	6.62E+03	--

Outputs	Parameter		Symbol	Description	Units	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Preliminary Remediation Goals for Noncancer Hazard - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The noncancer preliminary remediation goals for all plant inhalation, back-calculated to soil.	mg/kg	**2.72E+03**	**1.04E+03**	**1.75E+05**	--	--	**4.73E+02**	**1.31E+03**	--
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The noncancer preliminary remediation goals for each type of plant inhalation, back-calculated to soil.	mg/kg	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.57E+03	1.32E+03	2.25E+05	--	--	6.01E+02	1.66E+03	--
		Corn Pollen and Other Corn				5.94E+04	6.11E+04	7.05E+06	--	--	2.93E+04	1.04E+05	--
		Other Plant Types				1.43E+04	5.28E+03	8.98E+05	--	--	2.40E+03	6.62E+03	--

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radioniculides				
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	--	--	--	75	75	75	75	75
	Decay Constant		λ		1/Year	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide	Unitless	--	--	--	1.00	2.59	1.02	1.00	1.00
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02
		Sumac (skunkbush and other)				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
		Soaptree Yucca				--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03
		Sagebrush				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02
		Corn Pollen and Other Corn				--	--	--	3.00E-01	2.80E-03	1.80E-02	1.80E-03	7.80E-03
		Other Plant Types				--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides - Custom			PRGs for non-SE Radionuclides - Custom				
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234
Preliminary Remediation Goals - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	4.70E-01	1.92E-01	1.21E-01	1.25E+02	1.75E+00	9.88E-01	8.17E-01	1.00E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.23E-01	3.37E-01	2.11E-01	2.20E+02	3.07E+00	1.73E+00	1.43E+00	1.75E+00
		Corn Pollen and Other Corn				1.65E+00	6.73E-01	4.22E-01	4.39E+02	6.13E+00	3.46E+00	2.86E+00	3.51E+00
		Other Plant Types				3.29E+00	1.35E+00	8.44E-01	8.78E+02	1.23E+01	6.91E+00	5.72E+00	7.01E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Secular Equilibrium Radionuclides - Custom			PRGs for non-SE Radionuclides - Custom				
						Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230	U-234
Preliminary Remediation Goals - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	2.70E+00	1.98E+00	1.42E+00	1.22E+02	6.56E+01	3.17E+00	6.51E+01	1.56E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.43E+00	2.53E+00	1.81E+00	1.67E+02	8.30E+01	4.03E+00	8.51E+01	2.02E+01
		Corn Pollen and Other Corn				1.58E+02	8.94E+01	7.21E+01	1.46E+03	5.39E+03	1.94E+02	1.47E+03	4.41E+02
		Other Plant Types				1.37E+01	1.01E+01	7.23E+00	6.67E+02	3.32E+02	1.61E+01	3.40E+02	8.10E+01

Inputs	Parameter		Symbol	Description	Units	Transfer Factors for Secular Equilibrium Progeny Radionuclides of Ra-226						
						SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Po-218	Rn-222
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	7.40E-03	0.00E+00
		Sumac (skunkbush and other)				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04	2.00E-04	0.00E+00
		Soaptree Yucca				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04	2.00E-04	0.00E+00
		Sagebrush				--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	7.40E-03	0.00E+00
		Corn Pollen and Other Corn				--	1.00E-01	1.00E-01	2.80E-03	2.80E-03	2.40E-04	2.40E-04	0.00E+00
		Other Plant Types				--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	7.40E-03	0.00E+00
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Custom						
						SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Po-218	Rn-222
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL(inh-plant}(i)}}$	pCi/g	4.70E-01	6.12E+01	4.51E+02	1.75E+00	3.58E+02	1.92E+00	2.00E+03	1.22E+04
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.23E-01	1.07E+02	7.89E+02	3.07E+00	6.27E+02	3.36E+00	3.51E+03	2.14E+04
		Corn Pollen and Other Corn				1.65E+00	2.14E+02	1.58E+03	6.13E+00	1.25E+03	6.72E+00	7.01E+03	4.27E+04
		Other Plant Types				3.29E+00	4.28E+02	3.15E+03	1.23E+01	2.51E+03	1.34E+01	1.40E+04	8.55E+04

Outputs	Parameter		Symbol	Description	Units	PRGs for Progeny - Custom						
						SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Po-218	Rn-222
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	2.70E+00	5.50E+02	4.05E+03	2.53E+01	5.18E+03	1.16E+02	1.21E+05	1.09E+06
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.43E+00	9.27E+02	6.82E+03	3.21E+01	6.56E+03	1.46E+02	1.52E+05	1.37E+06
		Corn Pollen and Other Corn				1.58E+02	2.14E+03	1.57E+04	2.08E+03	4.26E+05	1.75E+04	1.82E+07	2.96E+08
		Other Plant Types				1.37E+01	3.71E+03	2.73E+04	1.28E+02	2.62E+04	5.85E+02	6.10E+05	5.48E+06

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units		TFs for Secular Equilibrium Radionuclides			TFs for non-SE Radionuclides			
						U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	--	--	--	75	75	75	75
	Decay Constant		λ		1/Year	1.55E-10	--	--	--	5.54E-10	3.12E-02	4.33E-04	9.19E-06
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide	Unitless	1.00	--	--	--	1.00	2.59	1.02	1.00
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	7.10E-02	--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03
		Sumac (skunkbush and other)				1.00E-03	--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04
		Soaptree Yucca				1.00E-03	--	--	--	3.00E-01	1.00E-02	1.00E-02	5.00E-04
		Sagebrush				7.10E-02	--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03
		Corn Pollen and Other Corn				7.80E-03	--	--	--	3.00E-01	2.80E-03	1.80E-02	1.80E-03
		Other Plant Types				7.10E-02	--	--	--	1.30E+00	8.00E-02	4.20E-01	1.20E-03

Outputs	Parameter		Symbol	Description	Units		PRGs for Secular Equilibrium Radionuclides - Kee'da'whíí tééh (full-time Navajo residential)			PRGs for non-SE Radionuclides - Kee'da'whíí tééh (ful			
						U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230
Preliminary Remediation Goals - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	1.18E+00	4.70E-01	1.92E-01	1.21E-01	1.25E+02	1.75E+00	9.88E-01	8.17E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				2.06E+00	8.23E-01	3.37E-01	2.11E-01	2.20E+02	3.07E+00	1.73E+00	1.43E+00
		Corn Pollen and Other Corn				4.13E+00	1.65E+00	6.73E-01	4.22E-01	4.39E+02	6.13E+00	3.46E+00	2.86E+00
		Other Plant Types				8.26E+00	3.29E+00	1.35E+00	8.44E-01	8.78E+02	1.23E+01	6.91E+00	5.72E+00

Outputs	Parameter		Symbol	Description	Units		Radionuclides - Kee'da'whíí tééh (full-time Navajo residential)			PRGs for non-SE Radionuclides - Kee'da'whíí tééh (ful			
						U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226	Th-230
Preliminary Remediation Goals - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	1.84E+01	2.70E+00	1.98E+00	1.42E+00	1.22E+02	6.56E+01	3.17E+00	6.51E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				2.38E+01	3.43E+00	2.53E+00	1.81E+00	1.67E+02	8.30E+01	4.03E+00	8.51E+01
		Corn Pollen and Other Corn				5.20E+02	1.58E+02	8.94E+01	7.21E+01	1.46E+03	5.39E+03	1.94E+02	1.47E+03
		Other Plant Types				9.54E+01	1.37E+01	1.01E+01	7.23E+00	6.67E+02	3.32E+02	1.61E+01	3.40E+02

Inputs	Parameter		Symbol	Description	Units			Transfer Factors for Secular Equilibrium Progeny Radionuclides of					
						Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Po-218
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	7.40E-03
		Sumac (skunkbush and other)				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04	2.00E-04
		Soaptree Yucca				1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04	2.00E-04
		Sagebrush				4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	7.40E-03
		Corn Pollen and Other Corn				1.80E-02	--	1.00E-01	1.00E-01	2.80E-03	2.80E-03	2.40E-04	2.40E-04
		Other Plant Types				4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03	7.40E-03
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units			PRGs for Progeny - Kee'da'whíí tééh (full-time Navajo resident					
						Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Po-218
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODLinh-plant}(i)}}$	pCi/g	9.88E-01	4.70E-01	6.12E+01	4.51E+02	1.75E+00	3.58E+02	1.92E+00	2.00E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.73E+00	8.23E-01	1.07E+02	7.89E+02	3.07E+00	6.27E+02	3.36E+00	3.51E+03
		Corn Pollen and Other Corn				3.46E+00	1.65E+00	2.14E+02	1.58E+03	6.13E+00	1.25E+03	6.72E+00	7.01E+03
		Other Plant Types				6.91E+00	3.29E+00	4.28E+02	3.15E+03	1.23E+01	2.51E+03	1.34E+01	1.40E+04

Outputs	Parameter		Symbol	Description	Units			PRGs for Progeny - Kee'da'whíí tééh (full-time Navajo resident					
						Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210	Po-218
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	3.12E+00	2.70E+00	5.50E+02	4.05E+03	2.53E+01	5.18E+03	1.16E+02	1.21E+05
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.97E+00	3.43E+00	9.27E+02	6.82E+03	3.21E+01	6.56E+03	1.46E+02	1.52E+05
		Corn Pollen and Other Corn				1.90E+02	1.58E+02	2.14E+03	1.57E+04	2.08E+03	4.26E+05	1.75E+04	1.82E+07
		Other Plant Types				1.59E+01	1.37E+01	3.71E+03	2.73E+04	1.28E+02	2.62E+04	5.85E+02	6.10E+05

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units			TFs for Secular Equilibrium Radionuclides					TFs for non-SE
						U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	75	--	--	--	75	75	75
	Decay Constant		λ		1/Year	2.82E-06	1.55E-10	--	--	--	5.54E-10	3.12E-02	4.33E-04
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide	Unitless	1.00	1.00	--	--	--	1.00	2.59	1.02
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	7.10E-02	7.10E-02	--	--	--	1.30E+00	8.00E-02	4.20E-01
		Sumac (skunkbush and other)				1.00E-03	1.00E-03	--	--	--	3.00E-01	1.00E-02	1.00E-02
		Soaptree Yucca				1.00E-03	1.00E-03	--	--	--	3.00E-01	1.00E-02	1.00E-02
		Sagebrush				7.10E-02	7.10E-02	--	--	--	1.30E+00	8.00E-02	4.20E-01
		Corn Pollen and Other Corn				7.80E-03	7.80E-03	--	--	--	3.00E-01	2.80E-03	1.80E-02
		Other Plant Types				7.10E-02	7.10E-02	--	--	--	1.30E+00	8.00E-02	4.20E-01

Outputs	Parameter		Symbol	Description	Units	l-time Navajo residential)		PRGs for Secular Equilibrium Radionuclides - Kǫǫh bí łíí nakaí (sheep camp)			PRGs for non-SE Radionuclides		
						U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226
Preliminary Remediation Goals - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	1.00E+00	1.18E+00	4.70E-01	1.92E-01	1.21E-01	1.25E+02	1.75E+00	9.88E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.75E+00	2.06E+00	8.23E-01	3.37E-01	2.11E-01	2.20E+02	3.07E+00	1.73E+00
		Corn Pollen and Other Corn				3.51E+00	4.13E+00	1.65E+00	6.73E-01	4.22E-01	4.39E+02	6.13E+00	3.46E+00
		Other Plant Types				7.01E+00	8.26E+00	3.29E+00	1.35E+00	8.44E-01	8.78E+02	1.23E+01	6.91E+00

Outputs	Parameter		Symbol	Description	Units	l-time Navajo residential)		Radionuclides - Kǫǫh bí łíí nakaí (sheep camp)			PRGs for non-SE Radionuclides		
						U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210	Ra-226
Preliminary Remediation Goals - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	1.56E+01	1.84E+01	2.70E+00	1.98E+00	1.42E+00	1.22E+02	6.56E+01	3.17E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				2.02E+01	2.38E+01	3.43E+00	2.53E+00	1.81E+00	1.67E+02	8.30E+01	4.03E+00
		Corn Pollen and Other Corn				4.41E+02	5.20E+02	1.58E+02	8.94E+01	7.21E+01	1.46E+03	5.39E+03	1.94E+02
		Other Plant Types				8.10E+01	9.54E+01	1.37E+01	1.01E+01	7.23E+00	6.67E+02	3.32E+02	1.61E+01

Inputs	Parameter		Symbol	Description	Units	Ra-226			Transfer Factors for Secular Equilibrium Progeny Ra				
						Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	0.00E+00	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
		Sumac (skunkbush and other)				0.00E+00	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Soaptree Yucca				0.00E+00	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	2.00E-04
		Sagebrush				0.00E+00	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
		Corn Pollen and Other Corn				0.00E+00	1.80E-02	--	1.00E-01	1.00E-01	2.80E-03	2.80E-03	2.40E-04
		Other Plant Types				0.00E+00	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02	7.40E-03
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	ial)		PRGs for Progeny - Kǫǫh bí łíí nakaí (sh					
						Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODLinh-plant}(i)}}$	pCi/g	1.22E+04	9.88E-01	4.70E-01	6.12E+01	4.51E+02	1.75E+00	3.58E+02	1.92E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				2.14E+04	1.73E+00	8.23E-01	1.07E+02	7.89E+02	3.07E+00	6.27E+02	3.36E+00
		Corn Pollen and Other Corn				4.27E+04	3.46E+00	1.65E+00	2.14E+02	1.58E+03	6.13E+00	1.25E+03	6.72E+00
		Other Plant Types				8.55E+04	6.91E+00	3.29E+00	4.28E+02	3.15E+03	1.23E+01	2.51E+03	1.34E+01

Outputs	Parameter		Symbol	Description	Units	ial)		PRGs for Progeny - Kǫǫh bí łíí nakaí (sh					
						Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214	Po-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	1.09E+06	3.12E+00	2.70E+00	5.50E+02	4.05E+03	2.53E+01	5.18E+03	1.16E+02
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.37E+06	3.97E+00	3.43E+00	9.27E+02	6.82E+03	3.21E+01	6.56E+03	1.46E+02
		Corn Pollen and Other Corn				2.96E+08	1.90E+02	1.58E+02	2.14E+03	1.57E+04	2.08E+03	4.26E+05	1.75E+04
		Other Plant Types				5.48E+06	1.59E+01	1.37E+01	3.71E+03	2.73E+04	1.28E+02	2.62E+04	5.85E+02

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	Radionuclides			TFs for Secular Equilibrium Radionuclides				
						Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	75	75	--	--	--	75	75
	Decay Constant		λ		1/Year	9.19E-06	2.82E-06	1.55E-10	--	--	--	5.54E-10	3.12E-02
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide	Unitless	1.00	1.00	1.00	--	--	--	1.00	2.59
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	7.10E-02	7.10E-02	--	--	--	1.30E+00	8.00E-02
		Sumac (skunkbush and other)				5.00E-04	1.00E-03	1.00E-03	--	--	--	3.00E-01	1.00E-02
		Soaptree Yucca				5.00E-04	1.00E-03	1.00E-03	--	--	--	3.00E-01	1.00E-02
		Sagebrush				1.20E-03	7.10E-02	7.10E-02	--	--	--	1.30E+00	8.00E-02
		Corn Pollen and Other Corn				1.80E-03	7.80E-03	7.80E-03	--	--	--	3.00E-01	2.80E-03
		Other Plant Types				1.20E-03	7.10E-02	7.10E-02	--	--	--	1.30E+00	8.00E-02

Outputs	Parameter		Symbol	Description	Units	- Kǫǫh bí líí nakaí (sheep camp)			PRGs for Secular Equilibrium Radionuclides - Kǫǫ eí nahaazáh (easy access open space)			PRGs for non-SE Radio	
						Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210
Preliminary Remediation Goals - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	8.17E-01	1.00E+00	1.18E+00	6.58E-01	2.69E-01	1.69E-01	1.76E+02	2.45E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.43E+00	1.75E+00	2.06E+00	8.23E-01	3.37E-01	2.11E-01	2.20E+02	3.07E+00
		Corn Pollen and Other Corn				2.86E+00	3.51E+00	4.13E+00	--	--	--	--	--
		Other Plant Types				5.72E+00	7.01E+00	8.26E+00	3.29E+00	1.35E+00	8.44E-01	8.78E+02	1.23E+01

Outputs	Parameter		Symbol	Description	Units	- Kǫǫh bí líí nakaí (sheep camp)			Radionuclides - Kǫǫ eí nahaazáh (easy access open space)			PRGs for non-SE Radio	
						Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40	Pb-210
Preliminary Remediation Goals - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	6.51E+01	1.56E+01	1.84E+01	2.74E+00	2.03E+00	1.45E+00	1.33E+02	6.64E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.51E+01	2.02E+01	2.38E+01	3.43E+00	2.53E+00	1.81E+00	1.67E+02	8.30E+01
		Corn Pollen and Other Corn				1.47E+03	4.41E+02	5.20E+02	--	--	--	--	--
		Other Plant Types				3.40E+02	8.10E+01	9.54E+01	1.37E+01	1.01E+01	7.23E+00	6.67E+02	3.32E+02

Inputs	Parameter		Symbol	Description	Units	adionuclides of Ra-226				Transfer Factors for Secular Equilibri			
						Po-218	Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	7.40E-03	0.00E+00	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02
		Sumac (skunkbush and other)				2.00E-04	0.00E+00	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02
		Soaptree Yucca				2.00E-04	0.00E+00	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02
		Sagebrush				7.40E-03	0.00E+00	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02
		Corn Pollen and Other Corn				2.40E-04	0.00E+00	1.80E-02	--	1.00E-01	1.00E-01	2.80E-03	2.80E-03
		Other Plant Types				7.40E-03	0.00E+00	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02	8.00E-02
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	eep camp)				PRGs for Progeny - Kǫǫ eí naha			
						Po-218	Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODLinh-plant}(i)}}$	pCi/g	2.00E+03	1.22E+04	9.88E-01	6.58E-01	8.57E+01	6.31E+02	2.45E+00	5.02E+02
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.51E+03	2.14E+04	1.73E+00	8.23E-01	1.07E+02	7.89E+02	3.07E+00	6.27E+02
		Corn Pollen and Other Corn				7.01E+03	4.27E+04	3.46E+00	--	--	--	--	--
		Other Plant Types				1.40E+04	8.55E+04	6.91E+00	3.29E+00	4.28E+02	3.15E+03	1.23E+01	2.51E+03

Outputs	Parameter		Symbol	Description	Units	eep camp)				PRGs for Progeny - Kǫǫ eí naha			
						Po-218	Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210	Pb-214
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	1.21E+05	1.09E+06	3.12E+00	2.74E+00	7.41E+02	5.46E+03	2.56E+01	5.25E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.52E+05	1.37E+06	3.97E+00	3.43E+00	9.27E+02	6.82E+03	3.21E+01	6.56E+03
		Corn Pollen and Other Corn				1.82E+07	2.96E+08	1.90E+02	--	--	--	--	--
		Other Plant Types				6.10E+05	5.48E+06	1.59E+01	1.37E+01	3.71E+03	2.73E+04	1.28E+02	2.62E+04

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	TFs for non-SE Radionuclides				TFs for Secular Equilibrium Radionuclides			
						Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	75	75	75	--	--	--	75
	Decay Constant		λ		1/Year	4.33E-04	9.19E-06	2.82E-06	1.55E-10	--	--	--	5.54E-10
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide	Unitless	1.02	1.00	1.00	1.00	--	--	--	1.00
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	4.20E-01	1.20E-03	7.10E-02	7.10E-02	--	--	--	1.30E+00
		Sumac (skunkbush and other)				1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--	--	3.00E-01
		Soaptree Yucca				1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--	--	3.00E-01
		Sagebrush				4.20E-01	1.20E-03	7.10E-02	7.10E-02	--	--	--	1.30E+00
		Corn Pollen and Other Corn				1.80E-02	1.80E-03	7.80E-03	7.80E-03	--	--	--	3.00E-01
		Other Plant Types				4.20E-01	1.20E-03	7.10E-02	7.10E-02	--	--	--	1.30E+00

Outputs	Parameter		Symbol	Description	Units	nuclides - Kọọ eí nahaazáh (easy access open space)				PRGs for Secular Equilibrium Radionuclides - Kọọ eí doo nahaazáh dah (difficult access open space)			PRGs for n
						Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40
Preliminary Remediation Goals - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	1.38E+00	1.14E+00	1.40E+00	1.65E+00	6.58E-01	2.69E-01	1.69E-01	1.76E+02
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.73E+00	1.43E+00	1.75E+00	2.06E+00	8.23E-01	3.37E-01	2.11E-01	2.20E+02
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				6.91E+00	5.72E+00	7.01E+00	8.26E+00	3.29E+00	1.35E+00	8.44E-01	8.78E+02

Outputs	Parameter		Symbol	Description	Units	nuclides - Kọọ eí nahaazáh (easy access open space)				Radionuclides - Kọọ eí doo nahaazáh dah (difficult access open space)			PRGs for n
						Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE	K-40
Preliminary Remediation Goals - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	3.23E+00	6.81E+01	1.62E+01	1.91E+01	2.74E+00	2.03E+00	1.45E+00	1.33E+02
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				4.03E+00	8.51E+01	2.02E+01	2.38E+01	3.43E+00	2.53E+00	1.81E+00	1.67E+02
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.61E+01	3.40E+02	8.10E+01	9.54E+01	1.37E+01	1.01E+01	7.23E+00	6.67E+02

Inputs	Parameter		Symbol	Description	Units	um Progeny Radionuclides of Ra-226					Transfer Factors for S		
						Po-210	Po-218	Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	7.40E-03	7.40E-03	0.00E+00	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02
		Sumac (skunkbush and other)				2.00E-04	2.00E-04	0.00E+00	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02
		Soaptree Yucca				2.00E-04	2.00E-04	0.00E+00	1.00E-02	--	1.00E-01	1.00E-01	1.00E-02
		Sagebrush				7.40E-03	7.40E-03	0.00E+00	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02
		Corn Pollen and Other Corn				2.40E-04	2.40E-04	0.00E+00	1.80E-02	--	1.00E-01	1.00E-01	2.80E-03
		Other Plant Types				7.40E-03	7.40E-03	0.00E+00	4.20E-01	--	1.00E-01	1.00E-01	8.00E-02
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	ıazáh (easy access open space)					PRGs for Progeny - Kọ		
						Po-210	Po-218	Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODLinh-plant}(i)}}$	pCi/g	2.69E+00	2.80E+03	1.71E+04	1.38E+00	6.58E-01	8.57E+01	6.31E+02	2.45E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.36E+00	3.51E+03	2.14E+04	1.73E+00	8.23E-01	1.07E+02	7.89E+02	3.07E+00
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.34E+01	1.40E+04	8.55E+04	6.91E+00	3.29E+00	4.28E+02	3.15E+03	1.23E+01

Outputs	Parameter		Symbol	Description	Units	ıazáh (easy access open space)					PRGs for Progeny - Kọ		
						Po-210	Po-218	Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214	Pb-210
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	1.17E+02	1.22E+05	1.10E+06	3.17E+00	2.74E+00	7.41E+02	5.46E+03	2.56E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.46E+02	1.52E+05	1.37E+06	3.97E+00	3.43E+00	9.27E+02	6.82E+03	3.21E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				5.85E+02	6.10E+05	5.48E+06	1.59E+01	1.37E+01	3.71E+03	2.73E+04	1.28E+02

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	TFs for non-SE Radionuclides					TFs for Secular Equilibrium Radionuclides		
						Pb-210	Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	75	75	75	75	--	--	--
	Decay Constant		λ		1/Year	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10	--	--	--
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide	Unitless	2.59	1.02	1.00	1.00	1.00	--	--	--
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02	--	--	--
		Sumac (skunkbush and other)				1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--	--
		Soaptree Yucca				1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03	--	--	--
		Sagebrush				8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02	--	--	--
		Corn Pollen and Other Corn				2.80E-03	1.80E-02	1.80E-03	7.80E-03	7.80E-03	--	--	--
		Other Plant Types				8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02	--	--	--

Outputs	Parameter		Symbol	Description	Units	on-SE Radionuclides - Kǫǫ eí doo nahaazáh dah (difficult access open space)					PRGs for Secular Equilibrium Radionuclides - Chíí dah wiih łeezh (washes and drainages)		
						Pb-210	Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE
Preliminary Remediation Goals - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	2.45E+00	1.38E+00	1.14E+00	1.40E+00	1.65E+00	4.70E-01	1.92E-01	1.21E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.07E+00	1.73E+00	1.43E+00	1.75E+00	2.06E+00	8.23E-01	3.37E-01	2.11E-01
		Corn Pollen and Other Corn				--	--	--	--	--	1.65E+00	6.73E-01	4.22E-01
		Other Plant Types				1.23E+01	6.91E+00	5.72E+00	7.01E+00	8.26E+00	3.29E+00	1.35E+00	8.44E-01

Outputs	Parameter		Symbol	Description	Units	on-SE Radionuclides - Kǫǫ eí doo nahaazáh dah (difficult access open space)					Radionuclides - Chíí dah wiih łeezh (washes and drainages)		
						Pb-210	Ra-226	Th-230	U-234	U-238	Ra-226 in SE	U-238 in SE	Th-232 in SE
Preliminary Remediation Goals - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	6.64E+01	3.23E+00	6.81E+01	1.62E+01	1.91E+01	2.70E+00	1.98E+00	1.42E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.30E+01	4.03E+00	8.51E+01	2.02E+01	2.38E+01	3.43E+00	2.53E+00	1.81E+00
		Corn Pollen and Other Corn				--	--	--	--	--	1.58E+02	8.94E+01	7.21E+01
		Other Plant Types				3.32E+02	1.61E+01	3.40E+02	8.10E+01	9.54E+01	1.37E+01	1.01E+01	7.23E+00

Inputs	Parameter		Symbol	Description	Units	ecular Equilibrium Progeny Radionuclides of Ra-226							Transfe
						Pb-214	Po-210	Po-218	Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	8.00E-02	7.40E-03	7.40E-03	0.00E+00	4.20E-01	--	1.00E-01	1.00E-01
		Sumac (skunkbush and other)				1.00E-02	2.00E-04	2.00E-04	0.00E+00	1.00E-02	--	1.00E-01	1.00E-01
		Soaptree Yucca				1.00E-02	2.00E-04	2.00E-04	0.00E+00	1.00E-02	--	1.00E-01	1.00E-01
		Sagebrush				8.00E-02	7.40E-03	7.40E-03	0.00E+00	4.20E-01	--	1.00E-01	1.00E-01
		Corn Pollen and Other Corn				2.80E-03	2.40E-04	2.40E-04	0.00E+00	1.80E-02	--	1.00E-01	1.00E-01
		Other Plant Types				8.00E-02	7.40E-03	7.40E-03	0.00E+00	4.20E-01	--	1.00E-01	1.00E-01
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	ǫ eí doo nahaazáh dah (difficult access open space)							PR
						Pb-214	Po-210	Po-218	Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODLinh-plant}(i)}}$	pCi/g	5.02E+02	2.69E+00	2.80E+03	1.71E+04	1.38E+00	4.70E-01	6.12E+01	4.51E+02
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				6.27E+02	3.36E+00	3.51E+03	2.14E+04	1.73E+00	8.23E-01	1.07E+02	7.89E+02
		Corn Pollen and Other Corn				--	--	--	--	--	1.65E+00	2.14E+02	1.58E+03
		Other Plant Types				2.51E+03	1.34E+01	1.40E+04	8.55E+04	6.91E+00	3.29E+00	4.28E+02	3.15E+03

Outputs	Parameter		Symbol	Description	Units	ǫ eí doo nahaazáh dah (difficult access open space)							PR
						Pb-214	Po-210	Po-218	Rn-222	Ra-226	SE for Ra-226	Bi-210	Bi-214
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	5.25E+03	1.17E+02	1.22E+05	1.10E+06	3.17E+00	2.70E+00	5.50E+02	4.05E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				6.56E+03	1.46E+02	1.52E+05	1.37E+06	3.97E+00	3.43E+00	9.27E+02	6.82E+03
		Corn Pollen and Other Corn				--	--	--	--	--	1.58E+02	2.14E+03	1.57E+04
		Other Plant Types				2.62E+04	5.85E+02	6.10E+05	5.48E+06	1.59E+01	1.37E+01	3.71E+03	2.73E+04

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Inputs	Parameter		Symbol	Description	Units	TFs for non-SE Radioniculides					
						K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Miscellaneous Radionuclide-Specific Parameters	Exposure Duration (Total)		ED_c+ED_a	Sum of adult and child exposure durations.	Years	75	75	75	75	75	75
	Decay Constant		λ		1/Year	5.54E-10	3.12E-02	4.33E-04	9.19E-06	2.82E-06	1.55E-10
	Decay Function		-	Half-life decay function to account for the fact that the radionuclide	Unitless	1.00	2.59	1.02	1.00	1.00	1.00
Transfer Factors for Radionuclides	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				3.00E-01	1.00E-02	1.00E-02	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				3.00E-01	2.80E-03	1.80E-02	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				1.30E+00	8.00E-02	4.20E-01	1.20E-03	7.10E-02	7.10E-02
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for non-SE Radionuclides - Chíí dah wiih leezh (washes and drainages)**					
						K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	1.25E+02	1.75E+00	9.88E-01	8.17E-01	1.00E+00	1.18E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				2.20E+02	3.07E+00	1.73E+00	1.43E+00	1.75E+00	2.06E+00
		Corn Pollen and Other Corn				4.39E+02	6.13E+00	3.46E+00	2.86E+00	3.51E+00	4.13E+00
		Other Plant Types				8.78E+02	1.23E+01	6.91E+00	5.72E+00	7.01E+00	8.26E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for non-SE Radionuclides - Chíí dah wiih leezh (washes and drainages)**					
						K-40	Pb-210	Ra-226	Th-230	U-234	U-238
Preliminary Remediation Goals - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	1.22E+02	6.56E+01	3.17E+00	6.51E+01	1.56E+01	1.84E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				1.67E+02	8.30E+01	4.03E+00	8.51E+01	2.02E+01	2.38E+01
		Corn Pollen and Other Corn				1.46E+03	5.39E+03	1.94E+02	1.47E+03	4.41E+02	5.20E+02
		Other Plant Types				6.67E+02	3.32E+02	1.61E+01	3.40E+02	8.10E+01	9.54E+01

Inputs	Parameter		Symbol	Description	Units	r Factors for Secular Equilibrium Progeny Radionuclides of Ra-226					
						Pb-210	Pb-214	Po-210	Po-218	Rn-222	Ra-226
Transfer Factors for SE Progeny Radionuclides of Ra-226	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	8.00E-02	8.00E-02	7.40E-03	7.40E-03	0.00E+00	4.20E-01
		Sumac (skunkbush and other)				1.00E-02	1.00E-02	2.00E-04	2.00E-04	0.00E+00	1.00E-02
		Soaptree Yucca				1.00E-02	1.00E-02	2.00E-04	2.00E-04	0.00E+00	1.00E-02
		Sagebrush				8.00E-02	8.00E-02	7.40E-03	7.40E-03	0.00E+00	4.20E-01
		Corn Pollen and Other Corn				2.80E-03	2.80E-03	2.40E-04	2.40E-04	0.00E+00	1.80E-02
		Other Plant Types				8.00E-02	8.00E-02	7.40E-03	7.40E-03	0.00E+00	4.20E-01
Fractional Contribution of Progeny for Ra-226			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**Gs for Progeny - Chíí dah wiih leezh (washes and drainages)**					
						Pb-210	Pb-214	Po-210	Po-218	Rn-222	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODLinh-plant}(i)}}$	pCi/g	1.75E+00	3.58E+02	1.92E+00	2.00E+03	1.22E+04	9.88E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				3.07E+00	6.27E+02	3.36E+00	3.51E+03	2.14E+04	1.73E+00
		Corn Pollen and Other Corn				6.13E+00	1.25E+03	6.72E+00	7.01E+03	4.27E+04	3.46E+00
		Other Plant Types				1.23E+01	2.51E+03	1.34E+01	1.40E+04	8.55E+04	6.91E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**Gs for Progeny - Chíí dah wiih leezh (washes and drainages)**					
						Pb-210	Pb-214	Po-210	Po-218	Rn-222	Ra-226
Preliminary Remediation Goals for Progeny Isotopes of Ra-226 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	2.53E+01	5.18E+03	1.16E+02	1.21E+05	1.09E+06	3.12E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				3.21E+01	6.56E+03	1.46E+02	1.52E+05	1.37E+06	3.97E+00
		Corn Pollen and Other Corn				2.08E+03	4.26E+05	1.75E+04	1.82E+07	2.96E+08	1.90E+02
		Other Plant Types				1.28E+02	2.62E+04	5.85E+02	6.10E+05	5.48E+06	1.59E+01

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter		Symbol	Description	Units	SE for Th-232	Transfer Factors for SE Progeny Radionuclides of Th-232						
						Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Rn-220	Th-228
Transfer Factors for SE Progeny Radionuclides of Th-232	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	0.00E+00	1.20E-03
	Sumac (skunkbush and other)				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	0.00E+00	5.00E-04
	Soaptree Yucca				--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	0.00E+00	5.00E-04
	Sagebrush				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	0.00E+00	1.20E-03
	Corn Pollen and Other Corn				--	1.00E-03	1.00E-01	2.80E-03	1.80E-02	1.80E-02	0.00E+00	1.80E-03
	Other Plant Types				--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	0.00E+00	1.20E-03
		--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter	Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Custom						
						Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Rn-220	Th-228
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation	$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	1.21E-01	5.66E+02	2.46E+02	4.43E+01	2.46E+00	6.37E-01	2.42E+04	2.11E-01
	Herbs and Medicinal: Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Soaptree Yucca				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sagebrush				2.11E-01	9.91E+02	4.31E+02	7.75E+01	4.31E+00	1.12E+00	4.24E+04	3.69E-01
	Herbs and Medicinal: Corn Pollen and Other Corn				4.22E-01	1.98E+03	8.63E+02	1.55E+02	8.63E+00	2.23E+00	8.48E+04	7.38E-01
	Herbs and Medicinal: Other Plant Types				8.44E-01	3.96E+03	1.73E+03	3.10E+02	1.73E+01	4.46E+00	1.70E+05	1.48E+00

Outputs	Parameter	Symbol	Description	Units	SE for Th-232	PRGs for Progeny - Custom						
						Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Rn-220	Th-228
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation	$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	1.42E+00	4.65E+04	2.22E+03	6.40E+02	7.79E+00	2.01E+00	2.17E+06	1.68E+01
	Herbs and Medicinal: Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Soaptree Yucca				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sagebrush				1.81E+00	5.97E+04	3.73E+03	8.10E+02	9.90E+00	2.56E+00	2.72E+06	2.20E+01
	Herbs and Medicinal: Corn Pollen and Other Corn				7.21E+01	1.73E+06	8.61E+03	5.26E+04	4.75E+02	1.23E+02	5.87E+08	3.80E+02
	Herbs and Medicinal: Other Plant Types				7.23E+00	2.39E+05	1.49E+04	3.24E+03	3.96E+01	1.02E+01	1.09E+07	8.79E+01

Parameter		Symbol	Description	Units	SE for U-238	Transfer Factors for SE Progeny Ra						
						Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Po-218
Transfer Factors for SE Progeny Radionuclides of U-238	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03
	Sumac (skunkbush and other)				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	2.00E-04
	Soaptree Yucca				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	2.00E-04
	Sagebrush				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03
	Corn Pollen and Other Corn				--	1.00E-01	1.00E-01	1.00E-02	2.80E-03	2.80E-03	2.40E-04	2.40E-04
	Other Plant Types				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03
		--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Parameter	Parameter	Symbol	Description	Units	SE for U-238	PRGs for Progeny - C						
						Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Po-218
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation	$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	1.92E-01	6.12E+01	4.51E+02	2.32E+04	1.75E+00	3.58E+02	1.92E+00	2.00E+03
	Herbs and Medicinal: Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Soaptree Yucca				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sagebrush				3.37E-01	1.07E+02	7.89E+02	4.06E+04	3.07E+00	6.27E+02	3.36E+00	3.51E+03
	Herbs and Medicinal: Corn Pollen and Other Corn				6.73E-01	2.14E+02	1.58E+03	8.12E+04	6.13E+00	1.25E+03	6.72E+00	7.01E+03
	Herbs and Medicinal: Other Plant Types				1.35E+00	4.28E+02	3.15E+03	1.62E+05	1.23E+01	2.51E+03	1.34E+01	1.40E+04

Parameter	Parameter	Symbol	Description	Units	SE for U-238	PRGs for Progeny - C						
						Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Po-218
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation	$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	1.98E+00	5.50E+02	4.05E+03	1.10E+06	2.53E+01	5.18E+03	1.16E+02	1.21E+05
	Herbs and Medicinal: Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Soaptree Yucca				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sagebrush				2.53E+00	9.27E+02	6.82E+03	1.59E+06	3.21E+01	6.56E+03	1.46E+02	1.52E+05
	Herbs and Medicinal: Corn Pollen and Other Corn				8.94E+01	2.14E+03	1.57E+04	8.01E+06	2.08E+03	4.26E+05	1.75E+04	1.82E+07
	Herbs and Medicinal: Other Plant Types				1.01E+01	3.71E+03	2.73E+04	6.35E+06	1.28E+02	2.62E+04	5.85E+02	6.10E+05

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter			Symbol	Description	Units			Transfer Factors for SE Progeny Radionuclides of Th-232					
						Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Rn-220
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	
		Sumac (skunkbush and other)				5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	
		Soaptree Yucca				5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02	
		Sagebrush				1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	
		Corn Pollen and Other Corn				1.80E-03	--	1.00E-03	1.00E-01	2.80E-03	1.80E-02	1.80E-02	
		Other Plant Types				1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01	
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	

Outputs	Parameter		Symbol	Description	Units			PRGs for Progeny - Kee'da'whíí tééh (full-time Navajo resident					
						Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Rn-220
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	6.43E-01	1.21E-01	5.66E+02	2.46E+02	4.43E+01	2.46E+00	6.37E-01	2.42E+04
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.13E+00	2.11E-01	9.91E+02	4.31E+02	7.75E+01	4.31E+00	1.12E+00	4.24E+04
		Corn Pollen and Other Corn				2.25E+00	4.22E-01	1.98E+03	8.63E+02	1.55E+02	8.63E+00	2.23E+00	8.48E+04
		Other Plant Types				4.50E+00	8.44E-01	3.96E+03	1.73E+03	3.10E+02	1.73E+01	4.46E+00	1.70E+05

Outputs	Parameter		Symbol	Description	Units			PRGs for Progeny - Kee'da'whíí tééh (full-time Navajo resident					
						Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228	Rn-220
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	5.12E+01	1.42E+00	4.65E+04	2.22E+03	6.40E+02	7.79E+00	2.01E+00	2.17E+06
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				6.70E+01	1.81E+00	5.97E+04	3.73E+03	8.10E+02	9.90E+00	2.56E+00	2.72E+06
		Corn Pollen and Other Corn				1.16E+03	7.21E+01	1.73E+06	8.61E+03	5.26E+04	4.75E+02	1.23E+02	5.87E+08
		Other Plant Types				2.68E+02	7.23E+00	2.39E+05	1.49E+04	3.24E+03	3.96E+01	1.02E+01	1.09E+07

Parameter			Symbol	Description	Units	dionuclides of U-238						SE for U-238	
						Ra-226	Rn-220	Th-230	Th-234	U-234	U-238		Bi-210
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	4.20E-01	0.00E+00	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01
		Sumac (skunkbush and other)				1.00E-02	0.00E+00	5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Soaptree Yucca				1.00E-02	0.00E+00	5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Sagebrush				4.20E-01	0.00E+00	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01
		Corn Pollen and Other Corn				1.80E-02	0.00E+00	1.80E-03	1.80E-03	7.80E-03	7.80E-03	--	1.00E-01
		Other Plant Types				4.20E-01	0.00E+00	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00

Parameter			Symbol	Description	Units	ustom							
						Ra-226	Rn-220	Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	9.88E-01	2.42E+04	8.17E-01	9.04E+02	1.00E+00	1.18E+00	1.92E-01	6.12E+01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.73E+00	4.24E+04	1.43E+00	1.58E+03	1.75E+00	2.06E+00	3.37E-01	1.07E+02
		Corn Pollen and Other Corn				3.46E+00	8.48E+04	2.86E+00	3.16E+03	3.51E+00	4.13E+00	6.73E-01	2.14E+02
		Other Plant Types				6.91E+00	1.70E+05	5.72E+00	6.33E+03	7.01E+00	8.26E+00	1.35E+00	4.28E+02

Parameter			Symbol	Description	Units	ustom							
						Ra-226	Rn-220	Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	3.12E+00	2.17E+06	6.50E+01	7.20E+04	1.56E+01	1.84E+01	1.98E+00	5.50E+02
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.97E+00	2.72E+06	8.51E+01	9.42E+04	2.02E+01	2.38E+01	2.53E+00	9.27E+02
		Corn Pollen and Other Corn				1.90E+02	5.87E+08	1.47E+03	1.63E+06	4.41E+02	5.20E+02	8.94E+01	2.14E+03
		Other Plant Types				1.59E+01	1.09E+07	3.40E+02	3.77E+05	8.10E+01	9.54E+01	1.01E+01	3.71E+03

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter			Symbol	Description	Units				Transfer Factors for SE Progeny Radionucl				
						Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01
		Sumac (skunkbush and other)				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Soaptree Yucca				5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02	1.00E-02
		Sagebrush				1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01
		Corn Pollen and Other Corn				1.80E-03	1.80E-03	--	1.00E-03	1.00E-01	2.80E-03	1.80E-02	1.80E-02
		Other Plant Types				1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01	4.20E-01
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Outputs	Parameter		Symbol	Description	Units	ial)			PRGs for Progeny - Kǫǫh bí łíí nakaí (sh				
						Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	2.11E-01	6.43E-01	1.21E-01	5.66E+02	2.46E+02	4.43E+01	2.46E+00	6.37E-01
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.69E-01	1.13E+00	2.11E-01	9.91E+02	4.31E+02	7.75E+01	4.31E+00	1.12E+00
		Corn Pollen and Other Corn				7.38E-01	2.25E+00	4.22E-01	1.98E+03	8.63E+02	1.55E+02	8.63E+00	2.23E+00
		Other Plant Types				1.48E+00	4.50E+00	8.44E-01	3.96E+03	1.73E+03	3.10E+02	1.73E+01	4.46E+00

Outputs	Parameter		Symbol	Description	Units	ial)			PRGs for Progeny - Kǫǫh bí łíí nakaí (sh				
						Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224	Ra-228
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	1.68E+01	5.12E+01	1.42E+00	4.65E+04	2.22E+03	6.40E+02	7.79E+00	2.01E+00
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				2.20E+01	6.70E+01	1.81E+00	5.97E+04	3.73E+03	8.10E+02	9.90E+00	2.56E+00
		Corn Pollen and Other Corn				3.80E+02	1.16E+03	7.21E+01	1.73E+06	8.61E+03	5.26E+04	4.75E+02	1.23E+02
		Other Plant Types				8.79E+01	2.68E+02	7.23E+00	2.39E+05	1.49E+04	3.24E+03	3.96E+01	1.02E+01

Parameter			Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of U-238							
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Po-218	Ra-226	Rn-220
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03	4.20E-01	0.00E+00
		Sumac (skunkbush and other)				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	2.00E-04	1.00E-02	0.00E+00
		Soaptree Yucca				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	2.00E-04	1.00E-02	0.00E+00
		Sagebrush				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03	4.20E-01	0.00E+00
		Corn Pollen and Other Corn				1.00E-01	1.00E-02	2.80E-03	2.80E-03	2.40E-04	2.40E-04	1.80E-02	0.00E+00
		Other Plant Types				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03	4.20E-01	0.00E+00
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00

Parameter			Symbol	Description	Units	PRGs for Progeny - Kee'da'whíí tééh (full-time Navajo residential)							
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Po-218	Ra-226	Rn-220
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	4.51E+02	2.32E+04	1.75E+00	3.58E+02	1.92E+00	2.00E+03	9.88E-01	2.42E+04
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				7.89E+02	4.06E+04	3.07E+00	6.27E+02	3.36E+00	3.51E+03	1.73E+00	4.24E+04
		Corn Pollen and Other Corn				1.58E+03	8.12E+04	6.13E+00	1.25E+03	6.72E+00	7.01E+03	3.46E+00	8.48E+04
		Other Plant Types				3.15E+03	1.62E+05	1.23E+01	2.51E+03	1.34E+01	1.40E+04	6.91E+00	1.70E+05

Parameter			Symbol	Description	Units	PRGs for Progeny - Kee'da'whíí tééh (full-time Navajo residential)							
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Po-218	Ra-226	Rn-220
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	4.05E+03	1.10E+06	2.53E+01	5.18E+03	1.16E+02	1.21E+05	3.12E+00	2.17E+06
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				6.82E+03	1.59E+06	3.21E+01	6.56E+03	1.46E+02	1.52E+05	3.97E+00	2.72E+06
		Corn Pollen and Other Corn				1.57E+04	8.01E+06	2.08E+03	4.26E+05	1.75E+04	1.82E+07	1.90E+02	5.87E+08
		Other Plant Types				2.73E+04	6.35E+06	1.28E+02	2.62E+04	5.85E+02	6.10E+05	1.59E+01	1.09E+07

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter			Symbol	Description	Units	ides of Th-232				Transfer Factors for SE Prog			
						Rn-220	Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil		1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01
		Sumac (skunkbush and other)					5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02
		Soaptree Yucca					5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02	1.00E-02
		Sagebrush					1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01
		Corn Pollen and Other Corn					1.80E-03	1.80E-03	--	1.00E-03	1.00E-01	2.80E-03	1.80E-02
		Other Plant Types					1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02	4.20E-01
			--	Daughter/parent fraction in secular equilibrium	Fraction		1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Outputs	Parameter		Symbol	Description	Units	eep camp)				PRGs for Progeny - Kǫǫ eí naha			
						Rn-220	Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**2.42E+04**	**2.11E-01**	**6.43E-01**	**1.69E-01**	**7.92E+02**	**3.45E+02**	**6.20E+01**	**3.45E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				4.24E+04	3.69E-01	1.13E+00	2.11E-01	9.91E+02	4.31E+02	7.75E+01	4.31E+00
		Corn Pollen and Other Corn				8.48E+04	7.38E-01	2.25E+00	--	--	--	--	--
		Other Plant Types				1.70E+05	1.48E+00	4.50E+00	8.44E-01	3.96E+03	1.73E+03	3.10E+02	1.73E+01
Outputs	Parameter		Symbol	Description	Units	eep camp)				PRGs for Progeny - Kǫǫ eí naha			
						Rn-220	Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212	Ra-224
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**2.17E+06**	**1.68E+01**	**5.12E+01**	**1.45E+00**	**4.77E+04**	**2.98E+03**	**6.48E+02**	**7.92E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				2.72E+06	2.20E+01	6.70E+01	1.81E+00	5.97E+04	3.73E+03	8.10E+02	9.90E+00
		Corn Pollen and Other Corn				5.87E+08	3.80E+02	1.16E+03	--	--	--	--	--
		Other Plant Types				1.09E+07	8.79E+01	2.68E+02	7.23E+00	2.39E+05	1.49E+04	3.24E+03	3.96E+01

Parameter			Symbol	Description	Units					SE for U-238			
						Th-230	Th-234	U-234	U-238		Bi-210	Bi-214	Pa-234
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02
		Sumac (skunkbush and other)				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01	1.00E-01	1.00E-02
		Soaptree Yucca				5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01	1.00E-01	1.00E-02
		Sagebrush				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02
		Corn Pollen and Other Corn				1.80E-03	1.80E-03	7.80E-03	7.80E-03	--	1.00E-01	1.00E-01	1.00E-02
		Other Plant Types				1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.60E-03
Parameter			Symbol	Description	Units								
						Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**8.17E-01**	**9.04E+02**	**1.00E+00**	**1.18E+00**	**1.92E-01**	**6.12E+01**	**4.51E+02**	**2.32E+04**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.43E+00	1.58E+03	1.75E+00	2.06E+00	3.37E-01	1.07E+02	7.89E+02	4.06E+04
		Corn Pollen and Other Corn				2.86E+00	3.16E+03	3.51E+00	4.13E+00	6.73E-01	2.14E+02	1.58E+03	8.12E+04
		Other Plant Types				5.72E+00	6.33E+03	7.01E+00	8.26E+00	1.35E+00	4.28E+02	3.15E+03	1.62E+05
Parameter			Symbol	Description	Units								
						Th-230	Th-234	U-234	U-238	SE for U-238	Bi-210	Bi-214	Pa-234
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**6.50E+01**	**7.20E+04**	**1.56E+01**	**1.84E+01**	**1.98E+00**	**5.50E+02**	**4.05E+03**	**1.10E+06**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				8.51E+01	9.42E+04	2.02E+01	2.38E+01	2.53E+00	9.27E+02	6.82E+03	1.59E+06
		Corn Pollen and Other Corn				1.47E+03	1.63E+06	4.41E+02	5.20E+02	8.94E+01	2.14E+03	1.57E+04	8.01E+06
		Other Plant Types				3.40E+02	3.77E+05	8.10E+01	9.54E+01	1.01E+01	3.71E+03	2.73E+04	6.35E+06

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter			Symbol	Description	Units	eny Radionuclides of Th-232					Transfer Fact		
						Ra-228	Rn-220	Th-228	Th-232	SE for Th-232	Ac-228	Bi-212	Pb-212
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	4.20E-01		1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02
		Sumac (skunkbush and other)				1.00E-02		5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
		Soaptree Yucca				1.00E-02		5.00E-04	5.00E-04	--	1.00E-03	1.00E-01	1.00E-02
		Sagebrush				4.20E-01		1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02
		Corn Pollen and Other Corn				1.80E-02		1.80E-03	1.80E-03	--	1.00E-03	1.00E-01	2.80E-03
		Other Plant Types				4.20E-01		1.20E-03	1.20E-03	--	1.00E-03	1.00E-01	8.00E-02
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00		1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.00E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**ɬazáh (easy access open space)**					**PRGs for Progeny - Kọ**		
						Ra-228	**Rn-220**	**Th-228**	**Th-232**	**SE for Th-232**	**Ac-228**	**Bi-212**	**Pb-212**
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**8.92E-01**	**3.39E+04**	**2.95E-01**	**9.00E-01**	**1.69E-01**	**7.92E+02**	**3.45E+02**	**6.20E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.12E+00	4.24E+04	3.69E-01	1.13E+00	2.11E-01	9.91E+02	4.31E+02	7.75E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				4.46E+00	1.70E+05	1.48E+00	4.50E+00	8.44E-01	3.96E+03	1.73E+03	3.10E+02
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**ɬazáh (easy access open space)**					**PRGs for Progeny - Kọ**		
						Ra-228	**Rn-220**	**Th-228**	**Th-232**	**SE for Th-232**	**Ac-228**	**Bi-212**	**Pb-212**
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**2.05E+00**	**2.17E+06**	**1.76E+01**	**5.36E+01**	**1.45E+00**	**4.77E+04**	**2.98E+03**	**6.48E+02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				2.56E+00	2.72E+06	2.20E+01	6.70E+01	1.81E+00	5.97E+04	3.73E+03	8.10E+02
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.02E+01	1.09E+07	8.79E+01	2.68E+02	7.23E+00	2.39E+05	1.49E+04	3.24E+03

Parameter			Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of U-238							
						Pb-210	Pb-214	Po-210	Po-218	Ra-226	Rn-220	Th-230	Th-234
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	8.00E-02	8.00E-02	7.40E-03	7.40E-03	4.20E-01	0.00E+00	1.20E-03	1.20E-03
		Sumac (skunkbush and other)				1.00E-02	1.00E-02	2.00E-04	2.00E-04	1.00E-02	0.00E+00	5.00E-04	5.00E-04
		Soaptree Yucca				1.00E-02	1.00E-02	2.00E-04	2.00E-04	1.00E-02	0.00E+00	5.00E-04	5.00E-04
		Sagebrush				8.00E-02	8.00E-02	7.40E-03	7.40E-03	4.20E-01	0.00E+00	1.20E-03	1.20E-03
		Corn Pollen and Other Corn				2.80E-03	2.80E-03	2.40E-04	2.40E-04	1.80E-02	0.00E+00	1.80E-03	1.80E-03
		Other Plant Types				8.00E-02	8.00E-02	7.40E-03	7.40E-03	4.20E-01	0.00E+00	1.20E-03	1.20E-03
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00	1.00E+00	1.00E+00
Parameter			**Symbol**	**Description**	**Units**	**PRGs for Progeny - Kọọh bí łíí nakaí (sheep camp)**							
						Pb-210	**Pb-214**	**Po-210**	**Po-218**	**Ra-226**	**Rn-220**	**Th-230**	**Th-234**
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**1.75E+00**	**3.58E+02**	**1.92E+00**	**2.00E+03**	**9.88E-01**	**2.42E+04**	**8.17E-01**	**9.04E+02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.07E+00	6.27E+02	3.36E+00	3.51E+03	1.73E+00	4.24E+04	1.43E+00	1.58E+03
		Corn Pollen and Other Corn				6.13E+00	1.25E+03	6.72E+00	7.01E+03	3.46E+00	8.48E+04	2.86E+00	3.16E+03
		Other Plant Types				1.23E+01	2.51E+03	1.34E+01	1.40E+04	6.91E+00	1.70E+05	5.72E+00	6.33E+03
Parameter			**Symbol**	**Description**	**Units**	**PRGs for Progeny - Kọọh bí łíí nakaí (sheep camp)**							
						Pb-210	**Pb-214**	**Po-210**	**Po-218**	**Ra-226**	**Rn-220**	**Th-230**	**Th-234**
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**2.53E+01**	**5.18E+03**	**1.16E+02**	**1.21E+05**	**3.12E+00**	**2.17E+06**	**6.50E+01**	**7.20E+04**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.21E+01	6.56E+03	1.46E+02	1.52E+05	3.97E+00	2.72E+06	8.51E+01	9.42E+04
		Corn Pollen and Other Corn				2.08E+03	4.26E+05	1.75E+04	1.82E+07	1.90E+02	5.87E+08	1.47E+03	1.63E+06
		Other Plant Types				1.28E+02	2.62E+04	5.85E+02	6.10E+05	1.59E+01	1.09E+07	3.40E+02	3.77E+05

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter		Symbol	Description	Units	brs for SE Progeny Radionuclides of Th-232							
					Ra-224	Ra-228	Rn-220	Th-228	Th-232	SE for Th-232	Ac-228	Bi-212
Transfer Factors for SE Progeny Radionuclides of Th-232	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	4.20E-01	4.20E-01		1.20E-03	1.20E-03	--	1.00E-03	1.00E-01
	Herbs and Medicinal: Sumac (skunkbush and other)				1.00E-02	1.00E-02		5.00E-04	5.00E-04	--	1.00E-03	1.00E-01
	Herbs and Medicinal: Soaptree Yucca				1.00E-02	1.00E-02		5.00E-04	5.00E-04	--	1.00E-03	1.00E-01
	Herbs and Medicinal: Sagebrush				4.20E-01	4.20E-01		1.20E-03	1.20E-03	--	1.00E-03	1.00E-01
	Herbs and Medicinal: Corn Pollen and Other Corn				1.80E-02	1.80E-02		1.80E-03	1.80E-03	--	1.00E-03	1.00E-01
	Herbs and Medicinal: Other Plant Types				4.20E-01	4.20E-01		1.20E-03	1.20E-03	--	1.00E-03	1.00E-01
		--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00		1.00E+00	1.00E+00	--	1.00E+00	1.00E+00
Outputs	**Parameter**	**Symbol**	**Description**	**Units**	**ǫ eí doo nahaazáh dah (difficult access open space)**							**PR**
					Ra-224	**Ra-228**	**Rn-220**	**Th-228**	**Th-232**	**SE for Th-232**	**Ac-228**	**Bi-212**
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants, by Plant Type	**Soil PRG for Total Plant Inhalation**	$PRG_{ODL\text{-}inh\text{-}plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**3.45E+00**	**8.92E-01**	**3.39E+04**	**2.95E-01**	**9.00E-01**	**1.21E-01**	**5.66E+02**	**2.46E+02**
	Herbs and Medicinal: Navajo Tea	$PRG_{ODL\text{-}inh\text{-}plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Soaptree Yucca				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sagebrush				4.31E+00	1.12E+00	4.24E+04	3.69E-01	1.13E+00	2.11E-01	9.91E+02	4.31E+02
	Herbs and Medicinal: Corn Pollen and Other Corn				--	--	--	--	--	4.22E-01	1.98E+03	8.63E+02
	Herbs and Medicinal: Other Plant Types				1.73E+01	4.46E+00	1.70E+05	1.48E+00	4.50E+00	8.44E-01	3.96E+03	1.73E+03
Outputs	**Parameter**	**Symbol**	**Description**	**Units**	**ǫ eí doo nahaazáh dah (difficult access open space)**							**PR**
					Ra-224	**Ra-228**	**Rn-220**	**Th-228**	**Th-232**	**SE for Th-232**	**Ac-228**	**Bi-212**
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**	$PRG_{ODL\text{-}inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**7.92E+00**	**2.05E+00**	**2.17E+06**	**1.76E+01**	**5.36E+01**	**1.42E+00**	**4.65E+04**	**2.22E+03**
	Herbs and Medicinal: Navajo Tea	$PRG_{ODL\text{-}inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Soaptree Yucca				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sagebrush				9.90E+00	2.56E+00	2.72E+06	2.20E+01	6.70E+01	1.81E+00	5.97E+04	3.73E+03
	Herbs and Medicinal: Corn Pollen and Other Corn				--	--	--	--	--	7.21E+01	1.73E+06	8.61E+03
	Herbs and Medicinal: Other Plant Types				3.96E+01	1.02E+01	1.09E+07	8.79E+01	2.68E+02	7.23E+00	2.39E+05	1.49E+04

Parameter		Symbol	Description	Units			SE for U-238					Trans
					U-234	U-238		Bi-210	Bi-214	Pa-234	Pb-210	Pb-214
Transfer Factors for SE Progeny Radionuclides of U-238	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02
	Herbs and Medicinal: Sumac (skunkbush and other)				1.00E-03	1.00E-03	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02
	Herbs and Medicinal: Soaptree Yucca				1.00E-03	1.00E-03	--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02
	Herbs and Medicinal: Sagebrush				7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02
	Herbs and Medicinal: Corn Pollen and Other Corn				7.80E-03	7.80E-03	--	1.00E-01	1.00E-01	1.00E-02	2.80E-03	2.80E-03
	Herbs and Medicinal: Other Plant Types				7.10E-02	7.10E-02	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02
		--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00
Parameter		**Symbol**	**Description**	**Units**								**PRGs for**
					U-234	**U-238**	**SE for U-238**	**Bi-210**	**Bi-214**	**Pa-234**	**Pb-210**	**Pb-214**
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	**Soil PRG for Total Plant Inhalation**	$PRG_{ODL\text{-}inh\text{-}plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**1.00E+00**	**1.18E+00**	**2.69E-01**	**8.57E+01**	**6.31E+02**	**3.25E+04**	**2.45E+00**	**5.02E+02**
	Herbs and Medicinal: Navajo Tea	$PRG_{ODL\text{-}inh\text{-}plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Soaptree Yucca				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sagebrush				1.75E+00	2.06E+00	3.37E-01	1.07E+02	7.89E+02	4.06E+04	3.07E+00	6.27E+02
	Herbs and Medicinal: Corn Pollen and Other Corn				3.51E+00	4.13E+00	--	--	--	--	--	--
	Herbs and Medicinal: Other Plant Types				7.01E+00	8.26E+00	1.35E+00	4.28E+02	3.15E+03	1.62E+05	1.23E+01	2.51E+03
Parameter		**Symbol**	**Description**	**Units**								**PRGs for**
					U-234	**U-238**	**SE for U-238**	**Bi-210**	**Bi-214**	**Pa-234**	**Pb-210**	**Pb-214**
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**	$PRG_{ODL\text{-}inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**1.56E+01**	**1.84E+01**	**2.03E+00**	**7.41E+02**	**5.46E+03**	**1.27E+06**	**2.56E+01**	**5.25E+03**
	Herbs and Medicinal: Navajo Tea	$PRG_{ODL\text{-}inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Soaptree Yucca				--	--	--	--	--	--	--	--
	Herbs and Medicinal: Sagebrush				2.02E+01	2.38E+01	2.53E+00	9.27E+02	6.82E+03	1.59E+06	3.21E+01	6.56E+03
	Herbs and Medicinal: Corn Pollen and Other Corn				4.41E+02	5.20E+02	--	--	--	--	--	--
	Herbs and Medicinal: Other Plant Types				8.10E+01	9.54E+01	1.01E+01	3.71E+03	2.73E+04	6.35E+06	1.28E+02	2.62E+04

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter			Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of Th-232					
						Pb-212	Ra-224	Ra-228	Rn-220	Th-228	Th-232
Transfer Factors for SE Progeny Radionuclides of Th-232	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	8.00E-02	4.20E-01	4.20E-01		1.20E-03	1.20E-03
		Sumac (skunkbush and other)				1.00E-02	1.00E-02	1.00E-02		5.00E-04	5.00E-04
		Soaptree Yucca				1.00E-02	1.00E-02	1.00E-02		5.00E-04	5.00E-04
		Sagebrush				8.00E-02	4.20E-01	4.20E-01		1.20E-03	1.20E-03
		Corn Pollen and Other Corn				2.80E-03	1.80E-02	1.80E-02		1.80E-03	1.80E-03
		Other Plant Types				8.00E-02	4.20E-01	4.20E-01		1.20E-03	1.20E-03
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00		1.00E+00	1.00E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Progeny - Chíí dah wiih łeezh (washes and drainages)**					
						Pb-212	**Ra-224**	**Ra-228**	**Rn-220**	**Th-228**	**Th-232**
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**4.43E+01**	**2.46E+00**	**6.37E-01**	**2.42E+04**	**2.11E-01**	**6.43E-01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh,plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				7.75E+01	4.31E+00	1.12E+00	4.24E+04	3.69E-01	1.13E+00
		Corn Pollen and Other Corn				1.55E+02	8.63E+00	2.23E+00	8.48E+04	7.38E-01	2.25E+00
		Other Plant Types				3.10E+02	1.73E+01	4.46E+00	1.70E+05	1.48E+00	4.50E+00
Outputs	**Parameter**		**Symbol**	**Description**	**Units**	**PRGs for Progeny - Chíí dah wiih łeezh (washes and drainages)**					
						Pb-212	**Ra-224**	**Ra-228**	**Rn-220**	**Th-228**	**Th-232**
Preliminary Remediation Goals for Progeny Isotopes of Th-232 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**6.40E+02**	**7.79E+00**	**2.01E+00**	**2.17E+06**	**1.68E+01**	**5.12E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil.. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--
		Sagebrush				8.10E+02	9.90E+00	2.56E+00	2.72E+06	2.20E+01	6.70E+01
		Corn Pollen and Other Corn				5.26E+04	4.75E+02	1.23E+02	5.87E+08	3.80E+02	1.16E+03
		Other Plant Types				3.24E+03	3.96E+01	1.02E+01	1.09E+07	8.79E+01	2.68E+02

Parameter			Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of U-238							
						Po-210	Po-218	Ra-226	Rn-220	Th-230	Th-234	U-234	U-238
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	7.40E-03	7.40E-03	4.20E-01	0.00E+00	1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				2.00E-04	2.00E-04	1.00E-02	0.00E+00	5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				2.00E-04	2.00E-04	1.00E-02	0.00E+00	5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				7.40E-03	7.40E-03	4.20E-01	0.00E+00	1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				2.40E-04	2.40E-04	1.80E-02	0.00E+00	1.80E-03	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				7.40E-03	7.40E-03	4.20E-01	0.00E+00	1.20E-03	1.20E-03	7.10E-02	7.10E-02
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Parameter			**Symbol**	**Description**	**Units**	**PRGs for Progeny - Kọọ eí nahaazáh (easy access open space)**							
						Po-210	**Po-218**	**Ra-226**	**Rn-220**	**Th-230**	**Th-234**	**U-234**	**U-238**
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**2.69E+00**	**2.80E+03**	**1.38E+00**	**3.39E+04**	**1.14E+00**	**1.27E+03**	**1.40E+00**	**1.65E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.36E+00	3.51E+03	1.73E+00	4.24E+04	1.43E+00	1.58E+03	1.75E+00	2.06E+00
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.34E+01	1.40E+04	6.91E+00	1.70E+05	5.72E+00	6.33E+03	7.01E+00	8.26E+00
Parameter			**Symbol**	**Description**	**Units**	**PRGs for Progeny - Kọọ eí nahaazáh (easy access open space)**							
						Po-210	**Po-218**	**Ra-226**	**Rn-220**	**Th-230**	**Th-234**	**U-234**	**U-238**
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**1.17E+02**	**1.22E+05**	**3.17E+00**	**2.17E+06**	**6.81E+01**	**7.53E+04**	**1.62E+01**	**1.91E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.46E+02	1.52E+05	3.97E+00	2.72E+06	8.51E+01	9.42E+04	2.02E+01	2.38E+01
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				5.85E+02	6.10E+05	1.59E+01	1.09E+07	3.40E+02	3.77E+05	8.10E+01	9.54E+01

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter			Symbol	Description	Units	SE for U-238	Transfer Factors for SE Progeny Ra						
							Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Po-218
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03
		Sumac (skunkbush and other)				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	2.00E-04
		Soaptree Yucca				--	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	2.00E-04
		Sagebrush				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03
		Corn Pollen and Other Corn				--	1.00E-01	1.00E-01	1.00E-02	2.80E-03	2.80E-03	2.40E-04	2.40E-04
		Other Plant Types				--	1.00E-01	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03
			--	Daughter/parent fraction in secular equilibrium	Fraction	--	1.00E+00	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Parameter			Symbol	Description	Units		PRGs for Progeny - Kǫǫ eí doo nahaazáh dah						
						SE for U-238	Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Po-218
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	2.69E-01	8.57E+01	6.31E+02	3.25E+04	2.45E+00	5.02E+02	2.69E+00	2.80E+03
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.37E-01	1.07E+02	7.89E+02	4.06E+04	3.07E+00	6.27E+02	3.36E+00	3.51E+03
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.35E+00	4.28E+02	3.15E+03	1.62E+05	1.23E+01	2.51E+03	1.34E+01	1.40E+04
Parameter			Symbol	Description	Units		PRGs for Progeny - Kǫǫ eí doo nahaazáh dah						
						SE for U-238	Bi-210	Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Po-218
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	2.03E+00	7.41E+02	5.46E+03	1.27E+06	2.56E+01	5.25E+03	1.17E+02	1.22E+05
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				2.53E+00	9.27E+02	6.82E+03	1.59E+06	3.21E+01	6.56E+03	1.46E+02	1.52E+05
		Corn Pollen and Other Corn				--	--	--	--	--	--	--	--
		Other Plant Types				1.01E+01	3.71E+03	2.73E+04	6.35E+06	1.28E+02	2.62E+04	5.85E+02	6.10E+05

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter			Symbol	Description	Units	dionuclides of U-238						SE for U-238	
						Ra-226	Rn-220	Th-230	Th-234	U-234	U-238		Bi-210
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	4.20E-01	0.00E+00	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01
		Sumac (skunkbush and other)				1.00E-02	0.00E+00	5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Soaptree Yucca				1.00E-02	0.00E+00	5.00E-04	5.00E-04	1.00E-03	1.00E-03	--	1.00E-01
		Sagebrush				4.20E-01	0.00E+00	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01
		Corn Pollen and Other Corn				1.80E-02	0.00E+00	1.80E-03	1.80E-03	7.80E-03	7.80E-03	--	1.00E-01
		Other Plant Types				4.20E-01	0.00E+00	1.20E-03	1.20E-03	7.10E-02	7.10E-02	--	1.00E-01
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	--	1.00E+00

Parameter			Symbol	Description	Units	(difficult access open space)						SE for U-238	
						Ra-226	Rn-220	Th-230	Th-234	U-234	U-238		Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**1.38E+00**	**3.39E+04**	**1.14E+00**	**1.27E+03**	**1.40E+00**	**1.65E+00**	**1.92E-01**	**6.12E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				1.73E+00	4.24E+04	1.43E+00	1.58E+03	1.75E+00	2.06E+00	3.37E-01	1.07E+02
		Corn Pollen and Other Corn				--	--	--	--	--	--	6.73E-01	2.14E+02
		Other Plant Types				6.91E+00	1.70E+05	5.72E+00	6.33E+03	7.01E+00	8.26E+00	1.35E+00	4.28E+02

Parameter			Symbol	Description	Units	(difficult access open space)						SE for U-238	
						Ra-226	Rn-220	Th-230	Th-234	U-234	U-238		Bi-210
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**3.17E+00**	**2.17E+06**	**6.81E+01**	**7.53E+04**	**1.62E+01**	**1.91E+01**	**1.98E+00**	**5.50E+02**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				3.97E+00	2.72E+06	8.51E+01	9.42E+04	2.02E+01	2.38E+01	2.53E+00	9.27E+02
		Corn Pollen and Other Corn				--	--	--	--	--	--	8.94E+01	2.14E+03
		Other Plant Types				1.59E+01	1.09E+07	3.40E+02	3.77E+05	8.10E+01	9.54E+01	1.01E+01	3.71E+03

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter			Symbol	Description	Units	Transfer Factors for SE Progeny Radionuclides of U-238							
						Bi-214	Pa-234	Pb-210	Pb-214	Po-210	Po-218	Ra-226	Rn-220
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03	4.20E-01	0.00E+00
		Sumac (skunkbush and other)				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	2.00E-04	1.00E-02	0.00E+00
		Soaptree Yucca				1.00E-01	1.00E-02	1.00E-02	1.00E-02	2.00E-04	2.00E-04	1.00E-02	0.00E+00
		Sagebrush				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03	4.20E-01	0.00E+00
		Corn Pollen and Other Corn				1.00E-01	1.00E-02	2.80E-03	2.80E-03	2.40E-04	2.40E-04	1.80E-02	0.00E+00
		Other Plant Types				1.00E-01	1.00E-02	8.00E-02	8.00E-02	7.40E-03	7.40E-03	4.20E-01	0.00E+00
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.60E-03	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00
Parameter			**Symbol**	**Description**	**Units**	**PRGs for Progeny - Chíí dah wiih leezh (washes and drainages)**							
						Bi-214	**Pa-234**	**Pb-210**	**Pb-214**	**Po-210**	**Po-218**	**Ra-226**	**Rn-220**
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**4.51E+02**	**2.32E+04**	**1.75E+00**	**3.58E+02**	**1.92E+00**	**2.00E+03**	**9.88E-01**	**2.42E+04**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				7.89E+02	4.06E+04	3.07E+00	6.27E+02	3.36E+00	3.51E+03	1.73E+00	4.24E+04
		Corn Pollen and Other Corn				1.58E+03	8.12E+04	6.13E+00	1.25E+03	6.72E+00	7.01E+03	3.46E+00	8.48E+04
		Other Plant Types				3.15E+03	1.62E+05	1.23E+01	2.51E+03	1.34E+01	1.40E+04	6.91E+00	1.70E+05
Parameter			**Symbol**	**Description**	**Units**	**PRGs for Progeny - Chíí dah wiih leezh (washes and drainages)**							
						Bi-214	**Pa-234**	**Pb-210**	**Pb-214**	**Po-210**	**Po-218**	**Ra-226**	**Rn-220**
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	**Soil PRG for Total Plant Inhalation**		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**4.05E+03**	**1.10E+06**	**2.53E+01**	**5.18E+03**	**1.16E+02**	**1.21E+05**	**3.12E+00**	**2.17E+06**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--	--	--	--	--
		Soaptree Yucca				--	--	--	--	--	--	--	--
		Sagebrush				6.82E+03	1.59E+06	3.21E+01	6.56E+03	1.46E+02	1.52E+05	3.97E+00	2.72E+06
		Corn Pollen and Other Corn				1.57E+04	8.01E+06	2.08E+03	4.26E+05	1.75E+04	1.82E+07	1.90E+02	5.87E+08
		Other Plant Types				2.73E+04	6.35E+06	1.28E+02	2.62E+04	5.85E+02	6.10E+05	1.59E+01	1.09E+07

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Parameter			Symbol	Description	Units	Th-230	Th-234	U-234	U-238
Transfer Factors for SE Progeny Radionuclides of U-238	Herbs and Medicinal	Navajo Tea	Br_{wet}	Plant Transfer Factors	pCi/g-fresh plant per pCi/g-dry soil	1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Sumac (skunkbush and other)				5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Soaptree Yucca				5.00E-04	5.00E-04	1.00E-03	1.00E-03
		Sagebrush				1.20E-03	1.20E-03	7.10E-02	7.10E-02
		Corn Pollen and Other Corn				1.80E-03	1.80E-03	7.80E-03	7.80E-03
		Other Plant Types				1.20E-03	1.20E-03	7.10E-02	7.10E-02
			--	Daughter/parent fraction in secular equilibrium	Fraction	1.00E+00	1.00E+00	1.00E+00	1.00E+00

Parameter			Symbol	Description	Units	Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh-plant}$	The preliminary remediation goals for all plant inhalation. $PRG_{ODL-inh-plant} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh-plant}(i)}}$	pCi/g	**8.17E-01**	**9.04E+02**	**1.00E+00**	**1.18E+00**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh-plant}(i)$	The preliminary remediation goals for each type of plant inhalation. $PRG_{ODL-inh-plant} = \frac{TR}{SF_i \times IFA_{ODL-inh-adj} \times C_{air} \times IF_p \times CF}$	pCi/g	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--
		Soaptree Yucca				--	--	--	--
		Sagebrush				1.43E+00	1.58E+03	1.75E+00	2.06E+00
		Corn Pollen and Other Corn				2.86E+00	3.16E+03	3.51E+00	4.13E+00
		Other Plant Types				5.72E+00	6.33E+03	7.01E+00	8.26E+00

Parameter			Symbol	Description	Units	Th-230	Th-234	U-234	U-238
Preliminary Remediation Goals for Progeny Isotopes of U-238 in Secular Equilibrium - Inhalation of Plants Back-Calculated to Soil, by Plant Type	Soil PRG for Total Plant Inhalation		$PRG_{ODL-inh}$	The preliminary remediation goals for all plant inhalation, back-calculated to soil. $PRG_{ODL-inh} = \frac{1}{\sum_{i=1}^{n} \frac{1}{PRG_{ODL-inh}(i)}}$	pCi/g	**6.50E+01**	**7.20E+04**	**1.56E+01**	**1.84E+01**
	Herbs and Medicinal	Navajo Tea	$PRG_{ODL-inh}(i)$	The preliminary remediation goals for each type of plant inhalation, back-calculated to soil. $PRG_{ODL-inh}(i) = \frac{PRG_{ODL-inh-plant}(i)}{(Br_{wet} + MLF_{produce})}$	pCi/g	--	--	--	--
		Sumac (skunkbush and other)				--	--	--	--
		Soaptree Yucca				--	--	--	--
		Sagebrush				8.51E+01	9.42E+04	2.02E+01	2.38E+01
		Corn Pollen and Other Corn				1.47E+03	1.63E+06	4.41E+02	5.20E+02
		Other Plant Types				3.40E+02	3.77E+05	8.10E+01	9.54E+01

Attachment A - NAUM Calculation Tool

12 - ODL Plant Inhalation

Chemical-Specific Values

Parameter	Decay Constant	Half-life	Dry Soil-to-plant transfer factor	Wet Soil-to-plant transfer factor Woody tree	Wet Soil-to-plant transfer factor Leaf	Wet Soil-to-plant transfer factor Root	Wet Soil-to-plant transfer factor Shrub	Wet Soil-to-plant transfer factor Non-leafy fruit	Wet Soil-to-plant transfer factor Maize grain	Wet Soil-to-plant transfer factor Legume seed	Wet Soil-to-plant transfer factor Tuber	Wet Soil-to-plant transfer factor Herbaceous	Wet Soil-to-plant transfer factor Sunflower Leaf	Wet Soil-to-plant transfer factor Maize Stems and Shoots	Wet Soil-to-plant transfer factor Cereal Grains
Symbol	λ			Woody Tree	Leaf	Root	Shrub	Non-Leafy Fruit	Maize Grain	Legume Seed	Tuber	Herbaceous	Sunflower Leaf	e Stems and Sh	Cereal
Units	1/year	years	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil	pCi/g-fresh plant per pCi/g-dry soil
Isotope															
Ac-228	9.87E+02	7.02E-04		1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03
At-218	1.46E+07	4.76E-08		2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01
Bi-210	5.05E+01	1.37E-02		1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Bi-212	6.02E+03	1.15E-04		1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Bi-214	1.83E+04	3.79E-05		1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Hg-206	4.47E+04	1.55E-05		3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01
K-40	5.54E-10	1.25E+09		3.00E-01	1.30E+00	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.00E-01	1.30E+00	3.00E-01	7.40E-01
Pa-234	9.06E+02	7.65E-04		1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
Pa-234m	3.11E+05	2.23E-06		1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
Pb-210	3.12E-02	2.22E+01		1.00E-02	8.00E-02	1.50E-02	1.00E-02	1.50E-02	1.20E-03	5.30E-03	1.50E-03	1.00E-02	8.00E-02	2.80E-03	1.10E-02
Pb-212	5.71E+02	1.21E-03		1.00E-02	8.00E-02	1.50E-02	1.00E-02	1.50E-02	1.20E-03	5.30E-03	1.50E-03	1.00E-02	8.00E-02	2.80E-03	1.10E-02
Pb-214	1.36E+04	5.10E-05		1.00E-02	8.00E-02	1.50E-02	1.00E-02	1.50E-02	1.20E-03	5.30E-03	1.50E-03	1.00E-02	8.00E-02	2.80E-03	1.10E-02
Po-210	1.83E+00	3.79E-01		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-212	7.31E+13	9.48E-15		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-214	1.33E+11	5.21E-12		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-216	1.51E+08	4.60E-09		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Po-218	1.17E+05	5.90E-06		2.00E-04	7.40E-03	5.80E-03	2.00E-04	2.00E-04	2.40E-04	2.70E-04	2.70E-03	2.00E-04	7.40E-03	2.40E-04	2.40E-04
Ra-224	6.91E+01	1.00E-02		1.00E-02	9.10E-02	7.00E-02	1.00E-02	1.70E-02	2.40E-03	1.40E-02	1.10E-02	1.00E-02	4.20E-01	1.80E-02	1.70E-02
Ra-226	4.33E-04	1.60E+03		1.00E-02	9.10E-02	7.00E-02	1.00E-02	1.70E-02	2.40E-03	1.40E-02	1.10E-02	1.00E-02	4.20E-01	1.80E-02	1.70E-02
Ra-228	1.21E-01	5.75E+00		1.00E-02	9.10E-02	7.00E-02	1.00E-02	1.70E-02	2.40E-03	1.40E-02	1.10E-02	1.00E-02	4.20E-01	1.80E-02	1.70E-02
Rn-218	6.24E+08	1.11E-09		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn-220	3.93E+05	1.76E-06		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn-222	6.62E+01	1.05E-02		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Th-228	3.63E-01	1.91E+00		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Th-230	9.19E-06	7.54E+04		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Th-232	4.93E-11	1.41E+10		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Th-234	1.05E+01	6.60E-02		5.00E-04	1.20E-03	8.00E-04	5.00E-04	7.80E-04	6.40E-04	5.30E-04	2.00E-04	5.00E-04	1.20E-03	1.80E-03	2.10E-03
Tl-206	8.67E+04	7.99E-06		8.00E-05	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04
Tl-208	1.19E+05	5.81E-06		8.00E-05	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04
Tl-210	2.80E+05	2.47E-06		8.00E-05	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04	8.00E-05	8.00E-05	8.00E-04	8.00E-04	8.00E-04
U-234	2.82E-06	2.46E+05		1.00E-03	2.00E-02	8.40E-03	1.00E-03	1.50E-02	1.50E-02	2.20E-03	5.00E-03	1.00E-03	7.10E-02	7.80E-03	6.20E-03
U-238	1.55E-10	4.47E+09		1.00E-03	2.00E-02	8.40E-03	1.00E-03	1.50E-02	1.50E-02	2.20E-03	5.00E-03	1.00E-03	7.10E-02	7.80E-03	6.20E-03

Notes:
All transfer factors are from USEPA 2020, with the following exceptions:
Sunflower leaf transfer factors for Ra and U are taken from IAEA 2010. Transfer factors for all other radionuclides are from USEPA 2020.
Maize stems and shoots transfer factors for Pb, Ra, Th, and U are taken from IAEA 2010. Transfer factors for other radionuclides are based on maize grain from USEPA 2020.

Sources:
USEPA. 2020. Preliminary Remediation Goals for Radionuclides (PRG) Calculator. Downloaded November 2.
IAEA. 2010. Handbook of Parameter Values for the Prediction of Radionuclide Transfer in Terrestrial and Freshwater Environments. Technical Reports Series No. 472.

Attachment A - NAUM Calculation Tool

13. COPC Toxicity

Selection, Toxicities, and Physical Parameters for Radionuclides and Metals of Concern.

Radionuclide Toxicity Values

The user can select which radionuclides have PRGs calculated and displayed on the Calculator Outputs worksheet.
This is done in column A by selecting "TRUE" to show the radionuclide, or "FALSE" to hide it.

Parameter		Soil Ingestion Slope Factor	Inhalation Slope Factor	External Exposure Slope Factor	Food Ingestion Slope Factor	Default Soil Volume Area Correction Factor	Ra-226 in SE Decay Chain Fractional Contribution of Progeny	Th-232 in SE Decay Chain Fractional Contribution of Progeny	U-238 in SE Decay Chain Fractional Contribution of Progeny	Decay Constant
Symbol		SF_s	SF_i	SF_{ext}	SF_f	ACF_{ext}	Unitless	Unitless	Unitless	$(years)^{-1}$
Units		risk/pCi	risk/pCi	risk/year pCi/g	risk/pCi	Unitless				
Selected	Isotope [1]									
TRUE	Ra-226 in SE	5.69E-09	5.92E-08	8.37E-06	3.69E-09	1	0.00E+00	0.00E+00	0.00E+00	--
FALSE	Th-232 in SE	2.90E-09	2.31E-07	1.14E-05	1.98E-09	1	0.00E+00	0.00E+00	0.00E+00	--
FALSE	U-238 in SE	6.20E-09	1.45E-07	8.49E-06	4.29E-09	1	0.00E+00	0.00E+00	0.00E+00	--
FALSE	K-40	5.85E-11	2.22E-10	7.99E-07	3.42E-11	1	0.00E+00	0.00E+00	0.00E+00	5.54E-10
FALSE	Pb-210	1.72E-09	1.59E-08	1.48E-09	1.18E-09	1	1.00E+00	0.00E+00	1.00E+00	3.12E-02
FALSE	Ra-226	6.77E-10	2.82E-08	2.50E-08	5.14E-10	1	1.00E+00	0.00E+00	1.00E+00	4.33E-04
FALSE	Th-230	1.66E-10	3.41E-08	8.45E-10	1.19E-10	1	0.00E+00	0.00E+00	1.00E+00	9.19E-06
FALSE	U-234	1.48E-10	2.78E-08	2.53E-10	9.55E-11	1	0.00E+00	0.00E+00	1.00E+00	2.82E-06
FALSE	U-238	1.34E-10	2.36E-08	1.24E-10	8.66E-11	1	0.00E+00	0.00E+00	1.00E+00	1.55E-10
FALSE	Ac-228	4.92E-12	4.92E-11	4.04E-06	2.73E-12	1	0.00E+00	1.00E+00	0.00E+00	9.87E+02
FALSE	At-218	0.00E+00	0.00E+00	2.74E-11	0.00E+00	0.9	2.00E-04	0.00E+00	2.00E-04	1.46E+07
FALSE	Bi-210	2.40E-11	4.55E-10	2.77E-09	1.30E-11	1	1.00E+00	0.00E+00	1.00E+00	5.05E+01
FALSE	Bi-212	1.68E-12	1.13E-10	4.96E-07	1.01E-12	1	0.00E+00	1.00E+00	0.00E+00	6.02E+03
FALSE	Bi-214	4.03E-13	6.18E-11	7.34E-06	2.65E-13	1	1.00E+00	0.00E+00	1.00E+00	1.83E+04
FALSE	Hg-206	0.00E+00	0.00E+00	4.83E-07	0.00E+00	1	1.90E-08	0.00E+00	1.98E-08	4.47E+04
FALSE	Pa-234	5.37E-12	1.20E-12	6.62E-06	3.00E-12	1	0.00E+00	0.00E+00	1.60E-03	9.06E+02
FALSE	Pa-234m	0.00E+00	0.00E+00	9.06E-08	0.00E+00	1	0.00E+00	0.00E+00	1.00E+00	3.11E+05
FALSE	Pb-212	6.33E-11	6.29E-10	4.96E-07	3.57E-11	1	0.00E+00	1.00E+00	0.00E+00	5.71E+02
FALSE	Pb-214	7.92E-13	7.77E-11	9.94E-07	4.85E-13	1	1.00E+00	0.00E+00	1.00E+00	1.36E+04
FALSE	Po-210	3.27E-09	1.45E-08	4.51E-11	2.25E-09	1	1.00E+00	0.00E+00	1.00E+00	1.83E+00
FALSE	Po-212	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.9	0.00E+00	6.41E-01	0.00E+00	7.31E+13
FALSE	Po-214	0.00E+00	0.00E+00	3.85E-10	0.00E+00	1	1.00E+00	0.00E+00	1.00E+00	1.33E+11
FALSE	Po-216	0.00E+00	0.00E+00	7.10E-11	0.00E+00	1	0.00E+00	1.00E+00	0.00E+00	1.51E+08
FALSE	Po-218	0.00E+00	1.39E-11	6.84E-15	0.00E+00	0.9	1.00E+00	0.00E+00	1.00E+00	1.17E+05
FALSE	Ra-224	4.26E-10	1.13E-08	3.91E-08	2.38E-10	1	0.00E+00	1.00E+00	0.00E+00	6.91E+01
FALSE	Ra-228	1.98E-09	4.37E-08	3.43E-11	1.42E-09	1	0.00E+00	1.00E+00	0.00E+00	1.21E-01
FALSE	Rn-218	0.00E+00	0.00E+00	3.39E-09	0.00E+00	1	2.00E-07	0.00E+00	2.00E-07	6.24E+08
FALSE	Rn-220	0.00E+00	1.15E-12	2.77E-09	0.00E+00	1	0.00E+00	1.00E+00	0.00E+00	3.93E+05
FALSE	Rn-222	0.00E+00	2.28E-12	1.69E-09	0.00E+00	1	1.00E+00	0.00E+00	1.00E+00	6.62E+01
FALSE	Th-228	2.43E-10	1.32E-07	5.64E-09	1.48E-10	1	0.00E+00	1.00E+00	0.00E+00	3.63E-01
FALSE	Th-232	1.84E-10	4.33E-08	3.58E-10	1.33E-10	1	0.00E+00	1.00E+00	0.00E+00	4.93E-11
FALSE	Th-234	6.25E-11	3.08E-11	1.77E-08	3.39E-11	1	0.00E+00	0.00E+00	1.00E+00	1.05E+01
FALSE	Tl-206	0.00E+00	0.00E+00	6.11E-09	0.00E+00	1	1.34E-06	0.00E+00	1.34E-06	8.67E+04
FALSE	Tl-208	0.00E+00	0.00E+00	1.75E-05	0.00E+00	1	0.00E+00	3.59E-01	0.00E+00	1.19E+05
FALSE	Tl-210	0.00E+00	0.00E+00	1.34E-05	0.00E+00	1	2.10E-04	0.00E+00	2.10E-04	2.80E+05

Notes: Selecting radionuclides with "in SE" indicates secular equilibrium is assumed (to include full decay chain).
pCi Picocuries
pCi/g Picocuries per gram
1 "in SE" - includes decay chain isotopes in secular equilibrium with the parent isotope. The non-selectable isotopes at the bottom of the table are present only for daughter calculations.

Source:
USEPA. 2020a. Preliminary Remediation Goals for Radionuclides (PRG). November. https://epa-prgs.ornl.gov/radionuclides/

Attachment A - NAUM Calculation Tool

13. COPC Toxicity

Selection, Toxicities, and Physical Parameters for Radionuclides and Metals of Concern.

Metal Toxicity Values and Metal-Specific inputs

The user can select which metals have PRGs calculated and displayed on the Calculator Outputs worksheet.
This is done in column A by selecting "TRUE" to show the metal, or "FALSE" to hide it.

Parameter		Oral Slope Factor [2]	Inhalation Unit Risk [2]	Reference Dose [2]	Reference Concentration [2]	Gastrointestinal Absorption Factor [2]	Dermal Absorption Factor [2]	Relative Bioavailability [2]	Plant-soil bioconcentration factor for aboveground plants [3]	Plant-soil bioconcentration factor for belowground produce [4]	Bioconcentration factor from soil to plants for forage. [5]
Symbol		SFO	IUR	RfD	RfC	GIABS	ABS_d	RBA	Br_{ag}	Br_{root}	Br_{forage}
Units		$(mg/kg\text{-}day)^{-1}$	$(ug/m^3)^{-1}$	(mg/kg-day)	(mg/m^3)	Unitless	Unitless	Unitless	mg/kg-dry plant per mg/kg dry soil	mg/kg-dry plant per mg/kg dry soil	Unitless
Selected	Metal [1]										
FALSE	Aluminum	--	--	1.0E+00	5.0E-03	1	--	1	4.00E-03	6.50E-04	4.00E-03
FALSE	Antimony	--	--	4.0E-04	3.0E-04	0.15	--	1	3.19E-02	3.00E-02	2.00E-01
TRUE	Arsenic	1.5E+00	4.3E-03	3.0E-04	1.5E-05	1	0.03	0.6	6.33E-03	8.00E-03	3.60E-02
FALSE	Barium	--	--	2.0E-01	5.0E-04	0.07	--	1	3.22E-02	1.50E-02	1.50E-01
FALSE	Beryllium	--	2.4E-03	2.0E-03	2.0E-05	0.007	--	1	2.58E-03	1.50E-03	1.00E-02
FALSE	Cadmium	--	1.8E-03	1.0E-04	1.0E-05	0.025	0.001	1	1.25E-01	6.40E-02	3.64E-01
FALSE	Chromium	--	--	1.5E+00	--	0.013	--	1	4.88E-03	4.50E-03	7.50E-03
FALSE	Cobalt	--	9.0E-03	3.0E-04	6.0E-06	1	--	1	2.00E-02	7.00E-03	2.00E-02
FALSE	Copper	--	--	4.0E-02	--	1	--	1	4.00E-01	2.50E-01	4.00E-01
FALSE	Iron	--	--	7.0E-01	--	1	--	1	4.00E-03	1.00E-03	4.00E-03
FALSE	Manganese	--	--	2.4E-02	5.0E-05	0.04	--	1	2.50E-01	5.00E-02	2.50E-01
FALSE	Mercury	--	--	3.0E-04	3.0E-04	0.07	--	1	1.45E-02	3.60E-02	0.00E+00
TRUE	Molybdenum	--	--	5.0E-03	2.0E-03	1	--	1	2.50E-01	6.00E-02	2.50E-01
FALSE	Nickel	--	2.6E-04	2.0E-02	9.0E-05	0.04	--	1	9.31E-03	8.00E-03	3.20E-02
TRUE	Selenium	--	--	5.0E-03	2.0E-02	1	--	1	1.95E-02	2.20E-02	1.60E-02
FALSE	Silver	--	--	5.0E-03	--	0.04	--	1	1.38E-01	1.00E-01	4.00E-01
FALSE	Thallium	--	--	1.0E-05	--	1	--	1	8.58E-04	4.00E-04	4.00E-03
TRUE	Uranium	--	--	2.0E-04	4.0E-05	1	--	1	8.50E-03	4.00E-03	8.50E-03
TRUE	Vanadium	--	--	5.0E-03	1.0E-04	0.026	--	1	5.50E-03	3.00E-03	5.50E-03
FALSE	Zinc	--	--	3.0E-01	--	1	--	1	9.70E-02	9.00E-01	2.50E-01

Notes:

Lead is not included in list of metals because PRGs for lead are calculated separately using the USEPA's Adult Lead Model (ALM) and Integrated Exposure-Uptake Biokinetic Model (IEUBK). Information on these models is available on the USEPA website: https://www.epa.gov/superfund/lead-superfund-sites.

1 Some of the metals names have been shortened to the common name. Toxicity, GIABS, ABS_d, and default RBA values were selected from the RSL table (USEPA 2020b) as follows:

Antimony	Antimony (metallic)
Arsenic	Arsenic, Inorganic
Beryllium	Beryllium and compounds
Cadmium	Cadmium (Diet)
Chromium	Chromium(III), Insoluble Salts
Manganese	Manganese (Non-Diet)
Mercury	Mercuric Chloride (and other Mercury salts)
Nickel	Nickel Soluble Salts
Thallium	Thallium (Soluble Salts)
Vanadium	Vanadium and Compounds

2 Values were taken from the EPA RSL tables (EPA 2022).

3 Values were taken from HHRAP (USEPA 2005). If not in HHRAP, then Bv values from Figure 2.1, Baes 1984 were selected.

4 Values were taken from HHRAP (USEPA 2005). If not in HHRAP, then Br values from Figure 2.2, Baes 1984 were selected.

5 Values were taken from HHRAP (Brf/s [forage from soil]) (USEPA 2005). If not in HHRAP, then Bv values from Figure 2.1, Baes 1984 were selected.

References:

USEPA. 2022. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites. May. https://www.epa.gov/risk/regional-screening-levels-rsls

Baes, C.F., R.D. Sharp, A.L Sjoreen, and R.W Shor. 1984. "A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture." Oak Ridge, TN: Oak Ridge National Laboratory. ORNL, 5786.

U.S. Environmental Protection Agency (USEPA). 2005. Human Health Risk Assessment Protocol (HHRAP) for Hazardous Waste Combustion Facilities, Final. Center of Combustion Science and Engineering. EPA520-R-05-006. September. https://archive.epa.gov/epawaste/hazard/tsd/td/web/html/risk.html#hhrad.

ATTACHMENT B PROUCL OUTPUT SHEETS



Attachment B - ProUCL Output

1. Background Area 1

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.2 9/2/2022 4:47:22 PM
From File	M+BJ_risk_bkg_data.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic

General Statistics

Total Number of Observations	20	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	5.2	Mean	6.545
Maximum	7.7	Median	6.5
SD	0.541	Std. Error of Mean	0.121
Coefficient of Variation	0.0827	Skewness	-0.314

Normal GOF Test

Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.11	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.754	95% Adjusted-CLT UCL (Chen-1995)	6.735
		95% Modified-t UCL (Johnson-1978)	6.753

Gamma GOF Test

A-D Test Statistic	0.322	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.103	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.193	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	149.7	k star (bias corrected MLE)	127.3
Theta hat (MLE)	0.0437	Theta star (bias corrected MLE)	0.0514
nu hat (MLE)	5990	nu star (bias corrected)	5093
MLE Mean (bias corrected)	6.545	MLE Sd (bias corrected)	0.58
		Approximate Chi Square Value (0.05)	4928
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	4915

Assuming Gamma Distribution

95% Approximate Gamma UCL	6.764	95% Adjusted Gamma UCL	6.782

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.111	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.649	Mean of logged Data	1.875
Maximum of Logged Data	2.041	SD of logged Data	0.0846

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	6.917
95% Chebyshev (MVUE) UCL	7.086	97.5% Chebyshev (MVUE) UCL	7.319
99% Chebyshev (MVUE) UCL	7.778		

Attachment B - ProUCL Output

1. Background Area 1

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	6.744	95% BCA Bootstrap UCL	6.72
95% Standard Bootstrap UCL	6.736	95% Bootstrap-t UCL	6.736
95% Hall's Bootstrap UCL	6.738	95% Percentile Bootstrap UCL	6.735
90% Chebyshev(Mean, Sd) UCL	6.908	95% Chebyshev(Mean, Sd) UCL	7.073
97.5% Chebyshev(Mean, Sd) UCL	7.301	99% Chebyshev(Mean, Sd) UCL	7.75

Suggested UCL to Use

95% Student's-t UCL 6.754

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Molybdenum

General Statistics

Total Number of Observations	21	Number of Distinct Observations	2
Number of Detects	20	Number of Non-Detects	1
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.4	Minimum Non-Detect	0.5
Maximum Detect	0.5	Maximum Non-Detect	0.5
Variance Detects	0.00168	Percent Non-Detects	4.762%
Mean Detects	0.42	SD Detects	0.041
Median Detects	0.4	CV Detects	0.0977
Skewness Detects	1.624	Kurtosis Detects	0.699
Mean of Logged Detects	-0.872	SD of Logged Detects	0.0916

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.496	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.487	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.419	KM Standard Error of Mean	0.00879
90KM SD	0.0393	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.434	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.434	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.445	95% KM Chebyshev UCL	0.457
97.5% KM Chebyshev UCL	0.474	99% KM Chebyshev UCL	0.507

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.329	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.74	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.492	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.193	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	120.3	k star (bias corrected MLE)	102.3
Theta hat (MLE)	0.00349	Theta star (bias corrected MLE)	0.00411
nu hat (MLE)	4813	nu star (bias corrected)	4092
Mean (detects)	0.42		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.4	Mean	0.42
Maximum	0.5	Median	0.4
SD	0.0401	CV	0.0955
k hat (MLE)	125.9	k star (bias corrected MLE)	108
Theta hat (MLE)	0.00333	Theta star (bias corrected MLE)	0.00389
nu hat (MLE)	5290	nu star (bias corrected)	4535
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (N/A, α)	4380	Adjusted Chi Square Value (N/A, β)	4368
95% Gamma Approximate UCL	0.434	95% Gamma Adjusted UCL	0.436

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.419	SD (KM)	0.0393
Variance (KM)	0.00154	SE of Mean (KM)	0.00879
k hat (KM)	113.9	k star (KM)	97.65
nu hat (KM)	4783	nu star (KM)	4101
theta hat (KM)	0.00368	theta star (KM)	0.00429
80% gamma percentile (KM)	0.454	90% gamma percentile (KM)	0.474
95% gamma percentile (KM)	0.491	99% gamma percentile (KM)	0.524

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	3953	Adjusted Chi Square Value (N/A, β)	3942
95% KM Approximate Gamma UCL	0.435	95% KM Adjusted Gamma UCL	0.436

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.496	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.92	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.487	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.176	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.42	Mean in Log Scale	-0.873
SD in Original Scale	0.0401	SD in Log Scale	0.0894
95% t UCL (assumes normality of ROS data)	0.435	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	N/A		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.874	KM Geo Mean	0.417
KM SD (logged)	0.0876	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0196	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0876	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0196		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.412	Mean in Log Scale	-0.896
SD in Original Scale	0.0546	SD in Log Scale	0.143
95% t UCL (Assumes normality)	0.432	95% H-Stat UCL	0.436

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.434

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Attachment B - ProUCL Output

1. Background Area 1

Ra-226

General Statistics

Total Number of Observations	21	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.8	Mean	1.219
Maximum	1.8	Median	1.2
SD	0.234	Std. Error of Mean	0.051
Coefficient of Variation	0.192	Skewness	0.552

Normal GOF Test

Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.873	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.219	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.307	95% Adjusted-CLT UCL (Chen-1995)	1.309
		95% Modified-t UCL (Johnson-1978)	1.308

Gamma GOF Test

A-D Test Statistic	0.431	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.162	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.189	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	29.16	k star (bias corrected MLE)	25.02
Theta hat (MLE)	0.0418	Theta star (bias corrected MLE)	0.0487
nu hat (MLE)	1225	nu star (bias corrected)	1051
MLE Mean (bias corrected)	1.219	MLE Sd (bias corrected)	0.244
		Approximate Chi Square Value (0.05)	976.7
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	971.2

Assuming Gamma Distribution

95% Approximate Gamma UCL	1.312	95% Adjusted Gamma UCL	1.319

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.923	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.173	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.223	Mean of logged Data	0.181
Maximum of Logged Data	0.588	SD of logged Data	0.19

Assuming Lognormal Distribution

95% H-UCL	1.315	90% Chebyshev (MVUE) UCL	1.372
95% Chebyshev (MVUE) UCL	1.441	97.5% Chebyshev (MVUE) UCL	1.537
99% Chebyshev (MVUE) UCL	1.726		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	1.303	95% BCA Bootstrap UCL	1.31
95% Standard Bootstrap UCL	1.301	95% Bootstrap-t UCL	1.312
95% Hall's Bootstrap UCL	1.315	95% Percentile Bootstrap UCL	1.3
90% Chebyshev(Mean, Sd) UCL	1.372	95% Chebyshev(Mean, Sd) UCL	1.441
97.5% Chebyshev(Mean, Sd) UCL	1.538	99% Chebyshev(Mean, Sd) UCL	1.726

Attachment B - ProUCL Output

1. Background Area 1

Suggested UCL to Use

95% Student's-t UCL 1.307

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Selenium

General Statistics

Total Number of Observations	21	Number of Distinct Observations	3
		Number of Missing Observations	0
Minimum	0.6	Mean	0.69
Maximum	0.8	Median	0.7
SD	0.07	Std. Error of Mean	0.0153
Coefficient of Variation	0.101	Skewness	0.132

Normal GOF Test

Shapiro Wilk Test Statistic	0.81	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.873	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.268	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.219	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.717	95% Adjusted-CLT UCL (Chen-1995)	0.716
		95% Modified-t UCL (Johnson-1978)	0.717

Gamma GOF Test

A-D Test Statistic	1.874	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.74	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.282	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.189	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	102	k star (bias corrected MLE)	87.47
Theta hat (MLE)	0.00677	Theta star (bias corrected MLE)	0.00789
nu hat (MLE)	4284	nu star (bias corrected)	3674
MLE Mean (bias corrected)	0.69	MLE Sd (bias corrected)	0.0738
		Approximate Chi Square Value (0.05)	3534
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	3523

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.718	95% Adjusted Gamma UCL	0.72

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.808	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.287	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.173	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.511	Mean of logged Data	-0.375
Maximum of Logged Data	-0.223	SD of logged Data	0.102

Assuming Lognormal Distribution

95% H-UCL	0.718	90% Chebyshev (MVUE) UCL	0.737
95% Chebyshev (MVUE) UCL	0.757	97.5% Chebyshev (MVUE) UCL	0.786
99% Chebyshev (MVUE) UCL	0.843		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Attachment B - ProUCL Output

1. Background Area 1

Nonparametric Distribution Free UCLs

95% CLT UCL	0.716	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.736	95% Chebyshev(Mean, Sd) UCL	0.757
97.5% Chebyshev(Mean, Sd) UCL	0.786	99% Chebyshev(Mean, Sd) UCL	0.843

Suggested UCL to Use

95% Student's-t UCL 0.717

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Uranium

General Statistics

Total Number of Observations	21	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	1.2	Mean	1.419
Maximum	1.8	Median	1.4
SD	0.172	Std. Error of Mean	0.0376
Coefficient of Variation	0.121	Skewness	0.651

Normal GOF Test

Shapiro Wilk Test Statistic	0.889	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.873	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.219	Data Not Normal at 1% Significance Level	

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.484	95% Adjusted-CLT UCL (Chen-1995)	1.487
		95% Modified-t UCL (Johnson-1978)	1.485

Gamma GOF Test

A-D Test Statistic	0.993	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.74	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.235	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.189	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	73.89	k star (bias corrected MLE)	63.37
Theta hat (MLE)	0.0192	Theta star (bias corrected MLE)	0.0224
nu hat (MLE)	3103	nu star (bias corrected)	2661
MLE Mean (bias corrected)	1.419	MLE Sd (bias corrected)	0.178
		Approximate Chi Square Value (0.05)	2543
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	2534

Assuming Gamma Distribution

95% Approximate Gamma UCL	1.485	95% Adjusted Gamma UCL	1.491

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.229	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.173	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.182	Mean of logged Data	0.343
Maximum of Logged Data	0.588	SD of logged Data	0.118

Attachment B - ProUCL Output

1. Background Area 1

Assuming Lognormal Distribution

95% H-UCL	1.486	90% Chebyshev (MVUE) UCL	1.529
95% Chebyshev (MVUE) UCL	1.579	97.5% Chebyshev (MVUE) UCL	1.648
99% Chebyshev (MVUE) UCL	1.785		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	1.481	95% BCA Bootstrap UCL	1.481
95% Standard Bootstrap UCL	1.48	95% Bootstrap-t UCL	1.488
95% Hall's Bootstrap UCL	1.485	95% Percentile Bootstrap UCL	1.481
90% Chebyshev(Mean, Sd) UCL	1.532	95% Chebyshev(Mean, Sd) UCL	1.583
97.5% Chebyshev(Mean, Sd) UCL	1.654	99% Chebyshev(Mean, Sd) UCL	1.793

Suggested UCL to Use

95% Student's-t UCL 1.484

When a data set follows an approximate distribution passing only one of the GOF tests,
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Vanadium

General Statistics

Total Number of Observations	20	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	17.9	Mean	21.58
Maximum	26.4	Median	21.95
SD	2.203	Std. Error of Mean	0.493
Coefficient of Variation	0.102	Skewness	0.0241

Normal GOF Test

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	22.43	95% Adjusted-CLT UCL (Chen-1995)	22.39
		95% Modified-t UCL (Johnson-1978)	22.43

Gamma GOF Test

A-D Test Statistic	0.46	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.154	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.193	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	100.1	k star (bias corrected MLE)	85.13
Theta hat (MLE)	0.216	Theta star (bias corrected MLE)	0.253
nu hat (MLE)	4005	nu star (bias corrected)	3405
MLE Mean (bias corrected)	21.58	MLE Sd (bias corrected)	2.339
		Approximate Chi Square Value (0.05)	3271
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	3260

Assuming Gamma Distribution

95% Approximate Gamma UCL	22.47	95% Adjusted Gamma UCL	22.54

Attachment B - ProUCL Output

1. Background Area 1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.158	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.885	Mean of logged Data	3.067
Maximum of Logged Data	3.273	SD of logged Data	0.103

Assuming Lognormal Distribution

95% H-UCL	22.49	90% Chebyshev (MVUE) UCL	23.07
95% Chebyshev (MVUE) UCL	23.75	97.5% Chebyshev (MVUE) UCL	24.69
99% Chebyshev (MVUE) UCL	26.53		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	22.39	95% BCA Bootstrap UCL	22.37
95% Standard Bootstrap UCL	22.37	95% Bootstrap-t UCL	22.4
95% Hall's Bootstrap UCL	22.41	95% Percentile Bootstrap UCL	22.41
90% Chebyshev(Mean, Sd) UCL	23.06	95% Chebyshev(Mean, Sd) UCL	23.73
97.5% Chebyshev(Mean, Sd) UCL	24.66	99% Chebyshev(Mean, Sd) UCL	26.48

Suggested UCL to Use

95% Student's-t UCL	22.43

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Attachment B - ProUCL Output

2. Background Area 2

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.2 9/2/2022 4:51:38 PM
From File	M+BJ_risk_bkg_data.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic

General Statistics

Total Number of Observations	21	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	2.2	Mean	3.324
Maximum	4.8	Median	3.3
SD	0.665	Std. Error of Mean	0.145
Coefficient of Variation	0.2	Skewness	0.168

Normal GOF Test

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.873	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.133	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.219	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	3.574	95% Adjusted-CLT UCL (Chen-1995)	3.568
		95% Modified-t UCL (Johnson-1978)	3.575

Gamma GOF Test

A-D Test Statistic	0.456	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.151	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.189	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	25.5	k star (bias corrected MLE)	21.89
Theta hat (MLE)	0.13	Theta star (bias corrected MLE)	0.152
nu hat (MLE)	1071	nu star (bias corrected)	919.3
MLE Mean (bias corrected)	3.324	MLE Sd (bias corrected)	0.71
		Approximate Chi Square Value (0.05)	850
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	844.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	3.595	95% Adjusted Gamma UCL	3.617

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.923	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.166	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.173	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.788	Mean of logged Data	1.181
Maximum of Logged Data	1.569	SD of logged Data	0.206

Assuming Lognormal Distribution

95% H-UCL	3.613	90% Chebyshev (MVUE) UCL	3.778
95% Chebyshev (MVUE) UCL	3.982	97.5% Chebyshev (MVUE) UCL	4.267
99% Chebyshev (MVUE) UCL	4.825		

Attachment B - ProUCL Output

2. Background Area 2

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	3.562	95% BCA Bootstrap UCL	3.557
95% Standard Bootstrap UCL	3.561	95% Bootstrap-t UCL	3.582
95% Hall's Bootstrap UCL	3.589	95% Percentile Bootstrap UCL	3.562
90% Chebyshev(Mean, Sd) UCL	3.759	95% Chebyshev(Mean, Sd) UCL	3.956
97.5% Chebyshev(Mean, Sd) UCL	4.23	99% Chebyshev(Mean, Sd) UCL	4.767

Suggested UCL to Use

95% Student's-t UCL 3.574

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Molybdenum

General Statistics

Total Number of Observations	21	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.2	Mean	0.329
Maximum	0.7	Median	0.3
SD	0.11	Std. Error of Mean	0.024
Coefficient of Variation	0.335	Skewness	1.846

Normal GOF Test

Shapiro Wilk Test Statistic	0.769	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.873	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.269	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.219	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.37	95% Adjusted-CLT UCL (Chen-1995)	0.378
		95% Modified-t UCL (Johnson-1978)	0.372

Gamma GOF Test

A-D Test Statistic	1.379	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.743	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.245	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.189	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	11.11	k star (bias corrected MLE)	9.558
Theta hat (MLE)	0.0296	Theta star (bias corrected MLE)	0.0344
nu hat (MLE)	466.8	nu star (bias corrected)	401.5
MLE Mean (bias corrected)	0.329	MLE Sd (bias corrected)	0.106
		Approximate Chi Square Value (0.05)	356
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	352.7

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.371	95% Adjusted Gamma UCL	0.374

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.854	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.25	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.173	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Attachment B - ProUCL Output

2. Background Area 2

Lognormal Statistics

Minimum of Logged Data	-1.609	Mean of logged Data	-1.159
Maximum of Logged Data	-0.357	SD of logged Data	0.302

Assuming Lognormal Distribution

95% H-UCL	0.372	90% Chebyshev (MVUE) UCL	0.394
95% Chebyshev (MVUE) UCL	0.424	97.5% Chebyshev (MVUE) UCL	0.465
99% Chebyshev (MVUE) UCL	0.546		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.368	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.401	95% Chebyshev(Mean, Sd) UCL	0.433
97.5% Chebyshev(Mean, Sd) UCL	0.479	99% Chebyshev(Mean, Sd) UCL	0.568

Suggested UCL to Use

95% Student's-t UCL 0.37

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Ra-226

General Statistics

Total Number of Observations	19	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.7	Mean	0.916
Maximum	1.2	Median	0.9
SD	0.161	Std. Error of Mean	0.0369
Coefficient of Variation	0.176	Skewness	0.342

Normal GOF Test

Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.98	95% Adjusted-CLT UCL (Chen-1995)	0.98
		95% Modified-t UCL (Johnson-1978)	0.98

Gamma GOF Test

A-D Test Statistic	0.527	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.186	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.198	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	34.69	k star (bias corrected MLE)	29.25
Theta hat (MLE)	0.0264	Theta star (bias corrected MLE)	0.0313
nu hat (MLE)	1318	nu star (bias corrected)	1111
MLE Mean (bias corrected)	0.916	MLE Sd (bias corrected)	0.169
		Approximate Chi Square Value (0.05)	1035
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	1029

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.983	95% Adjusted Gamma UCL	0.99

Attachment B - ProUCL Output

2. Background Area 2

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.176	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.357	Mean of logged Data	-0.102
Maximum of Logged Data	0.182	SD of logged Data	0.175

Assuming Lognormal Distribution

95% H-UCL	0.986	90% Chebyshev (MVUE) UCL	1.026
95% Chebyshev (MVUE) UCL	1.076	97.5% Chebyshev (MVUE) UCL	1.146
99% Chebyshev (MVUE) UCL	1.283		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.976	95% BCA Bootstrap UCL	0.974
95% Standard Bootstrap UCL	0.975	95% Bootstrap-t UCL	0.983
95% Hall's Bootstrap UCL	0.979	95% Percentile Bootstrap UCL	0.974
90% Chebyshev(Mean, Sd) UCL	1.026	95% Chebyshev(Mean, Sd) UCL	1.077
97.5% Chebyshev(Mean, Sd) UCL	1.146	99% Chebyshev(Mean, Sd) UCL	1.283

Suggested UCL to Use

95% Student's-t UCL 0.98

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Selenium

General Statistics

Total Number of Observations	21	Number of Distinct Observations	3
		Number of Missing Observations	0
Minimum	0.3	Mean	0.376
Maximum	0.8	Median	0.4
SD	0.109	Std. Error of Mean	0.0238
Coefficient of Variation	0.29	Skewness	3.076

Normal GOF Test

Shapiro Wilk Test Statistic	0.564	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.873	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.366	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.219	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.417	95% Adjusted-CLT UCL (Chen-1995)	0.432
		95% Modified-t UCL (Johnson-1978)	0.42

Gamma GOF Test

A-D Test Statistic	2.565	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.743	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.32	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.189	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	17.46	k star (bias corrected MLE)	14.99
Theta hat (MLE)	0.0216	Theta star (bias corrected MLE)	0.0251
nu hat (MLE)	733.2	nu star (bias corrected)	629.8
MLE Mean (bias corrected)	0.376	MLE Sd (bias corrected)	0.0972
		Approximate Chi Square Value (0.05)	572.5
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	568.4

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.414	95% Adjusted Gamma UCL	0.417

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.673	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.299	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.173	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.204	Mean of logged Data	-1.007
Maximum of Logged Data	-0.223	SD of logged Data	0.23

Assuming Lognormal Distribution

95% H-UCL	0.411	90% Chebyshev (MVUE) UCL	0.432
95% Chebyshev (MVUE) UCL	0.457	97.5% Chebyshev (MVUE) UCL	0.493
99% Chebyshev (MVUE) UCL	0.563		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.415	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.448	95% Chebyshev(Mean, Sd) UCL	0.48
97.5% Chebyshev(Mean, Sd) UCL	0.525	99% Chebyshev(Mean, Sd) UCL	0.613

Suggested UCL to Use

95% Student's-t UCL	0.417

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Uranium

General Statistics

Total Number of Observations	21	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	0.5	Mean	0.933
Maximum	1.2	Median	0.9
SD	0.198	Std. Error of Mean	0.0433
Coefficient of Variation	0.212	Skewness	-1.066

Normal GOF Test

Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.873	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.243	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.219	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.008	95% Adjusted-CLT UCL (Chen-1995)	0.994
		95% Modified-t UCL (Johnson-1978)	1.006

Gamma GOF Test

A-D Test Statistic	1.606	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.743	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.277	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.189	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	18.93	k star (bias corrected MLE)	16.26
Theta hat (MLE)	0.0493	Theta star (bias corrected MLE)	0.0574
nu hat (MLE)	795.2	nu star (bias corrected)	683
MLE Mean (bias corrected)	0.933	MLE Sd (bias corrected)	0.231
		Approximate Chi Square Value (0.05)	623.3
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	619

Assuming Gamma Distribution

95% Approximate Gamma UCL	1.023	95% Adjusted Gamma UCL	1.03

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.783	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.294	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.173	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.693	Mean of logged Data	-0.0956
Maximum of Logged Data	0.182	SD of logged Data	0.25

Assuming Lognormal Distribution

95% H-UCL	1.037	90% Chebyshev (MVUE) UCL	1.091
95% Chebyshev (MVUE) UCL	1.162	97.5% Chebyshev (MVUE) UCL	1.259
99% Chebyshev (MVUE) UCL	1.45		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	1.005	95% BCA Bootstrap UCL	0.995
95% Standard Bootstrap UCL	1.003	95% Bootstrap-t UCL	0.999
95% Hall's Bootstrap UCL	0.995	95% Percentile Bootstrap UCL	1.005
90% Chebyshev(Mean, Sd) UCL	1.063	95% Chebyshev(Mean, Sd) UCL	1.122
97.5% Chebyshev(Mean, Sd) UCL	1.204	99% Chebyshev(Mean, Sd) UCL	1.364

Suggested UCL to Use

95% Student's-t UCL	1.008

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Vanadium

General Statistics

Total Number of Observations	21	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	9.7	Mean	14.6
Maximum	17.9	Median	14.6
SD	2.286	Std. Error of Mean	0.499
Coefficient of Variation	0.157	Skewness	-0.771

Attachment B - ProUCL Output

2. Background Area 2

Normal GOF Test

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.873	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.21	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.219	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	15.46	95% Adjusted-CLT UCL (Chen-1995)	15.33
		95% Modified-t UCL (Johnson-1978)	15.45

Gamma GOF Test

A-D Test Statistic	0.857	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.232	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.189	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	38.54	k star (bias corrected MLE)	33.07
Theta hat (MLE)	0.379	Theta star (bias corrected MLE)	0.441
nu hat (MLE)	1619	nu star (bias corrected)	1389
MLE Mean (bias corrected)	14.6	MLE Sd (bias corrected)	2.539
		Approximate Chi Square Value (0.05)	1303
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	1297

Assuming Gamma Distribution

95% Approximate Gamma UCL	15.56	95% Adjusted Gamma UCL	15.63

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.244	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.173	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.272	Mean of logged Data	2.668
Maximum of Logged Data	2.885	SD of logged Data	0.17

Assuming Lognormal Distribution

95% H-UCL	15.63	90% Chebyshev (MVUE) UCL	16.25
95% Chebyshev (MVUE) UCL	16.99	97.5% Chebyshev (MVUE) UCL	18.02
99% Chebyshev (MVUE) UCL	20.04		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	15.42	95% BCA Bootstrap UCL	15.31
95% Standard Bootstrap UCL	15.41	95% Bootstrap-t UCL	15.36
95% Hall's Bootstrap UCL	15.34	95% Percentile Bootstrap UCL	15.39
90% Chebyshev(Mean, Sd) UCL	16.1	95% Chebyshev(Mean, Sd) UCL	16.77
97.5% Chebyshev(Mean, Sd) UCL	17.72	99% Chebyshev(Mean, Sd) UCL	19.56

Suggested UCL to Use

95% Student's-t UCL	15.46

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Attachment B - ProUCL Output

3. Subsurface Soil

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.2 9/2/2022 4:01:28 PM
From File	M+BJ_risk_bkg_data.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Uranium (black jack no. 1)

General Statistics

Total Number of Observations	77	Number of Distinct Observations	63
		Number of Missing Observations	0
Minimum	0.7	Mean	43.35
Maximum	650	Median	7.3
SD	100.1	Std. Error of Mean	11.4
Coefficient of Variation	2.309	Skewness	4.552

Normal GOF Test

Shapiro Wilk Test Statistic	0.462	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.335	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.117	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	62.34	95% Adjusted-CLT UCL (Chen-1995)	68.43
		95% Modified-t UCL (Johnson-1978)	63.33

Gamma GOF Test

A-D Test Statistic	3.232	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.835	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.147	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.109	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.427	k star (bias corrected MLE)	0.419
Theta hat (MLE)	101.6	Theta star (bias corrected MLE)	103.5
nu hat (MLE)	65.7	nu star (bias corrected)	64.47
MLE Mean (bias corrected)	43.35	MLE Sd (bias corrected)	67
		Approximate Chi Square Value (0.05)	47
Adjusted Level of Significance	0.0469	Adjusted Chi Square Value	46.72

Assuming Gamma Distribution

95% Approximate Gamma UCL	59.47	95% Adjusted Gamma UCL	59.83

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	1.9805E-4	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.121	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0924	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.357	Mean of logged Data	2.243
Maximum of Logged Data	6.477	SD of logged Data	1.794

Assuming Lognormal Distribution

95% H-UCL	90.3	90% Chebyshev (MVUE) UCL	85.02
95% Chebyshev (MVUE) UCL	103.3	97.5% Chebyshev (MVUE) UCL	128.6
99% Chebyshev (MVUE) UCL	178.4		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	62.11	95% BCA Bootstrap UCL	70.31
95% Standard Bootstrap UCL	62.56	95% Bootstrap-t UCL	82.25
95% Hall's Bootstrap UCL	152.9	95% Percentile Bootstrap UCL	63.95
90% Chebyshev(Mean, Sd) UCL	77.57	95% Chebyshev(Mean, Sd) UCL	93.06
97.5% Chebyshev(Mean, Sd) UCL	114.6	99% Chebyshev(Mean, Sd) UCL	156.8

Suggested UCL to Use

95% Student's-t UCL 62.34

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Uranium (black jack no. 2)

General Statistics

Total Number of Observations	84	Number of Distinct Observations	69
		Number of Missing Observations	0
Minimum	0.68	Mean	68.03
Maximum	1110	Median	9.1
SD	154.6	Std. Error of Mean	16.87
Coefficient of Variation	2.273	Skewness	4.526

Normal GOF Test

Shapiro Wilk Test Statistic	0.496	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level

Lilliefors Test Statistic	0.332	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.112	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	96.1	95% Adjusted-CLT UCL (Chen-1995)	104.7
		95% Modified-t UCL (Johnson-1978)	97.49

Gamma GOF Test

A-D Test Statistic	3.408	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.851	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.147	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.105	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.362	k star (bias corrected MLE)	0.357
Theta hat (MLE)	187.8	Theta star (bias corrected MLE)	190.5
nu hat (MLE)	60.85	nu star (bias corrected)	60.01
MLE Mean (bias corrected)	68.03	MLE Sd (bias corrected)	113.8
		Approximate Chi Square Value (0.05)	43.19
Adjusted Level of Significance	0.0471	Adjusted Chi Square Value	42.95

Assuming Gamma Distribution

95% Approximate Gamma UCL	94.51	95% Adjusted Gamma UCL	95.06

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	3.2781E-6	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.13	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.0886	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.386	Mean of logged Data	2.374
Maximum of Logged Data	7.012	SD of logged Data	2.082

Assuming Lognormal Distribution

95% H-UCL	207.4	90% Chebyshev (MVUE) UCL	180.3
95% Chebyshev (MVUE) UCL	222.6	97.5% Chebyshev (MVUE) UCL	281.4
99% Chebyshev (MVUE) UCL	396.8		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	95.79	95% BCA Bootstrap UCL	103.7
95% Standard Bootstrap UCL	94.78	95% Bootstrap-t UCL	110.7
95% Hall's Bootstrap UCL	130.2	95% Percentile Bootstrap UCL	97.8
90% Chebyshev(Mean, Sd) UCL	118.7	95% Chebyshev(Mean, Sd) UCL	141.6
97.5% Chebyshev(Mean, Sd) UCL	173.4	99% Chebyshev(Mean, Sd) UCL	235.9

Suggested UCL to Use

95% Student's-t UCL 96.1

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Uranium (mac no. 1)

General Statistics

Total Number of Observations	50	Number of Distinct Observations	50
		Number of Missing Observations	0
Minimum	0.83	Mean	99.33
Maximum	1590	Median	21.05
SD	246.6	Std. Error of Mean	34.88
Coefficient of Variation	2.483	Skewness	4.94

Normal GOF Test

Shapiro Wilk Test Statistic	0.429	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.93	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.345	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.146	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	157.8	95% Adjusted-CLT UCL (Chen-1995)	182.7
		95% Modified-t UCL (Johnson-1978)	161.9

Gamma GOF Test

A-D Test Statistic	1.957	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.831	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.168	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.134	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.432	k star (bias corrected MLE)	0.419
Theta hat (MLE)	230.1	Theta star (bias corrected MLE)	237
nu hat (MLE)	43.17	nu star (bias corrected)	41.91
MLE Mean (bias corrected)	99.33	MLE Sd (bias corrected)	153.4
		Approximate Chi Square Value (0.05)	28.07
Adjusted Level of Significance	0.0452	Adjusted Chi Square Value	27.73

Assuming Gamma Distribution

95% Approximate Gamma UCL	148.3	95% Adjusted Gamma UCL	150.1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.98	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.955	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0608	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.114	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.186	Mean of logged Data	3.093
Maximum of Logged Data	7.371	SD of logged Data	1.773

Assuming Lognormal Distribution

95% H-UCL	245	90% Chebyshev (MVUE) UCL	202.5
95% Chebyshev (MVUE) UCL	249.6	97.5% Chebyshev (MVUE) UCL	315
99% Chebyshev (MVUE) UCL	443.4		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	156.7	95% BCA Bootstrap UCL	200.6
95% Standard Bootstrap UCL	156.1	95% Bootstrap-t UCL	230.8
95% Hall's Bootstrap UCL	354.4	95% Percentile Bootstrap UCL	163.2
90% Chebyshev(Mean, Sd) UCL	204	95% Chebyshev(Mean, Sd) UCL	251.4
97.5% Chebyshev(Mean, Sd) UCL	317.2	99% Chebyshev(Mean, Sd) UCL	446.4

Suggested UCL to Use

95% H-UCL 245

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Uranium (mac no. 2)

General Statistics

Total Number of Observations	79	Number of Distinct Observations	62
		Number of Missing Observations	0
Minimum	0.5	Mean	30.59
Maximum	390	Median	4.1
SD	67.92	Std. Error of Mean	7.642
Coefficient of Variation	2.22	Skewness	3.941

Normal GOF Test

Shapiro Wilk Test Statistic	0.492	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.329	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.115	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	43.31	95% Adjusted-CLT UCL (Chen-1995)	46.78
		95% Modified-t UCL (Johnson-1978)	43.88

Gamma GOF Test

A-D Test Statistic	4.759	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.842	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.218	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.108	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.401	k star (bias corrected MLE)	0.394
Theta hat (MLE)	76.37	Theta star (bias corrected MLE)	77.68
nu hat (MLE)	63.3	nu star (bias corrected)	62.23
MLE Mean (bias corrected)	30.59	MLE Sd (bias corrected)	48.75
		Approximate Chi Square Value (0.05)	45.08
Adjusted Level of Significance	0.047	Adjusted Chi Square Value	44.81

Assuming Gamma Distribution

95% Approximate Gamma UCL	42.23	95% Adjusted Gamma UCL	42.48

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	3.8878E-6	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.125	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0913	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.693	Mean of logged Data	1.779
Maximum of Logged Data	5.966	SD of logged Data	1.818

Assuming Lognormal Distribution

95% H-UCL	59.76	90% Chebyshev (MVUE) UCL	55.98
95% Chebyshev (MVUE) UCL	68.06	97.5% Chebyshev (MVUE) UCL	84.82
99% Chebyshev (MVUE) UCL	117.7		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	43.16	95% BCA Bootstrap UCL	47.45
95% Standard Bootstrap UCL	42.83	95% Bootstrap-t UCL	50.03
95% Hall's Bootstrap UCL	58.42	95% Percentile Bootstrap UCL	43.97
90% Chebyshev(Mean, Sd) UCL	53.52	95% Chebyshev(Mean, Sd) UCL	63.9
97.5% Chebyshev(Mean, Sd) UCL	78.32	99% Chebyshev(Mean, Sd) UCL	106.6

Suggested UCL to Use

95% Student's-t UCL 43.31

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Radium 226 (black jack no. 1)

General Statistics

Total Number of Observations	77	Number of Distinct Observations	54
		Number of Missing Observations	0
Minimum	1.3	Mean	15.71
Maximum	139	Median	2.5
SD	30.16	Std. Error of Mean	3.437
Coefficient of Variation	1.92	Skewness	2.757

Normal GOF Test

Shapiro Wilk Test Statistic	0.535	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.357	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.117	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	21.43	95% Adjusted-CLT UCL (Chen-1995)	22.52
		95% Modified-t UCL (Johnson-1978)	21.61

Gamma GOF Test

A-D Test Statistic	8.72	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.814	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.253	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.107	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.545	k star (bias corrected MLE)	0.532
Theta hat (MLE)	28.84	Theta star (bias corrected MLE)	29.53

nu hat (MLE)	83.87	nu star (bias corrected)	81.93
MLE Mean (bias corrected)	15.71	MLE Sd (bias corrected)	21.54
		Approximate Chi Square Value (0.05)	62.07
Adjusted Level of Significance	0.0469	Adjusted Chi Square Value	61.74

Assuming Gamma Distribution

95% Approximate Gamma UCL	20.73	95% Adjusted Gamma UCL	20.84

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.803	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	2.132E-14	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.222	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.0924	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.262	Mean of logged Data	1.603
Maximum of Logged Data	4.934	SD of logged Data	1.355

Assuming Lognormal Distribution

95% H-UCL	18.73	90% Chebyshev (MVUE) UCL	19.57
95% Chebyshev (MVUE) UCL	22.92	97.5% Chebyshev (MVUE) UCL	27.58
99% Chebyshev (MVUE) UCL	36.73		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	21.36	95% BCA Bootstrap UCL	22.39
95% Standard Bootstrap UCL	21.37	95% Bootstrap-t UCL	23.21
95% Hall's Bootstrap UCL	22.42	95% Percentile Bootstrap UCL	21.68
90% Chebyshev(Mean, Sd) UCL	26.02	95% Chebyshev(Mean, Sd) UCL	30.69
97.5% Chebyshev(Mean, Sd) UCL	37.17	99% Chebyshev(Mean, Sd) UCL	49.91

Suggested UCL to Use

95% Student's-t UCL	21.43

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Radium 226 (black jack no. 2)

General Statistics

Total Number of Observations	84	Number of Distinct Observations	56
		Number of Missing Observations	0
Minimum	1.12	Mean	20.83
Maximum	376	Median	1.78
SD	54.57	Std. Error of Mean	5.954
Coefficient of Variation	2.62	Skewness	4.364

Normal GOF Test

Shapiro Wilk Test Statistic	0.432	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.367	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.112	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	30.74	95% Adjusted-CLT UCL (Chen-1995)	33.65
		95% Modified-t UCL (Johnson-1978)	31.21

Gamma GOF Test

A-D Test Statistic	12.89	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.844	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.323	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.105	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.393	k star (bias corrected MLE)	0.387
Theta hat (MLE)	52.94	Theta star (bias corrected MLE)	53.78
nu hat (MLE)	66.1	nu star (bias corrected)	65.08
MLE Mean (bias corrected)	20.83	MLE Sd (bias corrected)	33.47
		Approximate Chi Square Value (0.05)	47.52
Adjusted Level of Significance	0.0471	Adjusted Chi Square Value	47.25

Assuming Gamma Distribution

95% Approximate Gamma UCL	28.53	95% Adjusted Gamma UCL	28.69

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.737	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.253	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0886	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.113	Mean of logged Data	1.36
Maximum of Logged Data	5.93	SD of logged Data	1.553

Assuming Lognormal Distribution

95% H-UCL	21.05	90% Chebyshev (MVUE) UCL	21.55
95% Chebyshev (MVUE) UCL	25.59	97.5% Chebyshev (MVUE) UCL	31.21
99% Chebyshev (MVUE) UCL	42.24		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	30.62	95% BCA Bootstrap UCL	34.03
95% Standard Bootstrap UCL	30.44	95% Bootstrap-t UCL	36.52
95% Hall's Bootstrap UCL	37.47	95% Percentile Bootstrap UCL	31.65
90% Chebyshev(Mean, Sd) UCL	38.69	95% Chebyshev(Mean, Sd) UCL	46.78
97.5% Chebyshev(Mean, Sd) UCL	58.01	99% Chebyshev(Mean, Sd) UCL	80.07

Suggested UCL to Use

95% Student's-t UCL 30.74

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Radium 226 (mac no. 1)

General Statistics

Total Number of Observations	50	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	0.69	Mean	35.53
Maximum	638	Median	4.01
SD	111.8	Std. Error of Mean	15.82
Coefficient of Variation	3.148	Skewness	4.669

Normal GOF Test

Shapiro Wilk Test Statistic	0.336	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.93	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.388	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.146	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	62.04	95% Adjusted-CLT UCL (Chen-1995)	72.7
		95% Modified-t UCL (Johnson-1978)	63.79

Gamma GOF Test

A-D Test Statistic	5.714	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.84	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.246	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.134	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.391	k star (bias corrected MLE)	0.381
Theta hat (MLE)	90.83	Theta star (bias corrected MLE)	93.25
nu hat (MLE)	39.11	nu star (bias corrected)	38.1
MLE Mean (bias corrected)	35.53	MLE Sd (bias corrected)	57.56
		Approximate Chi Square Value (0.05)	24.96
Adjusted Level of Significance	0.0452	Adjusted Chi Square Value	24.65

Assuming Gamma Distribution

95% Approximate Gamma UCL	54.22	95% Adjusted Gamma UCL	54.91

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.895	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.955	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.166	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.114	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.371	Mean of logged Data	1.882
Maximum of Logged Data	6.458	SD of logged Data	1.535

Assuming Lognormal Distribution

95% H-UCL	41.07	90% Chebyshev (MVUE) UCL	38.03
95% Chebyshev (MVUE) UCL	46.05	97.5% Chebyshev (MVUE) UCL	57.18
99% Chebyshev (MVUE) UCL	79.05		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	61.54	95% BCA Bootstrap UCL	79.91
95% Standard Bootstrap UCL	62.01	95% Bootstrap-t UCL	152
95% Hall's Bootstrap UCL	172.5	95% Percentile Bootstrap UCL	65.29
90% Chebyshev(Mean, Sd) UCL	82.98	95% Chebyshev(Mean, Sd) UCL	104.5
97.5% Chebyshev(Mean, Sd) UCL	134.3	99% Chebyshev(Mean, Sd) UCL	192.9

Suggested UCL to Use

95% Student's-t UCL	62.04

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Radium 226 (mac no. 2)

General Statistics

Total Number of Observations	79	Number of Distinct Observations	56
		Number of Missing Observations	0
Minimum	0.84	Mean	16.86
Maximum	462	Median	2
SD	60.04	Std. Error of Mean	6.755
Coefficient of Variation	3.561	Skewness	6.079

Normal GOF Test

Shapiro Wilk Test Statistic	0.299	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.403	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.115	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	28.1	95% Adjusted-CLT UCL (Chen-1995)	32.91
		95% Modified-t UCL (Johnson-1978)	28.87

Gamma GOF Test

A-D Test Statistic	12.04	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.839	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.278	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.107	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.414	k star (bias corrected MLE)	0.406
Theta hat (MLE)	40.77	Theta star (bias corrected MLE)	41.5
nu hat (MLE)	65.34	nu star (bias corrected)	64.19
MLE Mean (bias corrected)	16.86	MLE Sd (bias corrected)	26.45
		Approximate Chi Square Value (0.05)	46.76
Adjusted Level of Significance	0.047	Adjusted Chi Square Value	46.48

Assuming Gamma Distribution

95% Approximate Gamma UCL	23.14	95% Adjusted Gamma UCL	23.28

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	1.021E-14	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.202	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0913	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.174	Mean of logged Data	1.242
Maximum of Logged Data	6.136	SD of logged Data	1.347

Assuming Lognormal Distribution

95% H-UCL	12.83	90% Chebyshev (MVUE) UCL	13.43
95% Chebyshev (MVUE) UCL	15.7	97.5% Chebyshev (MVUE) UCL	18.86
99% Chebyshev (MVUE) UCL	25.06		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	27.97	95% BCA Bootstrap UCL	35.38
95% Standard Bootstrap UCL	27.76	95% Bootstrap-t UCL	46.1
95% Hall's Bootstrap UCL	63.41	95% Percentile Bootstrap UCL	28.3
90% Chebyshev(Mean, Sd) UCL	37.12	95% Chebyshev(Mean, Sd) UCL	46.3
97.5% Chebyshev(Mean, Sd) UCL	59.04	99% Chebyshev(Mean, Sd) UCL	84.07

Suggested UCL to Use

95% Student's-t UCL 28.1

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Arsenic (black jack no. 1)

General Statistics

Total Number of Observations	52	Number of Distinct Observations	30
		Number of Missing Observations	25
Minimum	1.5	Mean	7.875
Maximum	14.2	Median	8.1
SD	1.923	Std. Error of Mean	0.267
Coefficient of Variation	0.244	Skewness	-0.39

Normal GOF Test

Shapiro Wilk Test Statistic	0.835	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	1.5504E-7	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.141	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8.322	95% Adjusted-CLT UCL (Chen-1995)	8.298
		95% Modified-t UCL (Johnson-1978)	8.319

Gamma GOF Test

A-D Test Statistic	4.921	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.251	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.123	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	11.29	k star (bias corrected MLE)	10.65
Theta hat (MLE)	0.697	Theta star (bias corrected MLE)	0.739
nu hat (MLE)	1174	nu star (bias corrected)	1108
MLE Mean (bias corrected)	7.875	MLE Sd (bias corrected)	2.413
		Approximate Chi Square Value (0.05)	1032
Adjusted Level of Significance	0.0454	Adjusted Chi Square Value	1030

Assuming Gamma Distribution

95% Approximate Gamma UCL	8.457	95% Adjusted Gamma UCL	8.474

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.629	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	8.882E-16	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.28	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.112	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.405	Mean of logged Data	2.019
Maximum of Logged Data	2.653	SD of logged Data	0.354

Assuming Lognormal Distribution

95% H-UCL	8.741	90% Chebyshev (MVUE) UCL	9.212
95% Chebyshev (MVUE) UCL	9.759	97.5% Chebyshev (MVUE) UCL	10.52
99% Chebyshev (MVUE) UCL	12.01		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	8.314	95% BCA Bootstrap UCL	8.288
95% Standard Bootstrap UCL	8.31	95% Bootstrap-t UCL	8.309
95% Hall's Bootstrap UCL	8.355	95% Percentile Bootstrap UCL	8.294
90% Chebyshev(Mean, Sd) UCL	8.675	95% Chebyshev(Mean, Sd) UCL	9.037
97.5% Chebyshev(Mean, Sd) UCL	9.54	99% Chebyshev(Mean, Sd) UCL	10.53

Suggested UCL to Use

95% Student's-t UCL	8.322

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Arsenic (black jack no. 2)

General Statistics

Total Number of Observations	63	Number of Distinct Observations	38
		Number of Missing Observations	21
Minimum	2.1	Mean	4.717
Maximum	15.4	Median	4
SD	2.361	Std. Error of Mean	0.297
Coefficient of Variation	0.5	Skewness	2.636

Normal GOF Test

Shapiro Wilk Test Statistic	0.743	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	1.632E-14	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.203	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.129	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.214	95% Adjusted-CLT UCL (Chen-1995)	5.312
		95% Modified-t UCL (Johnson-1978)	5.231

Gamma GOF Test

A-D Test Statistic	1.966	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.158	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.112	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.055	k star (bias corrected MLE)	5.777
Theta hat (MLE)	0.779	Theta star (bias corrected MLE)	0.817
nu hat (MLE)	762.9	nu star (bias corrected)	727.9
MLE Mean (bias corrected)	4.717	MLE Sd (bias corrected)	1.963
		Approximate Chi Square Value (0.05)	666.3
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	665

Assuming Gamma Distribution

95% Approximate Gamma UCL	5.154	95% Adjusted Gamma UCL	5.164

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.00322	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.128	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.102	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.742	Mean of logged Data	1.466
Maximum of Logged Data	2.734	SD of logged Data	0.387

Assuming Lognormal Distribution

95% H-UCL	5.102	90% Chebyshev (MVUE) UCL	5.368
95% Chebyshev (MVUE) UCL	5.687	97.5% Chebyshev (MVUE) UCL	6.13
99% Chebyshev (MVUE) UCL	6.999		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	5.207	95% BCA Bootstrap UCL	5.335
95% Standard Bootstrap UCL	5.199	95% Bootstrap-t UCL	5.403
95% Hall's Bootstrap UCL	5.468	95% Percentile Bootstrap UCL	5.21
90% Chebyshev(Mean, Sd) UCL	5.61	95% Chebyshev(Mean, Sd) UCL	6.014
97.5% Chebyshev(Mean, Sd) UCL	6.575	99% Chebyshev(Mean, Sd) UCL	7.677

Suggested UCL to Use

95% Student's-t UCL 5.214

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Arsenic (mac no. 1)

General Statistics

Total Number of Observations	32	Number of Distinct Observations	22
		Number of Missing Observations	18
Minimum	1.6	Mean	4.575
Maximum	16.9	Median	3.15
SD	3.669	Std. Error of Mean	0.649
Coefficient of Variation	0.802	Skewness	2.283

Normal GOF Test

Shapiro Wilk Test Statistic	0.674	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.904	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.271	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.18	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.675	95% Adjusted-CLT UCL (Chen-1995)	5.921
		95% Modified-t UCL (Johnson-1978)	5.718

Gamma GOF Test

A-D Test Statistic	2.28	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.241	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.157	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.67	k star (bias corrected MLE)	2.441
Theta hat (MLE)	1.713	Theta star (bias corrected MLE)	1.875
nu hat (MLE)	170.9	nu star (bias corrected)	156.2
MLE Mean (bias corrected)	4.575	MLE Sd (bias corrected)	2.929
		Approximate Chi Square Value (0.05)	128.3
Adjusted Level of Significance	0.0416	Adjusted Chi Square Value	127

Assuming Gamma Distribution

95% Approximate Gamma UCL	5.57	95% Adjusted Gamma UCL	5.629

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.875	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.212	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.142	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.47	Mean of logged Data	1.322
Maximum of Logged Data	2.827	SD of logged Data	0.58

Assuming Lognormal Distribution

95% H-UCL	5.462	90% Chebyshev (MVUE) UCL	5.846
95% Chebyshev (MVUE) UCL	6.497	97.5% Chebyshev (MVUE) UCL	7.4
99% Chebyshev (MVUE) UCL	9.173		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	5.642	95% BCA Bootstrap UCL	6.034
95% Standard Bootstrap UCL	5.668	95% Bootstrap-t UCL	6.48
95% Hall's Bootstrap UCL	6.126	95% Percentile Bootstrap UCL	5.734
90% Chebyshev(Mean, Sd) UCL	6.521	95% Chebyshev(Mean, Sd) UCL	7.402
97.5% Chebyshev(Mean, Sd) UCL	8.625	99% Chebyshev(Mean, Sd) UCL	11.03

Suggested UCL to Use

95% Student's-t UCL	5.675

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Arsenic (mac no. 2)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	36
		Number of Missing Observations	21
Minimum	2	Mean	6.403
Maximum	14	Median	6.65
SD	2.104	Std. Error of Mean	0.276
Coefficient of Variation	0.329	Skewness	0.613

Normal GOF Test

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0.177	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.103	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.134	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.865	95% Adjusted-CLT UCL (Chen-1995)	6.882
		95% Modified-t UCL (Johnson-1978)	6.869

Gamma GOF Test

A-D Test Statistic	0.766	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0978	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.117	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.786	k star (bias corrected MLE)	8.343
Theta hat (MLE)	0.729	Theta star (bias corrected MLE)	0.767
nu hat (MLE)	1019	nu star (bias corrected)	967.8
MLE Mean (bias corrected)	6.403	MLE Sd (bias corrected)	2.217
		Approximate Chi Square Value (0.05)	896.6
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	894.9

Assuming Gamma Distribution

95% Approximate Gamma UCL	6.912	95% Adjusted Gamma UCL	6.925

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.0104	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.115	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.106	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.693	Mean of logged Data	1.799
Maximum of Logged Data	2.639	SD of logged Data	0.36

Assuming Lognormal Distribution

95% H-UCL	7.006	90% Chebyshev (MVUE) UCL	7.375
95% Chebyshev (MVUE) UCL	7.8	97.5% Chebyshev (MVUE) UCL	8.389
99% Chebyshev (MVUE) UCL	9.546		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	6.858	95% BCA Bootstrap UCL	6.869
95% Standard Bootstrap UCL	6.85	95% Bootstrap-t UCL	6.899
95% Hall's Bootstrap UCL	6.922	95% Percentile Bootstrap UCL	6.853
90% Chebyshev(Mean, Sd) UCL	7.232	95% Chebyshev(Mean, Sd) UCL	7.607
97.5% Chebyshev(Mean, Sd) UCL	8.128	99% Chebyshev(Mean, Sd) UCL	9.152

Suggested UCL to Use

95% Student's-t UCL 6.865

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Molybdenum (black jack no. 1)

General Statistics

Total Number of Observations	52	Number of Distinct Observations	28
		Number of Missing Observations	25
Minimum	0.5	Mean	6.348
Maximum	105	Median	1.4
SD	19.25	Std. Error of Mean	2.67
Coefficient of Variation	3.033	Skewness	4.606

Normal GOF Test

Shapiro Wilk Test Statistic	0.313	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.418	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.141	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10.82	95% Adjusted-CLT UCL (Chen-1995)	12.56
		95% Modified-t UCL (Johnson-1978)	11.1

Gamma GOF Test

A-D Test Statistic	9.541	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.813	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.344	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.13	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Attachment B - ProUCL Output

3. Subsurface Soil

Gamma Statistics

k hat (MLE)	0.521	k star (bias corrected MLE)	0.503
Theta hat (MLE)	12.19	Theta star (bias corrected MLE)	12.61
nu hat (MLE)	54.14	nu star (bias corrected)	52.35
MLE Mean (bias corrected)	6.348	MLE Sd (bias corrected)	8.948
		Approximate Chi Square Value (0.05)	36.73
Adjusted Level of Significance	0.0454	Adjusted Chi Square Value	36.35

Assuming Gamma Distribution

95% Approximate Gamma UCL	9.048	95% Adjusted Gamma UCL	9.141

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.741	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	1.551E-11	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.248	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.112	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.693	Mean of logged Data	0.636
Maximum of Logged Data	4.654	SD of logged Data	1.12

Assuming Lognormal Distribution

95% H-UCL	5.191	90% Chebyshev (MVUE) UCL	5.433
95% Chebyshev (MVUE) UCL	6.322	97.5% Chebyshev (MVUE) UCL	7.556
99% Chebyshev (MVUE) UCL	9.981		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	10.74	95% BCA Bootstrap UCL	13.58
95% Standard Bootstrap UCL	10.77	95% Bootstrap-t UCL	26.91
95% Hall's Bootstrap UCL	28.85	95% Percentile Bootstrap UCL	11.21
90% Chebyshev(Mean, Sd) UCL	14.36	95% Chebyshev(Mean, Sd) UCL	17.98
97.5% Chebyshev(Mean, Sd) UCL	23.02	99% Chebyshev(Mean, Sd) UCL	32.91

Suggested UCL to Use

95% Student's-t UCL	10.82

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Molybdenum (black jack no. 2)

General Statistics

Total Number of Observations	63	Number of Distinct Observations	34
		Number of Missing Observations	21
Minimum	0.3	Mean	3.338
Maximum	39.1	Median	1.2
SD	6.904	Std. Error of Mean	0.87
Coefficient of Variation	2.068	Skewness	3.962

Normal GOF Test

Shapiro Wilk Test Statistic	0.453	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.33	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.129	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	4.79	95% Adjusted-CLT UCL (Chen-1995)	5.233
		95% Modified-t UCL (Johnson-1978)	4.863

Gamma GOF Test

A-D Test Statistic	4.502	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.798	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.117	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.692	k star (bias corrected MLE)	0.669
Theta hat (MLE)	4.826	Theta star (bias corrected MLE)	4.988
nu hat (MLE)	87.15	nu star (bias corrected)	84.33
MLE Mean (bias corrected)	3.338	MLE Sd (bias corrected)	4.08
		Approximate Chi Square Value (0.05)	64.16
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	63.75

Assuming Gamma Distribution

95% Approximate Gamma UCL	4.387	95% Adjusted Gamma UCL	4.415

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.905	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	4.5869E-5	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.136	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.102	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.204	Mean of logged Data	0.33
Maximum of Logged Data	3.666	SD of logged Data	1.157

Assuming Lognormal Distribution

95% H-UCL	3.794	90% Chebyshev (MVUE) UCL	4.116
95% Chebyshev (MVUE) UCL	4.77	97.5% Chebyshev (MVUE) UCL	5.678
99% Chebyshev (MVUE) UCL	7.462		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	4.769	95% BCA Bootstrap UCL	5.408
95% Standard Bootstrap UCL	4.728	95% Bootstrap-t UCL	5.968
95% Hall's Bootstrap UCL	5.225	95% Percentile Bootstrap UCL	4.783
90% Chebyshev(Mean, Sd) UCL	5.947	95% Chebyshev(Mean, Sd) UCL	7.129
97.5% Chebyshev(Mean, Sd) UCL	8.77	99% Chebyshev(Mean, Sd) UCL	11.99

Suggested UCL to Use

95% Student's-t UCL 4.79

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Molybdenum (mac no. 1)

General Statistics

Total Number of Observations	32	Number of Distinct Observations	22
		Number of Missing Observations	18
Minimum	0.3	Mean	3.291
Maximum	29.2	Median	1.05
SD	5.778	Std. Error of Mean	1.021
Coefficient of Variation	1.756	Skewness	3.511

Normal GOF Test

Shapiro Wilk Test Statistic	0.53	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.904	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.302	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.18	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.022	95% Adjusted-CLT UCL (Chen-1995)	5.648
		95% Modified-t UCL (Johnson-1978)	5.128

Gamma GOF Test

A-D Test Statistic	2.201	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.786	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.215	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.161	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.778	k star (bias corrected MLE)	0.726
Theta hat (MLE)	4.231	Theta star (bias corrected MLE)	4.534
nu hat (MLE)	49.78	nu star (bias corrected)	46.44
MLE Mean (bias corrected)	3.291	MLE Sd (bias corrected)	3.863
		Approximate Chi Square Value (0.05)	31.81
Adjusted Level of Significance	0.0416	Adjusted Chi Square Value	31.16

Assuming Gamma Distribution

95% Approximate Gamma UCL	4.805	95% Adjusted Gamma UCL	4.905

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.142	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.204	Mean of logged Data	0.425
Maximum of Logged Data	3.374	SD of logged Data	1.124

Assuming Lognormal Distribution

95% H-UCL	4.848	90% Chebyshev (MVUE) UCL	4.76
95% Chebyshev (MVUE) UCL	5.652	97.5% Chebyshev (MVUE) UCL	6.89
99% Chebyshev (MVUE) UCL	9.322		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	4.971	95% BCA Bootstrap UCL	5.925
95% Standard Bootstrap UCL	4.978	95% Bootstrap-t UCL	7.544
95% Hall's Bootstrap UCL	11.86	95% Percentile Bootstrap UCL	5.125
90% Chebyshev(Mean, Sd) UCL	6.355	95% Chebyshev(Mean, Sd) UCL	7.743
97.5% Chebyshev(Mean, Sd) UCL	9.669	99% Chebyshev(Mean, Sd) UCL	13.45

Suggested UCL to Use

95% Student's-t UCL	5.022

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Molybdenum (mac no. 2)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	24
		Number of Missing Observations	21
Minimum	0.2	Mean	1.202
Maximum	6	Median	0.7
SD	1.285	Std. Error of Mean	0.169
Coefficient of Variation	1.069	Skewness	2.241

Normal GOF Test

Shapiro Wilk Test Statistic	0.672	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	2.220E-16	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.134	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.484	95% Adjusted-CLT UCL (Chen-1995)	1.532
		95% Modified-t UCL (Johnson-1978)	1.492

Gamma GOF Test

A-D Test Statistic	3.449	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.768	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.196	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.119	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.509	k star (bias corrected MLE)	1.443
Theta hat (MLE)	0.796	Theta star (bias corrected MLE)	0.833
nu hat (MLE)	175.1	nu star (bias corrected)	167.4
MLE Mean (bias corrected)	1.202	MLE Sd (bias corrected)	1
		Approximate Chi Square Value (0.05)	138.4
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	137.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	1.453	95% Adjusted Gamma UCL	1.46

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	2.3535E-4	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.143	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.106	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.609	Mean of logged Data	-0.183
Maximum of Logged Data	1.792	SD of logged Data	0.792

Assuming Lognormal Distribution

95% H-UCL	1.425	90% Chebyshev (MVUE) UCL	1.529
95% Chebyshev (MVUE) UCL	1.708	97.5% Chebyshev (MVUE) UCL	1.958
99% Chebyshev (MVUE) UCL	2.447		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	1.479	95% BCA Bootstrap UCL	1.531
95% Standard Bootstrap UCL	1.48	95% Bootstrap-t UCL	1.586
95% Hall's Bootstrap UCL	1.541	95% Percentile Bootstrap UCL	1.479
90% Chebyshev(Mean, Sd) UCL	1.708	95% Chebyshev(Mean, Sd) UCL	1.937
97.5% Chebyshev(Mean, Sd) UCL	2.255	99% Chebyshev(Mean, Sd) UCL	2.881

Suggested UCL to Use

95% Student's-t UCL 1.484

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Selenium (black jack no. 1)

General Statistics

Total Number of Observations	52	Number of Distinct Observations	27
		Number of Missing Observations	25
Minimum	0.3	Mean	9.994
Maximum	148	Median	1.05
SD	28.64	Std. Error of Mean	3.972
Coefficient of Variation	2.866	Skewness	4.033

Normal GOF Test

Shapiro Wilk Test Statistic	0.38	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.408	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.141	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	16.65	95% Adjusted-CLT UCL (Chen-1995)	18.9
		95% Modified-t UCL (Johnson-1978)	17.02

Gamma GOF Test

A-D Test Statistic	7.306	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.845	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.314	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.375	k star (bias corrected MLE)	0.367
Theta hat (MLE)	26.63	Theta star (bias corrected MLE)	27.27
nu hat (MLE)	39.03	nu star (bias corrected)	38.12
MLE Mean (bias corrected)	9.994	MLE Sd (bias corrected)	16.51
		Approximate Chi Square Value (0.05)	24.98
Adjusted Level of Significance	0.0454	Adjusted Chi Square Value	24.67

Assuming Gamma Distribution

95% Approximate Gamma UCL	15.25	95% Adjusted Gamma UCL	15.44

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.819	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	2.8769E-8	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.189	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.112	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.204	Mean of logged Data	0.531
Maximum of Logged Data	4.997	SD of logged Data	1.561

Assuming Lognormal Distribution

95% H-UCL	11.06	90% Chebyshev (MVUE) UCL	10.27
95% Chebyshev (MVUE) UCL	12.45	97.5% Chebyshev (MVUE) UCL	15.46
99% Chebyshev (MVUE) UCL	21.39		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	16.53	95% BCA Bootstrap UCL	19.47
95% Standard Bootstrap UCL	16.49	95% Bootstrap-t UCL	27.4
95% Hall's Bootstrap UCL	25.95	95% Percentile Bootstrap UCL	16.86
90% Chebyshev(Mean, Sd) UCL	21.91	95% Chebyshev(Mean, Sd) UCL	27.31
97.5% Chebyshev(Mean, Sd) UCL	34.8	99% Chebyshev(Mean, Sd) UCL	49.51

Suggested UCL to Use

95% Student's-t UCL	16.65

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Selenium (black jack no. 2)

General Statistics

Total Number of Observations	63	Number of Distinct Observations	32
		Number of Missing Observations	21
Minimum	0.1	Mean	8.77
Maximum	124	Median	0.6
SD	21.02	Std. Error of Mean	2.648
Coefficient of Variation	2.397	Skewness	3.73

Normal GOF Test

Shapiro Wilk Test Statistic	0.484	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.362	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.129	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	13.19	95% Adjusted-CLT UCL (Chen-1995)	14.45
		95% Modified-t UCL (Johnson-1978)	13.4

Gamma GOF Test

A-D Test Statistic	6.649	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.854	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.294	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.121	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.341	k star (bias corrected MLE)	0.336
Theta hat (MLE)	25.7	Theta star (bias corrected MLE)	26.14
nu hat (MLE)	42.99	nu star (bias corrected)	42.28
MLE Mean (bias corrected)	8.77	MLE Sd (bias corrected)	15.14
		Approximate Chi Square Value (0.05)	28.37
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	28.1

Assuming Gamma Distribution

95% Approximate Gamma UCL	13.07	95% Adjusted Gamma UCL	13.19

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	1.5772E-8	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.171	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.102	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.303	Mean of logged Data	0.192
Maximum of Logged Data	4.82	SD of logged Data	1.889

Assuming Lognormal Distribution

95% H-UCL	14.62	90% Chebyshev (MVUE) UCL	13.76
95% Chebyshev (MVUE) UCL	16.95	97.5% Chebyshev (MVUE) UCL	21.39
99% Chebyshev (MVUE) UCL	30.09		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	13.13	95% BCA Bootstrap UCL	14.54
95% Standard Bootstrap UCL	13.03	95% Bootstrap-t UCL	16.1
95% Hall's Bootstrap UCL	17.28	95% Percentile Bootstrap UCL	13.33
90% Chebyshev(Mean, Sd) UCL	16.71	95% Chebyshev(Mean, Sd) UCL	20.31
97.5% Chebyshev(Mean, Sd) UCL	25.31	99% Chebyshev(Mean, Sd) UCL	35.12

Suggested UCL to Use

95% Student's-t UCL	13.19

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Selenium (mac no. 1)

General Statistics

Total Number of Observations	32	Number of Distinct Observations	26
		Number of Missing Observations	18
Minimum	0.1	Mean	4.813
Maximum	44.9	Median	1.95
SD	8.75	Std. Error of Mean	1.547
Coefficient of Variation	1.818	Skewness	3.665

Normal GOF Test

Shapiro Wilk Test Statistic	0.525	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.904	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.335	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.18	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	7.435	95% Adjusted-CLT UCL (Chen-1995)	8.428
		95% Modified-t UCL (Johnson-1978)	7.602

Gamma GOF Test

A-D Test Statistic	0.981	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.796	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.172	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.163	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.659	k star (bias corrected MLE)	0.618
Theta hat (MLE)	7.307	Theta star (bias corrected MLE)	7.791
nu hat (MLE)	42.15	nu star (bias corrected)	39.53
MLE Mean (bias corrected)	4.813	MLE Sd (bias corrected)	6.123
		Approximate Chi Square Value (0.05)	26.13
Adjusted Level of Significance	0.0416	Adjusted Chi Square Value	25.54

Assuming Gamma Distribution

95% Approximate Gamma UCL	7.281	95% Adjusted Gamma UCL	7.448

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.984	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0883	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.142	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.303	Mean of logged Data	0.646
Maximum of Logged Data	3.804	SD of logged Data	1.393

Assuming Lognormal Distribution

95% H-UCL	10.51	90% Chebyshev (MVUE) UCL	9.154
95% Chebyshev (MVUE) UCL	11.14	97.5% Chebyshev (MVUE) UCL	13.9
99% Chebyshev (MVUE) UCL	19.33		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.357	95% BCA Bootstrap UCL	8.959
95% Standard Bootstrap UCL	7.342	95% Bootstrap-t UCL	11.6
95% Hall's Bootstrap UCL	17.75	95% Percentile Bootstrap UCL	7.606
90% Chebyshev(Mean, Sd) UCL	9.453	95% Chebyshev(Mean, Sd) UCL	11.55
97.5% Chebyshev(Mean, Sd) UCL	14.47	99% Chebyshev(Mean, Sd) UCL	20.2

Suggested UCL to Use

95% H-UCL 10.51

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Selenium (mac no. 2)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	25
		Number of Missing Observations	21
Minimum	0.1	Mean	1.971
Maximum	32.8	Median	0.3
SD	4.919	Std. Error of Mean	0.646
Coefficient of Variation	2.496	Skewness	4.856

Normal GOF Test

Shapiro Wilk Test Statistic	0.429	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.352	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.134	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.051	95% Adjusted-CLT UCL (Chen-1995)	3.473
		95% Modified-t UCL (Johnson-1978)	3.119

Gamma GOF Test

A-D Test Statistic	5.306	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.822	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.256	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.124	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.473	k star (bias corrected MLE)	0.46
Theta hat (MLE)	4.167	Theta star (bias corrected MLE)	4.285
nu hat (MLE)	54.85	nu star (bias corrected)	53.35
MLE Mean (bias corrected)	1.971	MLE Sd (bias corrected)	2.906
		Approximate Chi Square Value (0.05)	37.57
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	37.23

Assuming Gamma Distribution

95% Approximate Gamma UCL	2.798	95% Adjusted Gamma UCL	2.824

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.871	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	1.5282E-6	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.209	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.106	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.303	Mean of logged Data	-0.677
Maximum of Logged Data	3.49	SD of logged Data	1.475

Assuming Lognormal Distribution

95% H-UCL	2.763	90% Chebyshev (MVUE) UCL	2.582
95% Chebyshev (MVUE) UCL	3.093	97.5% Chebyshev (MVUE) UCL	3.802
99% Chebyshev (MVUE) UCL	5.195		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	3.033	95% BCA Bootstrap UCL	3.752
95% Standard Bootstrap UCL	3.024	95% Bootstrap-t UCL	4.284
95% Hall's Bootstrap UCL	6.805	95% Percentile Bootstrap UCL	3.169
90% Chebyshev(Mean, Sd) UCL	3.908	95% Chebyshev(Mean, Sd) UCL	4.786
97.5% Chebyshev(Mean, Sd) UCL	6.004	99% Chebyshev(Mean, Sd) UCL	8.397

Suggested UCL to Use

95% Student's-t UCL 3.051

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Vanadium (black jack no. 1)

General Statistics

Total Number of Observations	52	Number of Distinct Observations	48
		Number of Missing Observations	25
Minimum	12.3	Mean	33.82
Maximum	89.3	Median	32.1
SD	14.55	Std. Error of Mean	2.018
Coefficient of Variation	0.43	Skewness	2.367

Normal GOF Test

Shapiro Wilk Test Statistic	0.755	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	5.886E-11	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.224	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.141	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	37.2	95% Adjusted-CLT UCL (Chen-1995)	37.84
		95% Modified-t UCL (Johnson-1978)	37.31

Gamma GOF Test

A-D Test Statistic	1.79	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.168	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.123	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.23	k star (bias corrected MLE)	6.826
Theta hat (MLE)	4.677	Theta star (bias corrected MLE)	4.954
nu hat (MLE)	751.9	nu star (bias corrected)	709.9
MLE Mean (bias corrected)	33.82	MLE Sd (bias corrected)	12.94
		Approximate Chi Square Value (0.05)	649.1
Adjusted Level of Significance	0.0454	Adjusted Chi Square Value	647.4

Assuming Gamma Distribution

95% Approximate Gamma UCL	36.98	95% Adjusted Gamma UCL	37.08

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	0.00199	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.112	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.51	Mean of logged Data	3.45
Maximum of Logged Data	4.492	SD of logged Data	0.37

Assuming Lognormal Distribution

95% H-UCL	36.97	90% Chebyshev (MVUE) UCL	39.01
95% Chebyshev (MVUE) UCL	41.43	97.5% Chebyshev (MVUE) UCL	44.77
99% Chebyshev (MVUE) UCL	51.35		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	37.13	95% BCA Bootstrap UCL	37.96
95% Standard Bootstrap UCL	37.12	95% Bootstrap-t UCL	38.41
95% Hall's Bootstrap UCL	39.29	95% Percentile Bootstrap UCL	37.26
90% Chebyshev(Mean, Sd) UCL	39.87	95% Chebyshev(Mean, Sd) UCL	42.61
97.5% Chebyshev(Mean, Sd) UCL	46.42	99% Chebyshev(Mean, Sd) UCL	53.89

Suggested UCL to Use

95% Student's-t UCL	37.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Vanadium (black jack no. 2)

General Statistics

Total Number of Observations	63	Number of Distinct Observations	58
		Number of Missing Observations	21
Minimum	7	Mean	74.18
Maximum	978	Median	22.1
SD	157.5	Std. Error of Mean	19.85
Coefficient of Variation	2.124	Skewness	4.248

Normal GOF Test

Shapiro Wilk Test Statistic	0.433	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.351	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.129	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	107.3	95% Adjusted-CLT UCL (Chen-1995)	118.2
		95% Modified-t UCL (Johnson-1978)	109.1

Gamma GOF Test

A-D Test Statistic	8.131	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.794	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.311	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.117	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.726	k star (bias corrected MLE)	0.702
Theta hat (MLE)	102.1	Theta star (bias corrected MLE)	105.6
nu hat (MLE)	91.51	nu star (bias corrected)	88.49
MLE Mean (bias corrected)	74.18	MLE Sd (bias corrected)	88.52
		Approximate Chi Square Value (0.05)	67.8
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	67.38

Assuming Gamma Distribution

95% Approximate Gamma UCL	96.81	95% Adjusted Gamma UCL	97.42

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.807	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	5.577E-11	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.254	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.102	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.946	Mean of logged Data	3.479
Maximum of Logged Data	6.886	SD of logged Data	1.051

Assuming Lognormal Distribution

95% H-UCL	76.23	90% Chebyshev (MVUE) UCL	82.08
95% Chebyshev (MVUE) UCL	94.09	97.5% Chebyshev (MVUE) UCL	110.8
99% Chebyshev (MVUE) UCL	143.5		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	106.8	95% BCA Bootstrap UCL	122.6
95% Standard Bootstrap UCL	105.9	95% Bootstrap-t UCL	135.7
95% Hall's Bootstrap UCL	119.2	95% Percentile Bootstrap UCL	108.2
90% Chebyshev(Mean, Sd) UCL	133.7	95% Chebyshev(Mean, Sd) UCL	160.7
97.5% Chebyshev(Mean, Sd) UCL	198.1	99% Chebyshev(Mean, Sd) UCL	271.7

Suggested UCL to Use

95% Student's-t UCL 107.3

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Vanadium (mac no. 1)

General Statistics

Total Number of Observations	32	Number of Distinct Observations	32
		Number of Missing Observations	18
Minimum	6.1	Mean	131.7
Maximum	1560	Median	38.75
SD	308.9	Std. Error of Mean	54.6
Coefficient of Variation	2.345	Skewness	3.953

Normal GOF Test

Shapiro Wilk Test Statistic	0.417	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.904	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.395	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.18	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	224.3	95% Adjusted-CLT UCL (Chen-1995)	262.3
		95% Modified-t UCL (Johnson-1978)	230.7

Gamma GOF Test

A-D Test Statistic	3.057	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.803	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.248	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.163	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.585	k star (bias corrected MLE)	0.551
Theta hat (MLE)	225.3	Theta star (bias corrected MLE)	239.2
nu hat (MLE)	37.42	nu star (bias corrected)	35.24
MLE Mean (bias corrected)	131.7	MLE Sd (bias corrected)	177.5
		Approximate Chi Square Value (0.05)	22.66
Adjusted Level of Significance	0.0416	Adjusted Chi Square Value	22.12

Assuming Gamma Distribution

95% Approximate Gamma UCL	204.9	95% Adjusted Gamma UCL	209.9

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.134	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.142	Data appear Lognormal at 10% Significance Level	

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.808	Mean of logged Data	3.82
Maximum of Logged Data	7.352	SD of logged Data	1.247

Assuming Lognormal Distribution

95% H-UCL	183.4	90% Chebyshev (MVUE) UCL	171.7
95% Chebyshev (MVUE) UCL	206.3	97.5% Chebyshev (MVUE) UCL	254.4
99% Chebyshev (MVUE) UCL	348.7		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	221.5	95% BCA Bootstrap UCL	289.2
95% Standard Bootstrap UCL	222.1	95% Bootstrap-t UCL	550.6
95% Hall's Bootstrap UCL	586.7	95% Percentile Bootstrap UCL	231.5
90% Chebyshev(Mean, Sd) UCL	295.5	95% Chebyshev(Mean, Sd) UCL	369.7
97.5% Chebyshev(Mean, Sd) UCL	472.7	99% Chebyshev(Mean, Sd) UCL	675

Suggested UCL to Use

95% H-UCL	183.4

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Vanadium (mac no. 2)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	56
		Number of Missing Observations	21
Minimum	9.5	Mean	54.92
Maximum	425	Median	27.45
SD	74.25	Std. Error of Mean	9.749
Coefficient of Variation	1.352	Skewness	3.323

Normal GOF Test

Shapiro Wilk Test Statistic	0.577	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.285	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.134	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	71.23	95% Adjusted-CLT UCL (Chen-1995)	75.51
		95% Modified-t UCL (Johnson-1978)	71.93

Gamma GOF Test

A-D Test Statistic	3.984	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.774	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.22	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.12	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.235	k star (bias corrected MLE)	1.182
Theta hat (MLE)	44.49	Theta star (bias corrected MLE)	46.46
nu hat (MLE)	143.2	nu star (bias corrected)	137.1
MLE Mean (bias corrected)	54.92	MLE Sd (bias corrected)	50.51
		Approximate Chi Square Value (0.05)	111.1
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	110.5

Assuming Gamma Distribution

95% Approximate Gamma UCL	67.81	95% Adjusted Gamma UCL	68.17

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	6.3446E-5	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.173	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.106	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Attachment B - ProUCL Output

3. Subsurface Soil

Lognormal Statistics

Minimum of Logged Data	2.251	Mean of logged Data	3.549
Maximum of Logged Data	6.052	SD of logged Data	0.848

Assuming Lognormal Distribution

95% H-UCL	63.62	90% Chebyshev (MVUE) UCL	68.19
95% Chebyshev (MVUE) UCL	76.7	97.5% Chebyshev (MVUE) UCL	88.5
99% Chebyshev (MVUE) UCL	111.7		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	70.96	95% BCA Bootstrap UCL	76.2
95% Standard Bootstrap UCL	71	95% Bootstrap-t UCL	80.24
95% Hall's Bootstrap UCL	85.81	95% Percentile Bootstrap UCL	72.2
90% Chebyshev(Mean, Sd) UCL	84.17	95% Chebyshev(Mean, Sd) UCL	97.42
97.5% Chebyshev(Mean, Sd) UCL	115.8	99% Chebyshev(Mean, Sd) UCL	151.9

Suggested UCL to Use

95% Student's-t UCL 71.23

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Attachment B - ProUCL Output

4. Surface Soil

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.2 9/2/2022 4:07:33 PM
From File	M+BJ_risk_bkg_data.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Uranium (black jack no. 1)

General Statistics

Total Number of Observations	52	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	0.7	Mean	53.48
Maximum	650	Median	11.55
SD	117.5	Std. Error of Mean	16.3
Coefficient of Variation	2.197	Skewness	3.954

Normal GOF Test

Shapiro Wilk Test Statistic	0.484	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.327	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.141	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	80.78	95% Adjusted-CLT UCL (Chen-1995)	89.83
		95% Modified-t UCL (Johnson-1978)	82.27

Gamma GOF Test

A-D Test Statistic	1.813	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.833	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.139	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.425	k star (bias corrected MLE)	0.413
Theta hat (MLE)	126	Theta star (bias corrected MLE)	129.5
nu hat (MLE)	44.15	nu star (bias corrected)	42.94
MLE Mean (bias corrected)	53.48	MLE Sd (bias corrected)	83.23
		Approximate Chi Square Value (0.05)	28.92
Adjusted Level of Significance	0.0454	Adjusted Chi Square Value	28.59

Assuming Gamma Distribution

95% Approximate Gamma UCL	79.42	95% Adjusted Gamma UCL	80.33

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.0109	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.129	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.112	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.357	Mean of logged Data	2.444
Maximum of Logged Data	6.477	SD of logged Data	1.86

Assuming Lognormal Distribution

95% H-UCL	156.9	90% Chebyshev (MVUE) UCL	126.1
95% Chebyshev (MVUE) UCL	156.2	97.5% Chebyshev (MVUE) UCL	197.9
99% Chebyshev (MVUE) UCL	279.8		

Attachment B - ProUCL Output

4. Surface Soil

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	80.29	95% BCA Bootstrap UCL	95.06
95% Standard Bootstrap UCL	80.2	95% Bootstrap-t UCL	119.1
95% Hall's Bootstrap UCL	207.3	95% Percentile Bootstrap UCL	81.84
90% Chebyshev(Mean, Sd) UCL	102.4	95% Chebyshev(Mean, Sd) UCL	124.5
97.5% Chebyshev(Mean, Sd) UCL	155.3	99% Chebyshev(Mean, Sd) UCL	215.6

Suggested UCL to Use

95% Student's-t UCL 80.78

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Uranium (black jack no. 2)

General Statistics

Total Number of Observations	50	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	0.7	Mean	102
Maximum	1110	Median	16.75
SD	192.7	Std. Error of Mean	27.25
Coefficient of Variation	1.89	Skewness	3.494

Normal GOF Test

Shapiro Wilk Test Statistic	0.585	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.93	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.3	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.146	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	147.7	95% Adjusted-CLT UCL (Chen-1995)	161.2
		95% Modified-t UCL (Johnson-1978)	149.9

Gamma GOF Test

A-D Test Statistic	1.347	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.844	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.135	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.135	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.378	k star (bias corrected MLE)	0.368
Theta hat (MLE)	270	Theta star (bias corrected MLE)	276.8
nu hat (MLE)	37.77	nu star (bias corrected)	36.83
MLE Mean (bias corrected)	102	MLE Sd (bias corrected)	168
		Approximate Chi Square Value (0.05)	23.94
Adjusted Level of Significance	0.0452	Adjusted Chi Square Value	23.63

Assuming Gamma Distribution

95% Approximate Gamma UCL	156.9	95% Adjusted Gamma UCL	158.9

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.955	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.11	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.114	Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.357	Mean of logged Data	2.866
Maximum of Logged Data	7.012	SD of logged Data	2.182

Assuming Lognormal Distribution

95% H-UCL	636.5	90% Chebyshev (MVUE) UCL	392.9
95% Chebyshev (MVUE) UCL	496.3	97.5% Chebyshev (MVUE) UCL	639.9
99% Chebyshev (MVUE) UCL	921.9		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	146.8	95% BCA Bootstrap UCL	165.9
95% Standard Bootstrap UCL	146	95% Bootstrap-t UCL	179.7
95% Hall's Bootstrap UCL	236.9	95% Percentile Bootstrap UCL	149.5
90% Chebyshev(Mean, Sd) UCL	183.7	95% Chebyshev(Mean, Sd) UCL	220.7
97.5% Chebyshev(Mean, Sd) UCL	272.1	99% Chebyshev(Mean, Sd) UCL	373.1

Suggested UCL to Use
95% H-UCL 636.5

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Uranium (mac no. 1)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	40
		Number of Missing Observations	0
Minimum	0.83	Mean	106.4
Maximum	1590	Median	21.65
SD	270.3	Std. Error of Mean	42.74
Coefficient of Variation	2.541	Skewness	4.669

Normal GOF Test

Shapiro Wilk Test Statistic	0.414	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.919	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.348	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.162	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	178.4	95% Adjusted-CLT UCL (Chen-1995)	210.4
		95% Modified-t UCL (Johnson-1978)	183.6

Gamma GOF Test

A-D Test Statistic	1.929	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.826	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.185	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.149	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.441	k star (bias corrected MLE)	0.425
Theta hat (MLE)	240.9	Theta star (bias corrected MLE)	250.2
nu hat (MLE)	35.32	nu star (bias corrected)	34
MLE Mean (bias corrected)	106.4	MLE Sd (bias corrected)	163.1
		Approximate Chi Square Value (0.05)	21.67
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	21.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	166.9	95% Adjusted Gamma UCL	169.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.984	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.949	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.08	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.128	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.186	Mean of logged Data	3.2
Maximum of Logged Data	7.371	SD of logged Data	1.715

Assuming Lognormal Distribution

95% H-UCL	267.9	90% Chebyshev (MVUE) UCL	206.3
95% Chebyshev (MVUE) UCL	255.3	97.5% Chebyshev (MVUE) UCL	323.3
99% Chebyshev (MVUE) UCL	456.8		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	176.7	95% BCA Bootstrap UCL	222.2
95% Standard Bootstrap UCL	175.9	95% Bootstrap-t UCL	289.6
95% Hall's Bootstrap UCL	396	95% Percentile Bootstrap UCL	185.8
90% Chebyshev(Mean, Sd) UCL	234.6	95% Chebyshev(Mean, Sd) UCL	292.7
97.5% Chebyshev(Mean, Sd) UCL	373.3	99% Chebyshev(Mean, Sd) UCL	531.6

Suggested UCL to Use
95% H-UCL 267.9

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Uranium (mac no. 2)

General Statistics

Total Number of Observations	70	Number of Distinct Observations	55
		Number of Missing Observations	0
Minimum	0.6	Mean	29.24
Maximum	390	Median	4.15
SD	68.56	Std. Error of Mean	8.195
Coefficient of Variation	2.344	Skewness	4.234

Normal GOF Test

Shapiro Wilk Test Statistic	0.455	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.338	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.122	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Attachment B - ProUCL Output

4. Surface Soil

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	42.91	95% Adjusted-CLT UCL (Chen-1995)	47.15
		95% Modified-t UCL (Johnson-1978)	43.6

Gamma GOF Test

A-D Test Statistic	4.22	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.837	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.213	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.114	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.417	k star (bias corrected MLE)	0.409
Theta hat (MLE)	70.08	Theta star (bias corrected MLE)	71.52
nu hat (MLE)	58.42	nu star (bias corrected)	57.25
MLE Mean (bias corrected)	29.24	MLE Sd (bias corrected)	45.73
		Approximate Chi Square Value (0.05)	40.86
Adjusted Level of Significance	0.0466	Adjusted Chi Square Value	40.57

Assuming Gamma Distribution

95% Approximate Gamma UCL	40.98	95% Adjusted Gamma UCL	41.27

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	8.0378E-5	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.123	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.0969	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.511	Mean of logged Data	1.809
Maximum of Logged Data	5.966	SD of logged Data	1.737

Assuming Lognormal Distribution

95% H-UCL	47.32	90% Chebyshev (MVUE) UCL	49.75
95% Chebyshev (MVUE) UCL	60.41	97.5% Chebyshev (MVUE) UCL	75.2
99% Chebyshev (MVUE) UCL	104.2		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	42.72	95% BCA Bootstrap UCL	48.05
95% Standard Bootstrap UCL	42.68	95% Bootstrap-t UCL	56.28
95% Hall's Bootstrap UCL	107.6	95% Percentile Bootstrap UCL	43.38
90% Chebyshev(Mean, Sd) UCL	53.83	95% Chebyshev(Mean, Sd) UCL	64.96
97.5% Chebyshev(Mean, Sd) UCL	80.42	99% Chebyshev(Mean, Sd) UCL	110.8

Suggested UCL to Use

95% Student's-t UCL 42.91

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Attachment B - ProUCL Output

4. Surface Soil

Radium 226 (black jack no. 1)

General Statistics

Total Number of Observations	52	Number of Distinct Observations	39
		Number of Missing Observations	0
Minimum	1.4	Mean	18.03
Maximum	139	Median	3.2
SD	33.61	Std. Error of Mean	4.661
Coefficient of Variation	1.864	Skewness	2.596

Normal GOF Test

Shapiro Wilk Test Statistic	0.547	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.356	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.141	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	25.84	95% Adjusted-CLT UCL (Chen-1995)	27.49
		95% Modified-t UCL (Johnson-1978)	26.12

Gamma GOF Test

A-D Test Statistic	5.166	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.81	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.223	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.13	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.55	k star (bias corrected MLE)	0.531
Theta hat (MLE)	32.8	Theta star (bias corrected MLE)	33.97
nu hat (MLE)	57.18	nu star (bias corrected)	55.21
MLE Mean (bias corrected)	18.03	MLE Sd (bias corrected)	24.75
		Approximate Chi Square Value (0.05)	39.14
Adjusted Level of Significance	0.0454	Adjusted Chi Square Value	38.75

Assuming Gamma Distribution

95% Approximate Gamma UCL	25.44	95% Adjusted Gamma UCL	25.69

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.829	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	8.2000E-8	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.2	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.112	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.336	Mean of logged Data	1.754
Maximum of Logged Data	4.934	SD of logged Data	1.38

Assuming Lognormal Distribution

95% H-UCL	25.55	90% Chebyshev (MVUE) UCL	25.21
95% Chebyshev (MVUE) UCL	30.08	97.5% Chebyshev (MVUE) UCL	36.84
99% Chebyshev (MVUE) UCL	50.12		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	25.7	95% BCA Bootstrap UCL	27.85
95% Standard Bootstrap UCL	25.54	95% Bootstrap-t UCL	29.74
95% Hall's Bootstrap UCL	26.46	95% Percentile Bootstrap UCL	25.96
90% Chebyshev(Mean, Sd) UCL	32.02	95% Chebyshev(Mean, Sd) UCL	38.35
97.5% Chebyshev(Mean, Sd) UCL	47.14	99% Chebyshev(Mean, Sd) UCL	64.41

Attachment B - ProUCL Output

4. Surface Soil

Suggested UCL to Use

95% Student's-t UCL 25.84

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Radium 226 (black jack no. 2)

General Statistics

Total Number of Observations	50	Number of Distinct Observations	38
		Number of Missing Observations	0
Minimum	1.2	Mean	32.95
Maximum	376	Median	3.35
SD	68.19	Std. Error of Mean	9.644
Coefficient of Variation	2.069	Skewness	3.305

Normal GOF Test

Shapiro Wilk Test Statistic	0.543	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.93	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.335	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.146	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	49.12	95% Adjusted-CLT UCL (Chen-1995)	53.63
		95% Modified-t UCL (Johnson-1978)	49.87

Gamma GOF Test

A-D Test Statistic	4.809	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.837	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.269	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.134	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.405	k star (bias corrected MLE)	0.394
Theta hat (MLE)	81.31	Theta star (bias corrected MLE)	83.57
nu hat (MLE)	40.53	nu star (bias corrected)	39.43
MLE Mean (bias corrected)	32.95	MLE Sd (bias corrected)	52.48
		Approximate Chi Square Value (0.05)	26.05
Adjusted Level of Significance	0.0452	Adjusted Chi Square Value	25.72

Assuming Gamma Distribution

95% Approximate Gamma UCL	49.89	95% Adjusted Gamma UCL	50.52

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.822	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.955	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.205	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.114	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.182	Mean of logged Data	1.875
Maximum of Logged Data	5.93	SD of logged Data	1.749

Assuming Lognormal Distribution

95% H-UCL	68.11	90% Chebyshev (MVUE) UCL	57.04
95% Chebyshev (MVUE) UCL	70.19	97.5% Chebyshev (MVUE) UCL	88.45
99% Chebyshev (MVUE) UCL	124.3		

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	48.82	95% BCA Bootstrap UCL	53.64
95% Standard Bootstrap UCL	48.74	95% Bootstrap-t UCL	58.45
95% Hall's Bootstrap UCL	61.74	95% Percentile Bootstrap UCL	49.94
90% Chebyshev(Mean, Sd) UCL	61.89	95% Chebyshev(Mean, Sd) UCL	74.99
97.5% Chebyshev(Mean, Sd) UCL	93.18	99% Chebyshev(Mean, Sd) UCL	128.9

Suggested UCL to Use
95% Student's-t UCL 49.12

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Radium 226 (mac no. 1)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	36
		Number of Missing Observations	0
Minimum	1.2	Mean	40.42
Maximum	638	Median	4.25
SD	123.7	Std. Error of Mean	19.55
Coefficient of Variation	3.059	Skewness	4.257

Normal GOF Test

Shapiro Wilk Test Statistic	0.345	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.919	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.391	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.162	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	73.36	95% Adjusted-CLT UCL (Chen-1995)	86.64
		95% Modified-t UCL (Johnson-1978)	75.56

Gamma GOF Test

A-D Test Statistic	4.595	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.839	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.249	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.15	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.383	k star (bias corrected MLE)	0.371
Theta hat (MLE)	105.6	Theta star (bias corrected MLE)	109
nu hat (MLE)	30.62	nu star (bias corrected)	29.66
MLE Mean (bias corrected)	40.42	MLE Sd (bias corrected)	66.38
		Approximate Chi Square Value (0.05)	18.23
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	17.89

Assuming Gamma Distribution

95% Approximate Gamma UCL	65.78	95% Adjusted Gamma UCL	67.02

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.949	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.128	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.182	Mean of logged Data	1.968
Maximum of Logged Data	6.458	SD of logged Data	1.569

Assuming Lognormal Distribution

95% H-UCL	53.96	90% Chebyshev (MVUE) UCL	45.53
95% Chebyshev (MVUE) UCL	55.74	97.5% Chebyshev (MVUE) UCL	69.92
99% Chebyshev (MVUE) UCL	97.77		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	72.58	95% BCA Bootstrap UCL	92.8
95% Standard Bootstrap UCL	71.9	95% Bootstrap-t UCL	226.7
95% Hall's Bootstrap UCL	216.6	95% Percentile Bootstrap UCL	74.14
90% Chebyshev(Mean, Sd) UCL	99.08	95% Chebyshev(Mean, Sd) UCL	125.6
97.5% Chebyshev(Mean, Sd) UCL	162.5	99% Chebyshev(Mean, Sd) UCL	235

Suggested UCL to Use

95% Student's-t UCL	73.36

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Radium 226 (mac no. 2)

General Statistics

Total Number of Observations	70	Number of Distinct Observations	49
		Number of Missing Observations	0
Minimum	0.84	Mean	11.64
Maximum	226	Median	2.1
SD	33.74	Std. Error of Mean	4.033
Coefficient of Variation	2.898	Skewness	5.071

Normal GOF Test

Shapiro Wilk Test Statistic	0.348	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.122	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	18.36	95% Adjusted-CLT UCL (Chen-1995)	20.89
		95% Modified-t UCL (Johnson-1978)	18.77

Attachment B - ProUCL Output

4. Surface Soil

Gamma GOF Test

A-D Test Statistic	9.138	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.815	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.258	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.112	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.52	k star (bias corrected MLE)	0.507
Theta hat (MLE)	22.38	Theta star (bias corrected MLE)	22.95
nu hat (MLE)	72.81	nu star (bias corrected)	71.03
MLE Mean (bias corrected)	11.64	MLE Sd (bias corrected)	16.34
		Approximate Chi Square Value (0.05)	52.62
Adjusted Level of Significance	0.0466	Adjusted Chi Square Value	52.29

Assuming Gamma Distribution

95% Approximate Gamma UCL	15.71	95% Adjusted Gamma UCL	15.81

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.827	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	4.182E-11	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.187	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.0969	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.174	Mean of logged Data	1.241
Maximum of Logged Data	5.421	SD of logged Data	1.22

Assuming Lognormal Distribution

95% H-UCL	9.923	90% Chebyshev (MVUE) UCL	11.09
95% Chebyshev (MVUE) UCL	12.88	97.5% Chebyshev (MVUE) UCL	15.36
99% Chebyshev (MVUE) UCL	20.23		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	18.27	95% BCA Bootstrap UCL	22.24
95% Standard Bootstrap UCL	18.22	95% Bootstrap-t UCL	29.34
95% Hall's Bootstrap UCL	39.77	95% Percentile Bootstrap UCL	18.77
90% Chebyshev(Mean, Sd) UCL	23.74	95% Chebyshev(Mean, Sd) UCL	29.22
97.5% Chebyshev(Mean, Sd) UCL	36.82	99% Chebyshev(Mean, Sd) UCL	51.76

Suggested UCL to Use

95% Student's-t UCL	18.36

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Arsenic (black jack no. 1)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	27
		Number of Missing Observations	11
Minimum	1.5	Mean	7.88
Maximum	14.2	Median	8.1
SD	2.131	Std. Error of Mean	0.333
Coefficient of Variation	0.27	Skewness	-0.364

Attachment B - ProUCL Output

4. Surface Soil

Normal GOF Test

Shapiro Wilk Test Statistic	0.848	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.92	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.16	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8.441	95% Adjusted-CLT UCL (Chen-1995)	8.408
		95% Modified-t UCL (Johnson-1978)	8.438

Gamma GOF Test

A-D Test Statistic	3.922	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.25	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.138	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.173	k star (bias corrected MLE)	8.518
Theta hat (MLE)	0.859	Theta star (bias corrected MLE)	0.925
nu hat (MLE)	752.2	nu star (bias corrected)	698.4
MLE Mean (bias corrected)	7.88	MLE Sd (bias corrected)	2.7
		Approximate Chi Square Value (0.05)	638.1
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	636

Assuming Gamma Distribution

95% Approximate Gamma UCL	8.625	95% Adjusted Gamma UCL	8.654

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.645	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.95	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.28	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.126	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.405	Mean of logged Data	2.009
Maximum of Logged Data	2.653	SD of logged Data	0.395

Assuming Lognormal Distribution

95% H-UCL	9.032	90% Chebyshev (MVUE) UCL	9.575
95% Chebyshev (MVUE) UCL	10.27	97.5% Chebyshev (MVUE) UCL	11.23
99% Chebyshev (MVUE) UCL	13.13		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	8.428	95% BCA Bootstrap UCL	8.41
95% Standard Bootstrap UCL	8.422	95% Bootstrap-t UCL	8.431
95% Hall's Bootstrap UCL	8.496	95% Percentile Bootstrap UCL	8.412
90% Chebyshev(Mean, Sd) UCL	8.879	95% Chebyshev(Mean, Sd) UCL	9.331
97.5% Chebyshev(Mean, Sd) UCL	9.959	99% Chebyshev(Mean, Sd) UCL	11.19

Suggested UCL to Use

95% Student's-t UCL 8.441

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Attachment B - ProUCL Output

4. Surface Soil

Arsenic (black jack no. 2)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	31
		Number of Missing Observations	10
Minimum	2.6	Mean	5.325
Maximum	15.4	Median	4.45
SD	2.723	Std. Error of Mean	0.431
Coefficient of Variation	0.511	Skewness	2.163

Normal GOF Test

Shapiro Wilk Test Statistic	0.779	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.919	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.169	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.162	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.05	95% Adjusted-CLT UCL (Chen-1995)	6.191
		95% Modified-t UCL (Johnson-1978)	6.075

Gamma GOF Test

A-D Test Statistic	1.114	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.144	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.14	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.484	k star (bias corrected MLE)	5.09
Theta hat (MLE)	0.971	Theta star (bias corrected MLE)	1.046
nu hat (MLE)	438.8	nu star (bias corrected)	407.2
MLE Mean (bias corrected)	5.325	MLE Sd (bias corrected)	2.36
		Approximate Chi Square Value (0.05)	361.4
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	359.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	5.999	95% Adjusted Gamma UCL	6.026

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.949	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.121	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.128	Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.956	Mean of logged Data	1.578
Maximum of Logged Data	2.734	SD of logged Data	0.414

Assuming Lognormal Distribution

95% H-UCL	5.973	90% Chebyshev (MVUE) UCL	6.337
95% Chebyshev (MVUE) UCL	6.821	97.5% Chebyshev (MVUE) UCL	7.493
99% Chebyshev (MVUE) UCL	8.813		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	6.033	95% BCA Bootstrap UCL	6.2
95% Standard Bootstrap UCL	6.025	95% Bootstrap-t UCL	6.298
95% Hall's Bootstrap UCL	6.505	95% Percentile Bootstrap UCL	6.065
90% Chebyshev(Mean, Sd) UCL	6.617	95% Chebyshev(Mean, Sd) UCL	7.202
97.5% Chebyshev(Mean, Sd) UCL	8.014	99% Chebyshev(Mean, Sd) UCL	9.609

Attachment B - ProUCL Output

4. Surface Soil

Suggested UCL to Use

95% H-UCL 5.973

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Arsenic (mac no. 1)

General Statistics

Total Number of Observations	27	Number of Distinct Observations	19
		Number of Missing Observations	13
Minimum	1.6	Mean	4.4
Maximum	16.9	Median	3.1
SD	3.863	Std. Error of Mean	0.744
Coefficient of Variation	0.878	Skewness	2.456

Normal GOF Test

Shapiro Wilk Test Statistic	0.601	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.894	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.194	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.668	95% Adjusted-CLT UCL (Chen-1995)	5.999
		95% Modified-t UCL (Johnson-1978)	5.727

Gamma GOF Test

A-D Test Statistic	2.827	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.293	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.17	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.487	k star (bias corrected MLE)	2.235
Theta hat (MLE)	1.77	Theta star (bias corrected MLE)	1.969
nu hat (MLE)	134.3	nu star (bias corrected)	120.7
MLE Mean (bias corrected)	4.4	MLE Sd (bias corrected)	2.943
		Approximate Chi Square Value (0.05)	96.32
Adjusted Level of Significance	0.0401	Adjusted Chi Square Value	94.93

Assuming Gamma Distribution

95% Approximate Gamma UCL	5.513	95% Adjusted Gamma UCL	5.594

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.816	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.935	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.254	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.153	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.47	Mean of logged Data	1.267
Maximum of Logged Data	2.827	SD of logged Data	0.585

Assuming Lognormal Distribution

95% H-UCL	5.33	90% Chebyshev (MVUE) UCL	5.677
95% Chebyshev (MVUE) UCL	6.353	97.5% Chebyshev (MVUE) UCL	7.292
99% Chebyshev (MVUE) UCL	9.137		

Attachment B - ProUCL Output

4. Surface Soil

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	5.623	95% BCA Bootstrap UCL	5.963
95% Standard Bootstrap UCL	5.578	95% Bootstrap-t UCL	6.498
95% Hall's Bootstrap UCL	5.747	95% Percentile Bootstrap UCL	5.615
90% Chebyshev(Mean, Sd) UCL	6.631	95% Chebyshev(Mean, Sd) UCL	7.641
97.5% Chebyshev(Mean, Sd) UCL	9.043	99% Chebyshev(Mean, Sd) UCL	11.8

Suggested UCL to Use

95% Student's-t UCL 5.668

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Arsenic (mac no. 2)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	34
		Number of Missing Observations	15
Minimum	2	Mean	6.331
Maximum	10.4	Median	6.7
SD	1.858	Std. Error of Mean	0.251
Coefficient of Variation	0.294	Skewness	-0.196

Normal GOF Test

Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	0.427	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.0951	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.138	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.75	95% Adjusted-CLT UCL (Chen-1995)	6.736
		95% Modified-t UCL (Johnson-1978)	6.749

Gamma GOF Test

A-D Test Statistic	1.017	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.122	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.12	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.893	k star (bias corrected MLE)	9.366
Theta hat (MLE)	0.64	Theta star (bias corrected MLE)	0.676
nu hat (MLE)	1088	nu star (bias corrected)	1030
MLE Mean (bias corrected)	6.331	MLE Sd (bias corrected)	2.069
		Approximate Chi Square Value (0.05)	956.7
Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	954.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	6.817	95% Adjusted Gamma UCL	6.831

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	1.4261E-4	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.135	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.109	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.693	Mean of logged Data	1.794
Maximum of Logged Data	2.342	SD of logged Data	0.345

Assuming Lognormal Distribution

95% H-UCL	6.926	90% Chebyshev (MVUE) UCL	7.288
95% Chebyshev (MVUE) UCL	7.701	97.5% Chebyshev (MVUE) UCL	8.275
99% Chebyshev (MVUE) UCL	9.402		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	6.743	95% BCA Bootstrap UCL	6.72
95% Standard Bootstrap UCL	6.742	95% Bootstrap-t UCL	6.741
95% Hall's Bootstrap UCL	6.75	95% Percentile Bootstrap UCL	6.742
90% Chebyshev(Mean, Sd) UCL	7.083	95% Chebyshev(Mean, Sd) UCL	7.423
97.5% Chebyshev(Mean, Sd) UCL	7.896	99% Chebyshev(Mean, Sd) UCL	8.824

Suggested UCL to Use

95% Student's-t UCL	6.75

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Molybdenum (black jack no. 1)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	25
		Number of Missing Observations	11
Minimum	0.5	Mean	7.676
Maximum	105	Median	1.4
SD	21.54	Std. Error of Mean	3.364
Coefficient of Variation	2.806	Skewness	4.048

Normal GOF Test

Shapiro Wilk Test Statistic	0.353	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.92	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.401	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.16	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	13.34	95% Adjusted-CLT UCL (Chen-1995)	15.48
		95% Modified-t UCL (Johnson-1978)	13.69

Gamma GOF Test

A-D Test Statistic	6.861	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.816	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.325	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.146	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.488	k star (bias corrected MLE)	0.468
Theta hat (MLE)	15.73	Theta star (bias corrected MLE)	16.38
nu hat (MLE)	40.01	nu star (bias corrected)	38.42
MLE Mean (bias corrected)	7.676	MLE Sd (bias corrected)	11.21
		Approximate Chi Square Value (0.05)	25.22
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	24.83

Assuming Gamma Distribution

95% Approximate Gamma UCL	11.69	95% Adjusted Gamma UCL	11.88

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.773	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.95	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.267	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.126	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.693	Mean of logged Data	0.731
Maximum of Logged Data	4.654	SD of logged Data	1.235

Assuming Lognormal Distribution

95% H-UCL	7.439	90% Chebyshev (MVUE) UCL	7.4
95% Chebyshev (MVUE) UCL	8.796	97.5% Chebyshev (MVUE) UCL	10.73
99% Chebyshev (MVUE) UCL	14.54		

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	13.21	95% BCA Bootstrap UCL	16.3
95% Standard Bootstrap UCL	13.08	95% Bootstrap-t UCL	31.55
95% Hall's Bootstrap UCL	35.28	95% Percentile Bootstrap UCL	13.73
90% Chebyshev(Mean, Sd) UCL	17.77	95% Chebyshev(Mean, Sd) UCL	22.34
97.5% Chebyshev(Mean, Sd) UCL	28.68	99% Chebyshev(Mean, Sd) UCL	41.14

Suggested UCL to Use

95% Student's-t UCL	13.34

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Molybdenum (black jack no. 2)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	27
		Number of Missing Observations	10
Minimum	0.3	Mean	4.34
Maximum	39.1	Median	1.1
SD	8.478	Std. Error of Mean	1.341
Coefficient of Variation	1.954	Skewness	3.103

Normal GOF Test

Shapiro Wilk Test Statistic	0.511	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.919	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.342	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.162	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.599	95% Adjusted-CLT UCL (Chen-1995)	7.248
		95% Modified-t UCL (Johnson-1978)	6.708

Attachment B - ProUCL Output

4. Surface Soil

Gamma GOF Test

A-D Test Statistic	3.143	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.803	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.199	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.146	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.608	k star (bias corrected MLE)	0.579
Theta hat (MLE)	7.133	Theta star (bias corrected MLE)	7.49
nu hat (MLE)	48.67	nu star (bias corrected)	46.36
MLE Mean (bias corrected)	4.34	MLE Sd (bias corrected)	5.701
		Approximate Chi Square Value (0.05)	31.74
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	31.28

Assuming Gamma Distribution

95% Approximate Gamma UCL	6.34	95% Adjusted Gamma UCL	6.432

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.949	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.136	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.128	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.204	Mean of logged Data	0.454
Maximum of Logged Data	3.666	SD of logged Data	1.288

Assuming Lognormal Distribution

95% H-UCL	6.385	90% Chebyshev (MVUE) UCL	6.132
95% Chebyshev (MVUE) UCL	7.332	97.5% Chebyshev (MVUE) UCL	8.997
99% Chebyshev (MVUE) UCL	12.27		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	6.545	95% BCA Bootstrap UCL	7.37
95% Standard Bootstrap UCL	6.506	95% Bootstrap-t UCL	8.713
95% Hall's Bootstrap UCL	7.123	95% Percentile Bootstrap UCL	6.618
90% Chebyshev(Mean, Sd) UCL	8.362	95% Chebyshev(Mean, Sd) UCL	10.18
97.5% Chebyshev(Mean, Sd) UCL	12.71	99% Chebyshev(Mean, Sd) UCL	17.68

Suggested UCL to Use

95% Student's-t UCL	6.599

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Molybdenum (mac no. 1)

General Statistics

Total Number of Observations	27	Number of Distinct Observations	18
		Number of Missing Observations	13
Minimum	0.3	Mean	3.37
Maximum	29.2	Median	0.9
SD	6.244	Std. Error of Mean	1.202
Coefficient of Variation	1.853	Skewness	3.321

Attachment B - ProUCL Output

4. Surface Soil

Normal GOF Test

Shapiro Wilk Test Statistic	0.515	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.894	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.338	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.194	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.42	95% Adjusted-CLT UCL (Chen-1995)	6.167
		95% Modified-t UCL (Johnson-1978)	5.548

Gamma GOF Test

A-D Test Statistic	2.389	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.787	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.24	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.175	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.718	k star (bias corrected MLE)	0.663
Theta hat (MLE)	4.692	Theta star (bias corrected MLE)	5.081
nu hat (MLE)	38.79	nu star (bias corrected)	35.82
MLE Mean (bias corrected)	3.37	MLE Sd (bias corrected)	4.138
		Approximate Chi Square Value (0.05)	23.12
Adjusted Level of Significance	0.0401	Adjusted Chi Square Value	22.47

Assuming Gamma Distribution

95% Approximate Gamma UCL	5.221	95% Adjusted Gamma UCL	5.373

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.935	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.181	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.153	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.204	Mean of logged Data	0.377
Maximum of Logged Data	3.374	SD of logged Data	1.15

Assuming Lognormal Distribution

95% H-UCL	5.218	90% Chebyshev (MVUE) UCL	4.838
95% Chebyshev (MVUE) UCL	5.798	97.5% Chebyshev (MVUE) UCL	7.131
99% Chebyshev (MVUE) UCL	9.749		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	5.347	95% BCA Bootstrap UCL	6.311
95% Standard Bootstrap UCL	5.313	95% Bootstrap-t UCL	9.079
95% Hall's Bootstrap UCL	12.81	95% Percentile Bootstrap UCL	5.419
90% Chebyshev(Mean, Sd) UCL	6.975	95% Chebyshev(Mean, Sd) UCL	8.608
97.5% Chebyshev(Mean, Sd) UCL	10.87	99% Chebyshev(Mean, Sd) UCL	15.33

Suggested UCL to Use

95% Student's-t UCL 5.42

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Attachment B - ProUCL Output

4. Surface Soil

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Molybdenum (mac no. 2)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	22
		Number of Missing Observations	15
Minimum	0.2	Mean	1.151
Maximum	6	Median	0.6
SD	1.289	Std. Error of Mean	0.174
Coefficient of Variation	1.12	Skewness	2.414

Normal GOF Test

Shapiro Wilk Test Statistic	0.634	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	1.110E-16	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.286	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.138	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.442	95% Adjusted-CLT UCL (Chen-1995)	1.497
		95% Modified-t UCL (Johnson-1978)	1.451

Gamma GOF Test

A-D Test Statistic	3.829	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.768	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.212	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.122	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.495	k star (bias corrected MLE)	1.425
Theta hat (MLE)	0.77	Theta star (bias corrected MLE)	0.807
nu hat (MLE)	164.4	nu star (bias corrected)	156.8
MLE Mean (bias corrected)	1.151	MLE Sd (bias corrected)	0.964
		Approximate Chi Square Value (0.05)	128.9
Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	128.2

Assuming Gamma Distribution

95% Approximate Gamma UCL	1.401	95% Adjusted Gamma UCL	1.408

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	6.7175E-5	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.109	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.609	Mean of logged Data	-0.23
Maximum of Logged Data	1.792	SD of logged Data	0.781

Assuming Lognormal Distribution

95% H-UCL	1.348	90% Chebyshev (MVUE) UCL	1.448
95% Chebyshev (MVUE) UCL	1.619	97.5% Chebyshev (MVUE) UCL	1.856
99% Chebyshev (MVUE) UCL	2.323		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	1.437	95% BCA Bootstrap UCL	1.522
95% Standard Bootstrap UCL	1.435	95% Bootstrap-t UCL	1.532

95% Hall's Bootstrap UCL	1.471	95% Percentile Bootstrap UCL	1.449
90% Chebyshev(Mean, Sd) UCL	1.672	95% Chebyshev(Mean, Sd) UCL	1.909
97.5% Chebyshev(Mean, Sd) UCL	2.236	99% Chebyshev(Mean, Sd) UCL	2.88

Suggested UCL to Use

95% Student's-t UCL 1.442

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Selenium (black jack no. 1)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	22
		Number of Missing Observations	11
Minimum	0.3	Mean	12.21
Maximum	148	Median	1.2
SD	31.96	Std. Error of Mean	4.991
Coefficient of Variation	2.618	Skewness	3.527

Normal GOF Test

Shapiro Wilk Test Statistic	0.425	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.92	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.401	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.16	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	20.61	95% Adjusted-CLT UCL (Chen-1995)	23.36
		95% Modified-t UCL (Johnson-1978)	21.07

Gamma GOF Test

A-D Test Statistic	5.431	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.846	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.328	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.149	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.354	k star (bias corrected MLE)	0.344
Theta hat (MLE)	34.53	Theta star (bias corrected MLE)	35.49
nu hat (MLE)	29	nu star (bias corrected)	28.21
MLE Mean (bias corrected)	12.21	MLE Sd (bias corrected)	20.82
		Approximate Chi Square Value (0.05)	17.09
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	16.77

Assuming Gamma Distribution

95% Approximate Gamma UCL	20.15	95% Adjusted Gamma UCL	20.53

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.815	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.95	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.211	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.126	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Attachment B - ProUCL Output

4. Surface Soil

Lognormal Statistics

Minimum of Logged Data	-1.204	Mean of logged Data	0.604
Maximum of Logged Data	4.997	SD of logged Data	1.714

Assuming Lognormal Distribution

95% H-UCL	19.16	90% Chebyshev (MVUE) UCL	15.33
95% Chebyshev (MVUE) UCL	18.96	97.5% Chebyshev (MVUE) UCL	23.99
99% Chebyshev (MVUE) UCL	33.87		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	20.42	95% BCA Bootstrap UCL	23.68
95% Standard Bootstrap UCL	20.23	95% Bootstrap-t UCL	32.43
95% Hall's Bootstrap UCL	31.92	95% Percentile Bootstrap UCL	21.15
90% Chebyshev(Mean, Sd) UCL	27.18	95% Chebyshev(Mean, Sd) UCL	33.97
97.5% Chebyshev(Mean, Sd) UCL	43.38	99% Chebyshev(Mean, Sd) UCL	61.87

Suggested UCL to Use

95% Student's-t UCL 20.61

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Selenium (black jack no. 2)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	25
		Number of Missing Observations	10
Minimum	0.1	Mean	12.02
Maximum	124	Median	0.7
SD	25.2	Std. Error of Mean	3.985
Coefficient of Variation	2.097	Skewness	3.071

Normal GOF Test

Shapiro Wilk Test Statistic	0.549	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.919	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.335	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.162	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	18.73	95% Adjusted-CLT UCL (Chen-1995)	20.64
		95% Modified-t UCL (Johnson-1978)	19.05

Gamma GOF Test

A-D Test Statistic	3.493	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.85	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.28	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.151	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.336	k star (bias corrected MLE)	0.327
Theta hat (MLE)	35.82	Theta star (bias corrected MLE)	36.75
nu hat (MLE)	26.84	nu star (bias corrected)	26.16
MLE Mean (bias corrected)	12.02	MLE Sd (bias corrected)	21.01

		Approximate Chi Square Value (0.05)	15.5
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	15.2

Assuming Gamma Distribution

95% Approximate Gamma UCL	20.28	95% Adjusted Gamma UCL	20.69

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.949	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.128	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.303	Mean of logged Data	0.468
Maximum of Logged Data	4.82	SD of logged Data	2.068

Assuming Lognormal Distribution

95% H-UCL	48.97	90% Chebyshev (MVUE) UCL	28.04
95% Chebyshev (MVUE) UCL	35.44	97.5% Chebyshev (MVUE) UCL	45.72
99% Chebyshev (MVUE) UCL	65.9		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	18.57	95% BCA Bootstrap UCL	20.93
95% Standard Bootstrap UCL	18.44	95% Bootstrap-t UCL	23.89
95% Hall's Bootstrap UCL	25.69	95% Percentile Bootstrap UCL	18.87
90% Chebyshev(Mean, Sd) UCL	23.97	95% Chebyshev(Mean, Sd) UCL	29.39
97.5% Chebyshev(Mean, Sd) UCL	36.9	99% Chebyshev(Mean, Sd) UCL	51.66

Suggested UCL to Use

95% Student's-t UCL	18.73

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Selenium (mac no. 1)

General Statistics

Total Number of Observations	27	Number of Distinct Observations	22
		Number of Missing Observations	13
Minimum	0.1	Mean	5.152
Maximum	44.9	Median	1.9
SD	9.478	Std. Error of Mean	1.824
Coefficient of Variation	1.84	Skewness	3.371

Normal GOF Test

Shapiro Wilk Test Statistic	0.539	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.894	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.358	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.194	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8.263	95% Adjusted-CLT UCL (Chen-1995)	9.416
		95% Modified-t UCL (Johnson-1978)	8.46

Gamma GOF Test

A-D Test Statistic	0.911	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.798	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.192	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.177	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.599	k star (bias corrected MLE)	0.557
Theta hat (MLE)	8.606	Theta star (bias corrected MLE)	9.253
nu hat (MLE)	32.33	nu star (bias corrected)	30.07
MLE Mean (bias corrected)	5.152	MLE Sd (bias corrected)	6.904
		Approximate Chi Square Value (0.05)	18.55
Adjusted Level of Significance	0.0401	Adjusted Chi Square Value	17.97

Assuming Gamma Distribution

95% Approximate Gamma UCL	8.352	95% Adjusted Gamma UCL	8.622

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.935	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.102	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.153	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.303	Mean of logged Data	0.607
Maximum of Logged Data	3.804	SD of logged Data	1.485

Assuming Lognormal Distribution

95% H-UCL	14.08	90% Chebyshev (MVUE) UCL	10.56
95% Chebyshev (MVUE) UCL	13.02	97.5% Chebyshev (MVUE) UCL	16.45
99% Chebyshev (MVUE) UCL	23.17		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	8.152	95% BCA Bootstrap UCL	9.896
95% Standard Bootstrap UCL	8.07	95% Bootstrap-t UCL	12.82
95% Hall's Bootstrap UCL	19.92	95% Percentile Bootstrap UCL	8.189
90% Chebyshev(Mean, Sd) UCL	10.62	95% Chebyshev(Mean, Sd) UCL	13.1
97.5% Chebyshev(Mean, Sd) UCL	16.54	99% Chebyshev(Mean, Sd) UCL	23.3

Suggested UCL to Use

95% H-UCL 14.08

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Selenium (mac no. 2)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	23
		Number of Missing Observations	15
Minimum	0.1	Mean	1.944
Maximum	32.8	Median	0.3
SD	5.03	Std. Error of Mean	0.678
Coefficient of Variation	2.588	Skewness	4.816

Normal GOF Test

Shapiro Wilk Test Statistic	0.414	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.357	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.138	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.079	95% Adjusted-CLT UCL (Chen-1995)	3.53
		95% Modified-t UCL (Johnson-1978)	3.152

Gamma GOF Test

A-D Test Statistic	5.659	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.823	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.268	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.127	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.465	k star (bias corrected MLE)	0.452
Theta hat (MLE)	4.177	Theta star (bias corrected MLE)	4.3
nu hat (MLE)	51.18	nu star (bias corrected)	49.72
MLE Mean (bias corrected)	1.944	MLE Sd (bias corrected)	2.891
		Approximate Chi Square Value (0.05)	34.53
Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	34.19

Assuming Gamma Distribution

95% Approximate Gamma UCL	2.799	95% Adjusted Gamma UCL	2.826

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	1.1473E-6	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.213	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.109	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.303	Mean of logged Data	-0.716
Maximum of Logged Data	3.49	SD of logged Data	1.452

Assuming Lognormal Distribution

95% H-UCL	2.517	90% Chebyshev (MVUE) UCL	2.4
95% Chebyshev (MVUE) UCL	2.875	97.5% Chebyshev (MVUE) UCL	3.534
99% Chebyshev (MVUE) UCL	4.829		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	3.059	95% BCA Bootstrap UCL	3.764
95% Standard Bootstrap UCL	3.034	95% Bootstrap-t UCL	4.309
95% Hall's Bootstrap UCL	6.823	95% Percentile Bootstrap UCL	3.145
90% Chebyshev(Mean, Sd) UCL	3.978	95% Chebyshev(Mean, Sd) UCL	4.9
97.5% Chebyshev(Mean, Sd) UCL	6.179	99% Chebyshev(Mean, Sd) UCL	8.692

Suggested UCL to Use

95% Student's-t UCL 3.079

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Attachment B - ProUCL Output

4. Surface Soil

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Vanadium (black jack no. 1)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	39
		Number of Missing Observations	11
Minimum	12.3	Mean	35.59
Maximum	89.3	Median	33.9
SD	15.57	Std. Error of Mean	2.432
Coefficient of Variation	0.438	Skewness	2.222

Normal GOF Test

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.92	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.252	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.16	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	39.68	95% Adjusted-CLT UCL (Chen-1995)	40.49
		95% Modified-t UCL (Johnson-1978)	39.82

Gamma GOF Test

A-D Test Statistic	1.824	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.193	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.138	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.967	k star (bias corrected MLE)	6.474
Theta hat (MLE)	5.108	Theta star (bias corrected MLE)	5.497
nu hat (MLE)	571.3	nu star (bias corrected)	530.8
MLE Mean (bias corrected)	35.59	MLE Sd (bias corrected)	13.99
		Approximate Chi Square Value (0.05)	478.4
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	476.6

Assuming Gamma Distribution

95% Approximate Gamma UCL	39.49	95% Adjusted Gamma UCL	39.64

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.95	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.172	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.126	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.51	Mean of logged Data	3.499
Maximum of Logged Data	4.492	SD of logged Data	0.378

Assuming Lognormal Distribution

95% H-UCL	39.6	90% Chebyshev (MVUE) UCL	41.91
95% Chebyshev (MVUE) UCL	44.84	97.5% Chebyshev (MVUE) UCL	48.9
99% Chebyshev (MVUE) UCL	56.88		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	39.59	95% BCA Bootstrap UCL	40.44
95% Standard Bootstrap UCL	39.49	95% Bootstrap-t UCL	41.26

95% Hall's Bootstrap UCL	42.42	95% Percentile Bootstrap UCL	39.55
90% Chebyshev(Mean, Sd) UCL	42.88	95% Chebyshev(Mean, Sd) UCL	46.19
97.5% Chebyshev(Mean, Sd) UCL	50.78	99% Chebyshev(Mean, Sd) UCL	59.79

Suggested UCL to Use

95% Student's-t UCL 39.68

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Vanadium (black jack no. 2)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	37
		Number of Missing Observations	10
Minimum	13.3	Mean	101.3
Maximum	978	Median	24.6
SD	192.1	Std. Error of Mean	30.38
Coefficient of Variation	1.896	Skewness	3.359

Normal GOF Test

Shapiro Wilk Test Statistic	0.505	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.919	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.162	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	152.5	95% Adjusted-CLT UCL (Chen-1995)	168.5
		95% Modified-t UCL (Johnson-1978)	155.2

Gamma GOF Test

A-D Test Statistic	4.603	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.795	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.304	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.146	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.688	k star (bias corrected MLE)	0.653
Theta hat (MLE)	147.3	Theta star (bias corrected MLE)	155.2
nu hat (MLE)	55.02	nu star (bias corrected)	52.23
MLE Mean (bias corrected)	101.3	MLE Sd (bias corrected)	125.4
		Approximate Chi Square Value (0.05)	36.63
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	36.14

Assuming Gamma Distribution

95% Approximate Gamma UCL	144.5	95% Adjusted Gamma UCL	146.4

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.804	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.949	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.242	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.128	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.588	Mean of logged Data	3.737
Maximum of Logged Data	6.886	SD of logged Data	1.155

Assuming Lognormal Distribution

95% H-UCL	132.2	90% Chebyshev (MVUE) UCL	132.4
95% Chebyshev (MVUE) UCL	156.3	97.5% Chebyshev (MVUE) UCL	189.5

99% Chebyshev (MVUE) UCL	254.6

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	151.3	95% BCA Bootstrap UCL	170.2
95% Standard Bootstrap UCL	150	95% Bootstrap-t UCL	201
95% Hall's Bootstrap UCL	168.1	95% Percentile Bootstrap UCL	152.2
90% Chebyshev(Mean, Sd) UCL	192.5	95% Chebyshev(Mean, Sd) UCL	233.7
97.5% Chebyshev(Mean, Sd) UCL	291	99% Chebyshev(Mean, Sd) UCL	403.6

Suggested UCL to Use

95% Student's-t UCL	152.5

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Vanadium (mac no. 1)

General Statistics

Total Number of Observations	27	Number of Distinct Observations	27
		Number of Missing Observations	13
Minimum	6.1	Mean	140.6
Maximum	1560	Median	35.7
SD	334.6	Std. Error of Mean	64.4
Coefficient of Variation	2.38	Skewness	3.67

Normal GOF Test

Shapiro Wilk Test Statistic	0.419	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.894	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.418	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.194	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	250.4	95% Adjusted-CLT UCL (Chen-1995)	295.1
		95% Modified-t UCL (Johnson-1978)	258

Gamma GOF Test

A-D Test Statistic	2.995	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.803	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.271	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.177	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.544	k star (bias corrected MLE)	0.508
Theta hat (MLE)	258.5	Theta star (bias corrected MLE)	276.7
nu hat (MLE)	29.36	nu star (bias corrected)	27.43
MLE Mean (bias corrected)	140.6	MLE Sd (bias corrected)	197.2
		Approximate Chi Square Value (0.05)	16.49
Adjusted Level of Significance	0.0401	Adjusted Chi Square Value	15.95

Assuming Gamma Distribution

95% Approximate Gamma UCL	233.9	95% Adjusted Gamma UCL	241.9

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.893	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.935	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.154	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.153	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.808	Mean of logged Data	3.793
Maximum of Logged Data	7.352	SD of logged Data	1.291

Assuming Lognormal Distribution

95% H-UCL	214	90% Chebyshev (MVUE) UCL	183.9
95% Chebyshev (MVUE) UCL	223.3	97.5% Chebyshev (MVUE) UCL	278.1
99% Chebyshev (MVUE) UCL	385.5		

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	246.5	95% BCA Bootstrap UCL	306.5
95% Standard Bootstrap UCL	243.8	95% Bootstrap-t UCL	720.1
95% Hall's Bootstrap UCL	736.4	95% Percentile Bootstrap UCL	251.5
90% Chebyshev(Mean, Sd) UCL	333.8	95% Chebyshev(Mean, Sd) UCL	421.3
97.5% Chebyshev(Mean, Sd) UCL	542.7	99% Chebyshev(Mean, Sd) UCL	781.3

Suggested UCL to Use

95% Student's-t UCL	250.4

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Vanadium (mac no. 2)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	53
		Number of Missing Observations	15
Minimum	9.5	Mean	53.48
Maximum	425	Median	27.2
SD	74.5	Std. Error of Mean	10.05
Coefficient of Variation	1.393	Skewness	3.476

Normal GOF Test

Shapiro Wilk Test Statistic	0.552	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.297	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.138	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	70.29	95% Adjusted-CLT UCL (Chen-1995)	75.03
		95% Modified-t UCL (Johnson-1978)	71.07

Gamma GOF Test

A-D Test Statistic	4.093	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.774	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.227	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.123	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Attachment B - ProUCL Output

4. Surface Soil

Gamma Statistics

k hat (MLE)	1.242	k star (bias corrected MLE)	1.187
Theta hat (MLE)	43.05	Theta star (bias corrected MLE)	45.06
nu hat (MLE)	136.7	nu star (bias corrected)	130.5
MLE Mean (bias corrected)	53.48	MLE Sd (bias corrected)	49.09
		Approximate Chi Square Value (0.05)	105.1
Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	104.5

Assuming Gamma Distribution

95% Approximate Gamma UCL	66.39	95% Adjusted Gamma UCL	66.78

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	4.9443E-5	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.178	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.109	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.251	Mean of logged Data	3.526
Maximum of Logged Data	6.052	SD of logged Data	0.833

Assuming Lognormal Distribution

95% H-UCL	61.31	90% Chebyshev (MVUE) UCL	65.8
95% Chebyshev (MVUE) UCL	74.02	97.5% Chebyshev (MVUE) UCL	85.44
99% Chebyshev (MVUE) UCL	107.9		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	70	95% BCA Bootstrap UCL	77.68
95% Standard Bootstrap UCL	70.03	95% Bootstrap-t UCL	81.01
95% Hall's Bootstrap UCL	89.36	95% Percentile Bootstrap UCL	71.22
90% Chebyshev(Mean, Sd) UCL	83.61	95% Chebyshev(Mean, Sd) UCL	97.26
97.5% Chebyshev(Mean, Sd) UCL	116.2	99% Chebyshev(Mean, Sd) UCL	153.4

Suggested UCL to Use

95% Student's-t UCL	70.29

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ATTACHMENT C REFINED ECOLOGICAL RISK ASSESSMENT CALCULATION SHEETS



Attachment C - Ecological Hazard Estimate Calculation

1 - Hazard Estimate Calculation for a Sagebrush Sparrow Exposed to Surface Soil at the Mines

Site Analyte	Soil EPC (mg/kg)	Soil to Biota Uptake Model [a] Invertebrate	Invertebrate EPC (mg/kg)	Ingestion Dose [b] (mg/kg-d)	TRV [a] (mg/kg-d)	Hazard Quotient (unitless)
Black Jack No. 1						
Molybdenum	13	1	13	3.4	35	0.095
Selenium	21	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	8.5	2.4	0.82	3.0
Vanadium	40	Cinvert = 0.042 * Csoil	1.7	1.3	1.7	0.78
Black Jack No. 2						
Molybdenum	6.6	1	6.6	1.7	35	0.047
Selenium	19	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	7.9	2.3	0.82	2.8
Vanadium	153	Cinvert = 0.042 * Csoil	6.4	5.1	1.7	3.0
Mac No. 1						
Molybdenum	5.4	1	5.4	1.4	35	0.039
Selenium	14	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	6.4	1.8	0.82	2.2
Vanadium	250	Cinvert = 0.042 * Csoil	11	8.3	1.7	4.9
Mac No. 2						
Molybdenum	1.4	1	1.4	0.36	35	0.010
Selenium	3.1	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	2.1	0.56	0.82	0.68
Vanadium	70	Cinvert = 0.042 * Csoil	3.0	2.3	1.7	1.4

Notes:

[a] Soil to biota uptake models and TRVs are presented in Tables 3-5 and 3-6, respectively.

[b] Ingestion dose is calculated according to the model in Section 3.4.2.2 of text, using exposure parameters presented in Table 3-4.

C_{invert} - concentration in invertebrate

C_{soil} - concentration in soil

EPC - exposure point concentration

mg/kg - milligrams per kilogram

mg/kg-d - milligrams per kilogram per day

TRV - toxicity reference value

Attachment C - Ecological Hazard Estimate Calculation

2 - Hazard Estimate Calculation for a Merriam's Shrew Exposed to Surface Soil at the Mines

Site Analyte	Soil EPC (mg/kg)	Soil to Biota Uptake Model [a] Invertebrate	Invertebrate EPC (mg/kg)	Ingestion Dose [b] (mg/kg-d)	TRV [a] (mg/kg-d)	Hazard Quotient (unitless)
Black Jack No. 1						
Molybdenum	13	1	13	2.8	2.6	1.1
Selenium	21	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	8.5	1.8	0.66	2.8
Vanadium	40	Cinvert = 0.042 * Csoil	1.7	0.50	9.4	0.053
Black Jack No. 2						
Molybdenum	6.6	1	6.6	1.4	2.6	0.53
Selenium	19	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	7.9	1.7	0.66	2.6
Vanadium	153	Cinvert = 0.042 * Csoil	6.4	1.9	9.4	0.20
Mac No. 1						
Molybdenum	5.4	1	5.4	1.1	2.6	0.43
Selenium	14	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	6.4	1.4	0.66	2.1
Vanadium	250	Cinvert = 0.042 * Csoil	11	3.2	9.4	0.34
Mac No. 2						
Molybdenum	1.4	1	1.4	0.30	2.6	0.12
Selenium	3.1	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	2.1	0.45	0.66	0.67
Vanadium	70	Cinvert = 0.042 * Csoil	3.0	0.89	9.4	0.094

Notes:

[a] Soil to biota uptake models and TRVs are presented in Tables 3-5 and 3-6, respectively.

[b] Ingestion dose is calculated according to the model in Section 3.4.2.2 of text, using exposure parameters presented in Table 3-4.

C_{invert} - concentration in invertebrate

C_{soil} - concentration in soil

EPC - exposure point concentration

mg/kg - milligrams per kilogram

mg/kg-d - milligrams per kilogram per day

TRV - toxicity reference value

Attachment C - Ecological Hazard Estimate Calculation

3 - Hazard Estimate Calculation for a Sagebrush Sparrow Exposed to Surface Soil at Background Areas

Background Area Analyte	Soil EPC (mg/kg)	Soil to Biota Uptake Model [a] Invertebrate	Invertebrate EPC (mg/kg)	Ingestion Dose [b] (mg/kg-d)	TRV [a] (mg/kg-d)	Hazard Quotient (unitless)
Background Area 1						
Molybdenum	0.43	1	0.43	0.11	35	0.0031
Selenium	0.72	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	0.73	0.18	0.82	0.22
Vanadium	22	Cinvert = 0.042 * Csoil	0.94	0.75	1.7	0.44
Background Area 2						
Molybdenum	0.37	1	0.37	0.093	35	0.0026
Selenium	0.42	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	0.49	0.12	0.82	0.15
Vanadium	15	Cinvert = 0.042 * Csoil	0.65	0.51	1.7	0.30

Notes:

[a] Soil to biota uptake models and TRVs are presented in Tables 3-5 and 3-6, respectively.

[b] Ingestion dose is calculated according to the model in Section 3.4.2.2 of text, using exposure parameters presented in Table 3-4.

C_{invert} - concentration in invertebrate

C_{soil} - concentration in soil

EPC - exposure point concentration

mg/kg - milligrams per kilogram

mg/kg-d - milligrams per kilogram per day

TRV - toxicity reference value

Attachment C - Ecological Hazard Estimate Calculation

4 - Hazard Estimate Calculation for Merriam's Shrew Exposed to Surface Soil at Background Areas

Background Area Analyte	Soil EPC (mg/kg)	Soil to Biota Uptake Model [a] Invertebrate	Invertebrate EPC (mg/kg)	Ingestion Dose [b] (mg/kg-d)	TRV [a] (mg/kg-d)	Hazard Quotient (unitless)
Background Area 1						
Molybdenum	0.43	1	0.43	0.091	2.6	0.035
Selenium	0.72	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	0.73	0.15	0.66	0.23
Vanadium	22	Cinvert = 0.042 * Csoil	0.94	0.28	9.4	0.030
Background Area 2						
Molybdenum	0.37	1	0.37	0.077	2.6	0.030
Selenium	0.42	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	0.49	0.10	0.66	0.15
Vanadium	15	Cinvert = 0.042 * Csoil	0.65	0.20	9.4	0.021

Notes:

[a] Soil to biota uptake models and TRVs are presented in Tables 3-5 and 3-6, respectively.

[b] Ingestion dose is calculated according to the model in Section 3.4.2.2 of text, using exposure parameters presented in Table 3-4.

C_{invert} - concentration in invertebrate

C_{soil} - concentration in soil

EPC - exposure point concentration

mg/kg - milligrams per kilogram

mg/kg-d - milligrams per kilogram per day

TRV - toxicity reference value

Attachment C - Ecological Risk-Based Screening Level Calculation

5 - Refined Ecological Soil PRG Calculation

Receptor Analyte	TRV [a] (mg/kg-d)	Soil to Biota Uptake Model [a] Invertebrate	Invertebrate EPC [b] (mg/kg)	Ecological Soil PRG [c] (mg/kg)
Sagebrush Sparrow				
Molybdenum	35.3	1	140	140
Selenium	0.82	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	3.1	5.1
Vanadium	1.7	Cinvert = 0.042 * Csoil	2.1	51
Merriam's Shrew				
Molybdenum	2.6	1	12	12
Selenium	0.66	Cinvert = exp[-0.075 + 0.733 * LN (Csoil)]	3.1	5.2
Vanadium	9.4	Cinvert = 0.042 * Csoil	31	744

Notes:

[a] Soil to biota uptake models and TRVs are presented in Tables 3-5 and 3-6, respectively.

[b] Invertebrate EPC calculated from the ecological soil PRG using the soil to biota uptake model presented here.

[c] Ecological soil PRG calculated for a target ecological hazard quotient (HQ) of 1 using the equation provided in Section 3.7.

C_{invert} - concentration in invertebrate

C_{soil} - concentration in soil

EPC - exposure point concentration

mg/kg - milligrams per kilogram

mg/kg-d - milligrams per kilogram per day

PRG - preliminary remediation goal

TRV - toxicity reference value

APPENDIX D
LIST OF ARARS

JANUARY 27, 2023
Attachment D to the EE/CA for the Mac and Black Jack Sites

Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC) Materials for Engineering Evaluation/Cost Analysis (EE/CA)

Introduction to ARARs and TBC Tables

Tables A-1 and A-2 below list the federal and Navajo location- and action-specific ARARs and TBC materials, respectively, that have been identified for all the alternative response actions described in the draft EE/CA for the Mac No. 1, Mac No. 2, Black Jack No. 1, and Black Jack No. 2 Sites (Sites). EPA did not identify chemical specific ARARs or TBCs because potential chemical-specific ARARs were not as conservative as the risk based cleanup standards developed for this action. Chemical related requirements tied to an action such as cap design were included in the action-specific table. Following Tables A-1 and A-2 is a list of federal and Navajo ARARs that must be attained if certain conditions are present at the Site. Identification and evaluation of ARARs is an iterative process that continues throughout the response process. As a better understanding is gained of Site conditions, contaminants, and response alternatives, the lists of ARARs, TBCs and their relevance to the removal action may change. ARARs and TBCs are finalized in the Action Memo for the selected response action.

Cleanup standards were derived through the EPA risk assessment process, in accordance with the following EPA guidance.

Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-18, Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination (August 1997).

Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-23, Clarification of the Role of Applicable, or Relevant and Appropriate Requirements in Establishing Preliminary Remediation Goals under CERCLA (August 1997).

Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-25, Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites (February 1998).

Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-40, Radiation Risk Assessment at CERCLA Sites: Q&A (May 2014).

The following Navajo Nation laws, regulations and guidances are not considered ARARs or TBCs for the response actions anticipated by this EE/CA; however, they are listed here because situations may arise during implementation of the alternatives discussed in the EE/CA, or during future actions at the Site, where these requirements may be applicable.

Navajo Nation CERCLA, 4 N.N.C. §§2101-2805 – The NNCERCLA requirements must be complied with during implementation of the response action if petroleum contamination is discovered at the Site, because NNCERCLA § 2104.Q includes petroleum in the definition of hazardous substance. Based on Site investigations thus far, petroleum contamination is not anticipated.

Navajo Nation Underground and Aboveground Storage Tank Act of 2012, 4 N.N.C. §§ 1501-1577 (NNSTA) – If any permanent storage tanks are found at a site, including both USTs and ASTs and tanks holding not only petroleum but any hazardous substances, NNSTA §1542(C)(1) requires their removal. (The guidance for temporary/mobile storage tanks brought on site is included in Table A-2 below as a TBC because that situation is anticipated to arise.)

Navajo Nation Business Opportunity Act, 5 N.N.C. §§201-214, and the Navajo Preference in Employment Act, 15 N.N.C §§ 601-619 – While these are not environmental regulations and therefore, not ARARs, these regulations give preference to Navajo Nation businesses and individuals when hiring employees and contractors to perform the response actions contemplated by this EE/CA.

Navajo Nation Dine Radioactive Materials Transportation Act, 18 N.N.C. §§1304-1307 ("RMTA") – The RMTA is not applicable to onsite activities; however, its requirements may be applicable to transportation on public roads on the Navajo Nation between sites that are subject to a combined action pursuant to CERCLA § 104(d)(4), as well as for shipment of radioactive materials through the Navajo Nation generally. RMTA § 1307 includes specific requirements that are not found in federal law, including advance notice of the transportation of radioactive and related substances, equipment, vehicles, persons, and materials over and across Navajo Nation lands, as well as license fees, bonding requirements, route restrictions and curfews.

The EE/CAs for which the ARARs tables were prepared do not address groundwater, and therefore ARARs for groundwater are not included. If any groundwater contamination is found at the Site, the related ARARs for the Site will be addressed at that time.

Table A-1 Location-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Prerequisites, Status and Rationale**
Cultural Resources	FEDERAL **The Native American Graves Protection and Repatriation Act 25 USC §§ 3002(c) and (d)** 43 CFR §§ 10.3(b)-(c) and 10.4(b)-(e)	Protects Native American cultural items from unpermitted removal and excavation and requires the protection of such items in the event of inadvertent discovery. Excavation or removal of cultural items must be done under procedures required by this Act and the Archaeological Resources Protection Act (Sec. 3 (c)(1)).	**Applicable** Substantive requirements are applicable if cultural items (meaning human remains and associated or unassociated funerary objects, sacred objects, or cultural patrimony), are inadvertently discovered or are intentionally excavated or removed within area to be disturbed. If cultural items are discovered, on-going activity in the area of discovery must stop, the relevant Indian tribe official must be notified immediately, and reasonable effort must be made to protect such cultural items.
Cultural Resources	FEDERAL **National Historic Preservation Act 54 USC §§ 306101(a), 306102, 306107, and 306108** 36 CFR §§ 800.3(a) and (c); 800.4(a)-(c); 800.5(a)-(b); 800.6(a)-(b); 800.10(a); 800.13(b)-(d) 36 CFR §§ 60.9(a); 63.2(a) and (c)	Federal agencies are required to consider the effects of federally funded (in whole or in part) activity on any historic property, minimize harm to any National Historic Landmark, and nominate qualifying historic property for inclusion on the National Register. Federal agencies may be required to identify historic properties, determine whether proposed activity will have an adverse effect on historic properties, and develop alternatives or modifications to the proposed action that could avoid, minimize, or mitigate adverse effects, through NHPA's section 106 process.	**Applicable** Substantive requirements are applicable if federally funded activity could adversely affect historic property (meaning a prehistoric or historic district, site, building, structure, or object) included on, or eligible for inclusion on, the National Register of Historic Places.
Cultural Resources	FEDERAL **Preservation of Historical and Archaeological Data 54 USC §§ 312502(a) and 312503**	Protects significant scientific, prehistorical, historical, and archaeological data. When a federal agency action may cause irreparable loss or destruction of significant data, the agency must notify DOI and either recover, protect, and preserve the data itself, or request DOI to do so.	**Applicable** Substantive requirements are applicable if federal agency action may cause irreparable loss or destruction to significant scientific, prehistorical, historical, or archaeological data.

Table A-1 Location-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Prerequisites, Status and Rationale**
Cultural Resources	FEDERAL **Archaeological Resources Protection Act of 1979** **16 USC §§ 470cc(a)-(c) and 470ee(a)** 43 CFR §§ 7.4(a), 7.5(a), 7.7, 7.8(a), 7.9(c), and 7.35	Prohibits the excavation, removal, damage, or alteration or defacement of archaeological resources on public or Indian lands, unless by permit or exception.	**Applicable** Substantive requirements are applicable if eligible archaeological resources are located within the area to be disturbed.
Cultural Resources	FEDERAL **American Indian Religious Freedom Act** **42 USC § 1996**	Policy of the United States to protect access to and the use of religious, ceremonial, and burial sites and sacred objects by Native American groups.	**TBC** Policy should be followed if Native American sacred sites are identified within area to be disturbed.
Biological Resources	FEDERAL **Migratory Bird Treaty Act** **16 USC § 703(a)** 50 CFR §§ 10.13 and 21.10	Prohibits the killing, capturing, taking and incidental taking of protected migratory bird species, their parts, nests and eggs, without DOI's prior approval. The species of protected migratory birds are listed at 50 CFR § 10.13.	**Applicable** Substantive requirements are applicable if migratory birds, or their nests, are present at or near the site.
Biological Resources	FEDERAL **Bald and Golden Eagle Protection Act** **16 USC §§ 668(a)** 50 CFR §§ 22.10; 22.80(a), (c)-(f); 22.85(a)-(b) and (d)-(e) 50 CFR § 13.21(b)	Prohibits the unpermitted taking, including the killing, disturbing, or incidental taking, of bald and golden eagles, their parts, nests, and eggs.	**Applicable** Substantive requirements applicable if bald or golden eagles, or their nests, are identified at or near the site.

Table A-1 Location-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Prerequisites, Status and Rationale**
Biological Resources	FEDERAL **Endangered Species Act** **16 USC §§ 1531(c); 1536(a)(2), (c)-(d), (g)-(h), and (l); 1538(a) and (g); 1539(a)** 50 CFR §§ 17.21(a)-(c);17.22(b); 17.31(a) and (c);17.32(b); 17.82; and 17.94(a) 50 CFR §§ 402.09; 402.12 (a)-(b) and (i); 402.14(a); 402.15(a)	Federal agencies must ensure that any activities funded, carried out, or authorized by them do not jeopardize the continued existence of any threatened or endangered species, nor result in the destruction or alteration of such species' habitats. List of endangered and threatened species can be found at 50 CFR Part 17, Subpart B.	**Applicable** Substantive requirements applicable if endangered or threatened species are identified at the site.
Cultural Resources	NAVAJO NATION **Navajo Nation Cultural Resources Protection Act (NNCRPA)** **11 N.N.C. §§ 1003(S); 1021; and 1031**	Prohibits alteration, damage, excavation, defacement, destruction, or removal of cultural properties.	**Applicable** Substantive requirements applicable to activities at the AUM sites where cultural resources may be encountered.

Table A-1 Location-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Prerequisites, Status and Rationale**
Cultural Resources	NAVAJO NATION **Navajo Nation Policy for the Disposition of Cultural Resources Collections Sections 2 and 6.1 These sections would trigger other provisions in the policy.**	Establishes procedures and guidelines to be followed for excavation (as a last resort) and disposition of cultural resources recovered on Navajo Nation Lands, including handling of inadvertent discovery.	**TBC** TBC for activities on AUMs where cultural resources may be encountered.
Cultural Resources	NAVAJO NATION **Navajo Nation Guidelines for the Treatment of Discovery Situations**	Establish procedures and guidelines to be followed in any situation involving the discovery of cultural or historic property, including historical and prehistoric archaeological sites and traditional cultural properties and human remains, whether or not previously identified.	**TBC** The Navajo Nation Historic Preservation Dept. (NN HPD) performs these functions pursuant to a contract with the BIA, under which the NN HPD serves as the BIA's agent.
Cultural Resources	NAVAJO NATION **Navajo Nation Policy for the Protection of Jishchaá: Gravesites, Human Remains, and Funerary Items**	Establishes principles for locating and handling of gravesites, human remains, and associated artifacts and soil in the area to be disturbed by AUM removal activities. See in particular Section IV (Traditional Concerns), which contains requirements if the AUM activity comes into contact with gravesites, human remains, or funerary items. It imposes specific requirements for how to navigate around, prepare for, and respond to burial grounds and uncovered remains. See also Section V (Encountering Gravesites, Human Remains, and Funerary Items), which specifies the procedures when an inadvertent discovery is made. Sections VI and VII contain additional requirements in that event.	**TBC**

Table A-1 Location-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Prerequisites, Status and Rationale**
Biological Resources	NAVAJO NATION **Navajo Nation Endangered Species Act (NNESA)** **17 N.N.C. §§ 500-508** **Navajo Nation Endangered Species List –** Resource Committee Resolution RCAU-103-05	NNESA § 507 makes it unlawful for any person to "take, possess, transport, export, process, sell or offer for sale or ship any species or subspecies of wildlife" listed as endangered or threatened on federal or Navajo Nation lists, which also protect those species' critical habitat. NNESA §§ 500-504 and 506-508 also protect, to various extents, game fish, game birds, songbirds, game animals, fur-bearing animals (all defined under § 500), and hawks, vultures, and owls from being taken. The Navajo Nation Endangered Species List includes species that are not on the federal list. It also provides broader criteria for when species would be listed, based on their prospects of survival or recruitment within the Navajo Nation. (See Categories "G2" and "G3"). Category G4 provides a means for the Navajo Nation Department of Fish and Wildlife to include additional species (or exclude species), making it possible for the list to change during the course of work.	Applicable Substantive requirements applicable if protected species or habitat are identified within area to be disturbed on AUM sites.

Table A-2 Action-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Prerequisites, Status and Rationale**
Air	FEDERAL **Clean Air Act** **42 U.S.C. §§ 7401, *et seq.*** 40 CFR § 61.92	Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.	**Relevant and appropriate** This standard is applicable to a DOE facility. The Site is not a DOE facility; therefore, this standard is not applicable. However, this standard has been determined to be relevant and appropriate during removal action activities because of potential emissions of radionuclides during excavation of the waste and movement of the waste.
Air	FEDERAL **Clean Air Act** **42 U.S.C. §§ 7401, *et seq.*** 40 CFR §§ 61.222(a)	Radon-222 emissions to the ambient air from a uranium mill tailings pile that is no longer operational shall not exceed 20 pCi/m^2-sec.	**Relevant and appropriate** These requirements are applicable to non-operational uranium mill tailings piles. The Site's waste to be disposed of, is not uranium mill tailings. These requirements have been determined to be relevant and appropriate to the design of the engineered cover to be constructed in Alternative (fill in Alt. #), which consists of onsite containment of the contaminated soil and uranium waste rock.
Water	FEDERAL **Clean Water Act** **33 USC § 1342(p)(3)(A)** NPDES – Stormwater Discharges 40 CFR §§ 122.41(d) and (e)	Requirements to ensure storm water discharges do not contribute to a violation of surface water quality standards. All reasonable steps must be taken to minimize or prevent discharges which have a reasonable likelihood of causing adverse impacts on surface water.	**Applicable** if there are discharges to WOTUS. **Relevant and appropriate** if there are discharges to Navajo Nation Surface Waters (as defined in Table 206.1, *see* https://www.epa.gov/sites/default/files/2014-12/documents/navajo-tribe.pdf (Waters of the NN)).
Water	FEDERAL **Clean Water Act** **33 USC § 1342(p)(3)(A)** NPDES – Stormwater Discharges 40 CFR § 450.21	Requires BMPs to abate discharges of pollutants from stormwater discharges, including erosion and sediment control BMPs. All treatment and control systems and facilities will be properly operated and maintained.	**Applicable** if there are discharges to WOTUS. **Relevant and appropriate** if there are discharges to Navajo Nation Surface Waters (as defined in Table 206.1, *see* https://www.epa.gov/sites/default/files/2014-12/documents/navajo-tribe.pdf (Waters of the NN)).
Water	FEDERAL **Clean Water Act** **33 USC § 1342(p)** NPDES 2022 Construction General Permit (CGP) for	"2.2 EROSION AND SEDIMENT CONTROL REQUIREMENTS You must implement erosion and sediment controls in accordance with the following requirements to minimize the discharge of pollutants in stormwater from construction activities. 2.2.1 Provide and maintain natural buffers and/or	**Applicable** for operators of construction activities if weather events necessitating stormwater runoff controls occur during on-site excavation, waste consolidation, and repository construction.

Table A-2 Action-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Prerequisites, Status and Rationale**
	Stormwater Discharges from Construction Activities Part 2. Technology-Based Effluent Limitations. Section 2.2. Erosion and Sediment Control Requirements, Subsection 2.2.1.	equivalent erosion and sediment controls for discharges to any receiving waters that is located within 50 feet of the site's earth disturbances. a. Compliance Alternatives. For any discharges to receiving waters located within 50 feet of your site's earth disturbances, you must comply with one of the following alternatives: i. Provide and maintain a 50-foot undisturbed natural buffer; or ii. Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or iii. If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer. See Appendix F, Part F.2 for additional conditions applicable to each compliance alternative. b. Exceptions. See Appendix F, Part F.2 for exceptions to the compliance alternatives."	
Repository	FEDERAL **Uranium Mill Tailings Radiation Control Act 42 USC §§ 7918 and 2022** 40 CFR §§192.02(a) and (d)	Requires design of uranium mill tailings disposal sites to provide for control of residual radioactive materials for up to 1,000 years to the extent reasonably achievable and, in any case, for at least 200 years. The uranium mill tailings disposal site must also be designed and stabilized in a manner that minimizes the need for future maintenance.	**Relevant and Appropriate** These standards are applicable to UMTRCA Title I sites. The Site is not a Title I Site; therefore, these requirements are not applicable. These requirements have been determined to be relevant and appropriate to the design of the engineered cover to be constructed under Alternative (insert #), which consists of onsite containment of the contaminated soil and uranium waste rock.
Repository	FEDERAL **Uranium Mill Tailings Radiation Control Act 42 USC §§ 7918 and**	In selecting and designing uranium mill tailings disposal sites, certain criteria must be considered, including remoteness, hydrologic and topographic features, potential for erosion and vegetation.	**Relevant and Appropriate** These standards are applicable to UMTRCA Title I sites. The Site is not a Title I sites; therefore, these requirements are not applicable. These requirements have been

Table A-2 Action-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Prerequisites, Status and Rationale**
	2022 10 CFR Part 40, Appendix A. Criterions 1, 4, 6(1), 6(3), 6(5) and 6(7)	Disposal sites must be covered by an earthen cap, or approved alterative, that meets certain control requirements, including limiting the release of radon 222 to the atmosphere. When the final radon barrier is placed in phases, verification of the radon-222 release rate must be completed for each portion of the final radon barrier as it is emplaced. Waste or rock with elevated levels of radium must not be placed near the surface of disposal sites. Disposal sites must be closed in a manner that, to the extent necessary, controls, minimizes, or eliminates post closure escape of non-radiological hazardous constituents, leachate, contaminated rainwater, or waste decomposition products to the ground or surface waters or atmosphere.	determined to be relevant and appropriate to the design of the engineered cover to be constructed in Alternative (insert #), which consists of onsite containment for the contaminated soil and uranium waste rock.
Repository	FEDERAL **NRC Regulations Protection of the General Population from Releases of Radioactivity** 10 CFR § 61.41	"Concentrations of radioactive material which may be released to the general environment in groundwater, surface water, air, soil, plants, or animals must not result in an annual dose exceeding an equivalent of 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public. Reasonable effort should be made to maintain releases of radioactivity in effluents to the general environment as low as is reasonably achievable."	**Relevant and Appropriate** This standard is applicable to NRC sites. The Site is not an NRC site; therefore, this requirement is not applicable. This standard was found to be relevant and appropriate to the design of the engineered cover to be constructed in Alternative (insert #) for the onsite containment of contaminated soil and uranium waste rock.
All	NAVAJO NATION **Navajo Nation Fundamental Law 1 N.N.C. §§ 201-206** Navajo Nation Guidance on the Uniform Application of Fundamental Law to AUM Cleanup Activities	The Navajo people have an obligation under the Diné Fundamental Law to listen to elders and medicine people and respect, preserve and protect Mother Earth as stewards and guardians for the benefit of future generations. The 2020 Guidance explains the principles of Fundamental Law and how they would be applied at the various stages of AUM cleanup.	**TBC** Navajo Nation Fundamental Law and the 2022 Guidance will be TBCs to the extent that they do not conflict with US CERCLA, the National Contingency Plan, 40 CFR Part 300, or other federal requirements.

Table A-2 Action-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Prerequisites, Status and Rationale**
	(2022)		
Soil and Water	NAVAJO NATION **Navajo Nation Underground and Aboveground Storage Tank Act of 2012 – 4 N.N.C. §§ 1501-1577, as amended** NNEPA Storage Tank Program Guidance No. 3 (ASTs at Construction Sites) – Section III (Operating Guidelines)	The Act regulates storage of petroleum and other regulated substances in underground and aboveground storage tanks. This guidance clarifies that the NNSTA applies to ASTs that are temporarily placed at construction sites within the Navajo Nation. It requires such ASTs to file tank information forms with NNEPA, locate the tank within a secondary containment area, secure the tank to prevent movement on the containment surface or mount it on metal skids (not on an elevated stilt rack), and contact the Navajo Nation Storage Tank Program for an inspection of the AST to check for evidence of soil contamination both prior to the first deposit of a regulated substance and when the AST is removed from the site.	**TBC** Guidance should be followed for AUM response activities requiring ASTs to be brought to sites, for example for fuel needed for equipment and vehicles.

List of ARARs to be Included in EE/CA ARARs Tables to Address Certain Site Conditions if Encountered

Media	**Requirement**	**Requirement Synopsis**	**Prerequisites, Status and Rationale**
Soil and Water	NAVAJO NATION **Navajo Nation Leaking Storage Tank Soil and Water Cleanup Standards 2012 –** Resolution of the Navajo Nation Council CAP-47-95	Establish cleanup standards for soil and water contaminated by leaking underground and aboveground storage tanks. More stringent than federal requirements, which consist of screening levels for contaminated soils and not standards. Also, Cleanup Standards § VI provides that the point of compliance is at the source of the release and not at the nearby receptor, i.e., drinking water well. Cleanup Standards § IX provides that "NNEPA will not consider Monitoring Natural Attenuation as an acceptable cleanup method unless contamination	**Applicable** Applicable if there is a leak from a temporary tank that is brought to a site, for example for fuel needed for equipment and vehicles. Also applicable to response activities resulting from releases of petroleum or other regulated substances from tanks, if there are any, at AUMs.

List of ARARs to be Included in EE/CA ARARs Tables to Address Certain Site Conditions if Encountered

Media	Requirement	Requirement Synopsis	Prerequisites, Status and Rationale
		levels are within 10% of the values of the relevant cleanup standard."	
Surface Water	NAVAJO NATION **Navajo Nation Clean Water Act (NNCWA)** **4 N.N.C. § 1302(43)** Navajo Nation Surface Water Quality Standards (NNWQS) Table 207.1, Table 206.1 See the August 16, 2018 Atlas of Navajo Nation Surface Waters for maps of all NN surface waters.	The surface water quality standards apply to all "waters of the Navajo Nation" pursuant to the NNCWA. They are intended to protect, maintain, and improve the quality of Navajo Nation surface waters for public and private drinking water supplies and other domestic uses, and for fish, wildlife, cultural, agricultural, and recreational uses of water. 4 N.N.C. § 1302(43) defines waters of the Navajo Nation more broadly than the federal definition of waters of the U.S. Therefore, the provisions of the NNCWA are more broadly applicable than those of the federal CWA. All Navajo Nation surface waters are listed in Table 206.1 and depicted in the 2018 Atlas. There are no federal WQS, only federal criteria, so only the NNSWQS would be applicable although the federal criteria would be relevant and appropriate. The NNSWQS are more stringent in that they cover more waters than would be covered under the federal CWA due to the broader definition of waters of the Navajo Nation under the NNCWA, 4 NNC § 1302(43). The NNSWQS also are more stringent because they apply to more designated uses. The federal criteria cover 4 uses/scenarios: Aquatic habitat acute and chronic, domestic consumption of organisms (fish) plus water, and domestic consumption of fish. The NNSWQS also include primary and secondary human contact, agricultural watering, and livestock watering. See NNWQS Table 206.1.	**Applicable or Relevant and Appropriate** Applicable to discharges into Navajo Nation Surface Waters (as defined in Table 206.1, *see* https://www.epa.gov/sites/default/files/2014-12/documents/navajo-tribe.pdf (Waters of the NN)) on AUM sites and relevant and appropriate if there may be discharges into such Waters as a result of removal activities. Relevant and appropriate as clean-up standards for Waters of the Navajo Nation contaminated by AUM sites.

List of ARARs to be Included in EE/CA ARARs Tables to Address Certain Site Conditions if Encountered

Media	Requirement	Requirement Synopsis	Prerequisites, Status and Rationale
		The following COPCs for the site are included in the NNSWQS and have numeric standards, see Table 207.1: (1) molybdenum for agricultural water supply; (2) vanadium for agricultural and livestock watering; and (3) selenium for both domestic consumption and fish consumption. Also, Navajo Nation uses the MCL for Radium 226/228 for its WQS for domestic water supply, agricultural water supply, and livestock watering, so it would be applicable for these uses. USEPA would use the MCL as relevant and appropriate, rather than applicable. Similarly, Navajo Nation uses the MCL for uranium for its WQS for all uses. Finally Navajo Nation uses the arsenic MCL for all uses, and that would be more stringent than the water quality criteria for primary and secondary human contact, agricultural use, and livestock watering.	
Water	FEDERAL **Clean Water Act** **33 USC § 1344** CWA § 404(b) Guidelines 40 CFR §§230.10; 230.61, and 230.71-76	Prohibits the unpermitted discharge of dredge or fill material into waters of the U.S., other than incidental fallback. Should dredge and fill material be discharged to a water of the U.S., the chemical, biological and physical impacts to the WOTUS must be tested and evaluated. Any adverse effects shall be minimized by treating the material prior to discharge, limiting the mobility of the discharge materials, and avoiding or limiting impacts to WOTUS that serve as wildlife habitat, recreational space or other use by humans.	**Applicable** if there are discharges to WOTUS. **Relevant and Appropriate** if there are discharges to Navajo Nation Surface Waters (as defined in NNCWA § 1302(43) and listed in NNSWQS Table 206.1, *see* https://www.epa.gov/sites/default/files/2014-12/documents/navajo-tribe.pdf) (Waters of the NN)).
Water	FEDERAL **Clean Water Act** **33 USC § 1344 (CWA § 404)** 33 CFR §323.3(a), 323.4(a)(6), (b), (c)	The construction of temporary roads that result in a discharge of dredge or fill material to a water of the U.S. does not require a permit unless the materials contain toxic pollutants, or the discharge will alter the flow of the WOTUS.	**Applicable** if there are discharges to WOTUS. **Relevant and Appropriate** if there are discharges to Navajo Nation Surface Waters (as defined in NNCWA § 1302(43) and listed in NNSWQS Table 206.1, *see* https://www.epa.gov/sites/default/files/2014-12/documents/navajo-tribe.pdf (Waters of the NN)).

List of ARARs to be Included in EE/CA ARARs Tables to Address Certain Site Conditions if Encountered

Media	Requirement	Requirement Synopsis	Prerequisites, Status and Rationale
Water	FEDERAL **Clean Water Act** **33 USC § 1344 (CWA § 404)** Nationwide Permit 38 – Clean Up of Hazardous and Toxic Waste	On-site CERCLA actions conducted by a federal agency that involve the discharge of dredged or fill material into waters of the United States must comply with the substantive requirements of the NWP 38 General Conditions, as appropriate, and any regional or case-specific conditions recommended by the Corps District Engineer, after consultation.	**Applicable** if there are discharges to WOTUS. **Relevant and Appropriate** if there are discharges to Navajo Nation Surface Waters (as defined in NNCWA § 1302(43) and listed in NNSWQS Table 206.1, *see* https://www.epa.gov/sites/default/files/2014-12/documents/navajo-tribe.pdf (Waters of the NN)).

APPENDIX E
ALTERNATIVES EVALUATION SUMMARY

Alternative 1: No Action

Evaluation Factors for Effectiveness		Evaluation Summary
Overall Protection of Human Health and the Environment	Adequate protection of human health and the environment shall be evaluated for long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	Waste remains exposed to humans, animals, and the environment.
Compliance with ARARs and Other Criteria, Advisories, and Guidance	Compliance with chemical-specific ARARs	Chemical, action, and location specific ARARs would not be met.
	Compliance with location-specific ARARs	ARARs would not be met
	Compliance with action-specific ARARs	ARARs would not be met
Long-Term Effectiveness and Permanence	Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the response activities	Residual risk would be high since no waste would be removed from the sites.
	Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	No controls would be used to manage waste at the sites.
Short-Term Effectiveness	Short-term risks that might be posed to the community during implementation of the alternative	This alternative is not effective in the short-term to reduce contamination nor does it offer protection to human health or the environment.
	Potential impacts on workers during response action and the effectiveness and reliability of protective measures	No impacts to workers because there is no response action. Zero effectiveness of protective measures.
	Potential adverse environmental impacts from implementation of an alternative and the reliability of mitigation measures in preventing or reducing the potential impacts	High potential for adverse environmental impacts with No Action.
	Time until protection is achieved	Protection would not be achieved
Evaluation Factors for Implementability		**Evaluation Summary**
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	Technically feasible, no services or materials are required.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	No technology considered, no schedule delays
	Potential future response action, difficulty to implement PRSC or future response actions	No response action, no PRSC
	Ability to monitor effectiveness of the alternative	There would be no effectiveness of this alternative
Administrative Feasibility	Evaluate alternative for compliance with the statutory limits which requires the alternative to remain under $2 million or completed within a 12-month period	Administratively feasible. No permits are required.
	Evaluate whether alternative will require off-site permits or other factors including easements, right-of-way agreements, or zoning variances	No additional permits required.
State/Agency Acceptance	State/agency concerns will be considered in determining the recommended alternative in the EE/CA and in the final selection of the alternative in the Action Memorandum	The State or support agency may have technical and administrative concerns. These concerns will be considered in determining the recommended alternative in the EE/CA and in the final selection of the alternative in the Action memorandum.
Community Acceptance	Acceptance from the community will be considered in determining a recommendation for the EE/CA and in the final selection of the alternative in the Action Memorandum	Community acceptance of an alternative will be considered when making a recommendation in the EE/CA and in the final selection of the alternative in the Action Memorandum.
Evaluation Factors for Cost		**Approximate Total Cost**
Cost	Direct Capital Cost	No cost
	Indirect Capital Cost	No cost
	PRSC Costs	No cost

Alternative 2: Consolidate and Cap In-Place at Each Site

Evaluation Factors for Effectiveness		Evaluation Summary
Overall Protection of Human Health and the Environment	Adequate protection of human health and the environment shall be evaluated for long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	The MRM exceeding the action level would be consolidated and covered on each mine site. These activities would prevent direct contact between the MRM and humans and the environment. With proper design and construction of the cap, and proper stormwater controls and maintenance of the cap, erosion and release of MRM back into the environment would be mitigated.
Compliance with ARARs and Other Criteria, Advisories, and Guidance	Compliance with chemical-specific ARARs	Met by containing and isolating the MRM exceeding the Action Level in a repository at each site with a cover system. Stormwater controls would be included in the design to mitigate impacts of surface water on the repositories. The cover would provide a physical barrier to provide protection from water infiltration to the mine wastes, protecting groundwater, and also provide shielding from ionizing radiation to protect human health and the environment.
	Compliance with location-specific ARARs	Natural and Cultural Resource surveys have been conducted at the sites and those surveys would be reviewed and additional surveys would be identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.
	Compliance with action-specific ARARs	Compliance with action-specific ARARs would be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, and establishing air quality standards to monitor and mitigate dust. Plans would be created to implement and comply with the action-specific ARARs.
Long-Term Effectiveness and Permanence	Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the response activities	Untreated waste would be consolidated and capped at each of the 4 sites. The magnitude of residual risk would be low and is dependent on maintenance and monitoring of the cover, erosion, and stormwater controls. Monitoring and maintenance was assumed to occur for 100 years, and the repositories are anticipated to be stable long-term.
	Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	Untreated waste would be consolidated and capped with an ET cover. Maintenance and monitoring of the cover until vegetation is established would provide adequate and reliable control to manage untreated wastes.
Short-Term Effectiveness	Short-term risks that might be posed to the community during implementation of the alternative	Potential impacts to the community include temporary traffic affects and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment.
	Potential impacts on workers during response action and the effectiveness and reliability of protective measures	Worker protection, safety equipment, air monitoring protocols, and control of dust during remediation activities will be addressed and comply with OSHA, State, and local standards.
	Potential adverse environmental impacts from implementation of an alternative and the reliability of mitigation measures in preventing or reducing the potential impacts	Dust control, air monitoring, will be implemented and comply with OSHA, State, and local standards. Emergency spill containment and cleanup contingencies would be included in a plan.
	Time until protection is achieved	Approximately 579 working days.

Alternative 2: Consolidate and Cap In-Place at Each Site

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	Alternative 2 is technically feasible and would not require unconventional techniques, materials, or labor for the excavation and associated activities.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	Equipment, construction crews are readily available. Schedule delays due to technical problems would not be anticipated.
	Potential future response action, difficulty to implement PRSC or future response actions	PRSC activities are assumed to occur over a 100-year period, but would not be difficult to implement at each site. May be more difficult to manage PRSC activities at four different sites vs. less repository sites. No future response actions are anticipated.
	Ability to monitor effectiveness of the alternative	The PRSC Plan would include monitoring effectiveness
Administrative Feasibility	Evaluate alternative for compliance with the statutory limits which requires the alternative to remain under $2 million or completed within a 12-month period	Statutory limits may not be applicable if the response action is respondent-financed.
	Evaluate whether alternative will require off-site permits or other factors including easements, right-of-way agreements, or zoning variances	May require property easements, depending on where repository is located on each site. Four repository locations will require similar coordination with multiple land owners, access, permits, and agreements as compared to the other repository alternatives.
State/Agency Acceptance	State/agency concerns will be considered in determining the recommended alternative in the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Community Acceptance	Acceptance from the community will be considered in determining a recommendation for the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Evaluation Factors for Cost		**Approximate Total Cost**
Cost	Direct Capital Cost	$22,066,719
	Indirect Capital Cost	$132,375
	PRSC Costs	$381,609

Alternative 3a: Consolidate Four Homestake Sites at Mac No. 1 Repository Site

Evaluation Factors for Effectiveness		Evaluation Summary
Overall Protection of Human Health and the Environment	Adequate protection of human health and the environment shall be evaluated for long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	The MRM exceeding the action level would be excavated and transported to the Mac No. 1 site. The MRM would then be consolidated and covered in a repository at the mine site. These activities would prevent direct contact between the MRM and humans and the environment. With proper design and construction of the cap, and proper stormwater controls and maintenance of the cap, erosion and release of MRM back into the environment would be mitigated.
Compliance with ARARs and Other Criteria, Advisories, and Guidance	Compliance with chemical-specific ARARs	Met by containing and isolating the MRM exceeding the Action Level in a repository with a cover system. Stormwater controls would be included in the design to mitigate impacts of surface water on the repository. The cover would provide a physical barrier to provide protection from water infiltration to the mine wastes, protecting groundwater, and also provide shielding from ionizing radiation to protect human health and the environment.
	Compliance with location-specific ARARs	Natural and Cultural Resource surveys have been conducted at the site and those surveys would be reviewed and additional surveys would be identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.
	Compliance with action-specific ARARs	Compliance with action-specific ARARs would be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.
Long-Term Effectiveness and Permanence	Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the response activities	Untreated waste would be consolidated and capped at the Mac No. 1 site. The magnitude of residual risk would be low and is dependent on maintenance and monitoring of the cover, erosion, and stormwater controls. Monitoring and maintenance was assumed to occur for 100 years, and the repository is anticipated to be stable long-term.
	Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	Untreated waste would be consolidated and capped with an ET cover. Maintenance and monitoring of the cover until vegetation is established would provide adequate and reliable control to manage untreated wastes.
Short-Term Effectiveness	Short-term risks that might be posed to the community during implementation of the alternative	Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. MRM hauling would take place between each mine site and the repository location and heavy equipment would be present on the highway during construction. Additional measures and plans would be in place to ensure the protection of the public and community while hauling MRM on the highway.
	Potential impacts on workers during response action and the effectiveness and reliability of protective measures	Worker protection, safety equipment, air monitoring protocols, and control of dust during remediation activities will be addressed and comply with OSHA, State, and local standards.
	Potential adverse environmental impacts from implementation of an alternative and the reliability of mitigation measures in preventing or reducing the potential impacts	Dust control, air monitoring, will be implemented and comply with OSHA, State, and local standards. Emergency spill containment and cleanup contingencies would be included in a plan.
	Time until protection is achieved	Approximately 657 working days

Alternative 3a: Consolidate Four Homestake Sites at Mac No. 1 Repository Site

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	Alternative 3a is technically feasible and would not require unconventional techniques, materials, or labor for the excavation and associated activities.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	Equipment, construction crews are readily available. Schedule delays due to technical problems would not be anticipated.
	Potential future response action, difficulty to implement PRSC or future response actions	PRSC activities are assumed to occur over a 100-year period, but would not be difficult to implement. No future response actions are anticipated.
	Ability to monitor effectiveness of the alternative	The PRSC Plan would include monitoring effectiveness
Administrative Feasibility	Evaluate alternative for compliance with the statutory limits which requires the alternative to remain under $2 million or completed within a 12-month period	Statutory limits may not be applicable if the response action is respondent-financed.
	Evaluate whether alternative will require off-site permits or other factors including easements, right-of-way agreements, or zoning variances	May require one or more land allotees, depending on where final repository is located and if property boundaries are crossed.
State/Agency Acceptance	State/agency concerns will be considered in determining the recommended alternative in the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Community Acceptance	Acceptance from the community will be considered in determining a recommendation for the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Evaluation Factors for Cost		**Approximate Total Cost**
Cost	Direct Capital Cost	$32,494,680
	Indirect Capital Cost	$132,375
	PRSC Costs	$249,698

Alternative 3b: Consolidate Four Homestake Sites at Black Jack No. 1 Repository Site

Evaluation Factors for Effectiveness		Evaluation Summary
Overall Protection of Human Health and the Environment	Adequate protection of human health and the environment shall be evaluated for long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	The MRM exceeding the action level would be excavated and transported to the Black Jack No. 1 site. The MRM would then be consolidated and covered in a repository at the mine site. These activities would prevent direct contact between the MRM and humans and the environment. With proper design and construction of the cap, and proper stormwater controls and maintenance of the cap, erosion and release of MRM back into the environment would be mitigated.
Compliance with ARARs and Other Criteria, Advisories, and Guidance	Compliance with chemical-specific ARARs	Met by containing and isolating the MRM exceeding the Action Level in a repository with a cover system. Stormwater controls would be included in the design to mitigate impacts of surface water on the repository. The cover would provide a physical barrier to provide protection from water infiltration to the mine wastes, protecting groundwater, and also provide shielding from ionizing radiation to protect human health and the environment.
	Compliance with location-specific ARARs	Natural and Cultural Resource surveys have been conducted at the site and those surveys would be reviewed and additional surveys would be identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.
	Compliance with action-specific ARARs	Compliance with action-specific ARARs would be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.
Long-Term Effectiveness and Permanence	Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the response activities	Untreated waste would be consolidated and capped at the Black Jack No. 1 site. The magnitude of residual risk would be low and is dependent on maintenance and monitoring of the cover, erosion, and stormwater controls. Monitoring and maintenance was assumed to occur for 100 years, and the repository is anticipated to be stable long-term.
	Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	Untreated waste would be consolidated and capped with an ET cover. Maintenance and monitoring of the cover until vegetation is established would provide adequate and reliable control to manage untreated wastes.
Short-Term Effectiveness	Short-term risks that might be posed to the community during implementation of the alternative	Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. MRM hauling would take place between each mine site and the repository location and heavy equipment would be present on the highway during construction. Additional measures and plans would be in place to ensure the protection of the public and community while hauling MRM on the highway.
	Potential impacts on workers during response action and the effectiveness and reliability of protective measures	Worker protection, safety equipment, air monitoring protocols, and control of dust during remediation activities will be addressed and comply with OSHA, State, and local standards.
	Potential adverse environmental impacts from implementation of an alternative and the reliability of mitigation measures in preventing or reducing the potential impacts	Dust control, air monitoring, will be implemented and comply with OSHA, State, and local standards. Emergency spill containment and cleanup contingencies would be included in a plan.
	Time until protection is achieved	Approximately 672 working days.

Alternative 3b: Consolidate Four Homestake Sites at Black Jack No. 1 Repository Site

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	Alternative 3b is technically feasible and would not require unconventional techniques, materials, or labor for the excavation and associated activities.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	Equipment, construction crews are readily available. Schedule delays due to technical problems would not be anticipated.
	Potential future response action, difficulty to implement PRSC or future response actions	PRSC activities are assumed to occur over a 100-year period, but would not be difficult to implement. No future response actions are anticipated.
	Ability to monitor effectiveness of the alternative	The PRSC Plan would include monitoring effectiveness
Administrative Feasibility	Evaluate alternative for compliance with the statutory limits which requires the alternative to remain under $2 million or completed within a 12-month period	Statutory limits may not be applicable if the response action is respondent-financed.
	Evaluate whether alternative will require off-site permits or other factors including easements, right-of-way agreements, or zoning variances	May require one or more land allotees, depending on where final repository is located and if property boundaries are crossed.
State/Agency Acceptance	State/agency concerns will be considered in determining the recommended alternative in the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Community Acceptance	Acceptance from the community will be considered in determining a recommendation for the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Evaluation Factors for Cost		**Approximate Total Cost**
Cost	Direct Capital Cost	$30,109,405
	Indirect Capital Cost	$132,375
	PRSC Costs	$140,321

Alternative 4a: Regional Repository at Mac No. 1

Evaluation Factors for Effectiveness		Evaluation Summary
Overall Protection of Human Health and the Environment	Adequate protection of human health and the environment shall be evaluated for long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	The MRM exceeding the action level from the four Homestake mines would be excavated, consolidated, and covered in one regional repository at the Mac No. 1 mine site. The repository could accommodate MRM from the Mariano Lake mine site, totaling 1,039,000 CY. These activities would prevent direct contact between the MRM and humans and the environment and would remove contaminants from all sites except Mac No. 1. With proper design and construction of the cap, and proper stormwater controls and maintenance of the cap, erosion and release of MRM back into the environment would be mitigated.
Compliance with ARARs and Other Criteria, Advisories, and Guidance	Compliance with chemical-specific ARARs	Met by containing and isolating the MRM exceeding the Action Level in a repository with a cover system. Stormwater controls would be included in the design to mitigate impacts of surface water on the repository. The cover would provide a physical barrier to provide protection from water infiltration to the mine wastes, protecting groundwater, and also provide shielding from ionizing radiation to protect human health and the environment.
	Compliance with location-specific ARARs	Natural and Cultural Resource surveys have been conducted at the site and those surveys would be reviewed and additional surveys would be identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.
	Compliance with action-specific ARARs	Compliance with action-specific ARARs would be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.
Long-Term Effectiveness and Permanence	Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the response activities	Untreated waste would be consolidated and capped at the Mac No. 1 site. The magnitude of residual risk would be low and is dependent on maintenance and monitoring of the cover, erosion, and stormwater controls. Monitoring and maintenance was assumed to occur for 100 years, and the repository is anticipated to be stable long-term.
	Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	Untreated waste would be consolidated and capped with an ET cover. Maintenance and monitoring of the cover until vegetation is established would provide adequate and reliable control to manage untreated wastes.
Short-Term Effectiveness	Short-term risks that might be posed to the community during implementation of the alternative	Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. MRM hauling would take place between each mine site and the repository location and heavy equipment would be present on the highway during construction. Additional measures and plans would be in place to ensure the protection of the public and community while hauling MRM on the highway.
	Potential impacts on workers during response action and the effectiveness and reliability of protective measures	Worker protection, safety equipment, air monitoring protocols, and control of dust during remediation activities will be addressed and comply with OSHA, State, and local standards.
	Potential adverse environmental impacts from implementation of an alternative and the reliability of mitigation measures in preventing or reducing the potential impacts	Dust control, air monitoring, will be implemented and comply with OSHA, State, and local standards. Emergency spill containment and cleanup contingencies would be included in a plan.
	Time until protection is achieved	Approximately 657 working days

Alternative 4a: Regional Repository at Mac No. 1

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	Alternative 4a is technically feasible and would not require unconventional techniques, materials, or labor for the excavation and associated activities.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	Equipment, construction crews are readily available. Schedule delays due to technical problems would not be anticipated.
	Potential future response action, difficulty to implement PRSC or future response actions	PRSC activities are assumed to occur over a 100-year period, but would not be difficult to implement. No future response actions are anticipated.
	Ability to monitor effectiveness of the alternative	The PRSC Plan would include monitoring effectiveness
Administrative Feasibility	Evaluate alternative for compliance with the statutory limits which requires the alternative to remain under $2 million or completed within a 12-month period	Statutory limits may not be applicable if the response action is respondent-financed.
	Evaluate whether alternative will require off-site permits or other factors including easements, right-of-way agreements, or zoning variances	The MRM remains on Navajo Nation and would require coordination and cooperation with other agencies, including BIA, and Navajo Nation. Government to government consultation is ongoing on specific administrative actions such as rights-of-way, permits, and property easements. Depending on the repository location within the site, property easements may be required.
State/Agency Acceptance	State/agency concerns will be considered in determining the recommended alternative in the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Community Acceptance	Acceptance from the community will be considered in determining a recommendation for the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Evaluation Factors for Cost		**Approximate Total Cost**
Cost	Direct Capital Cost	$32,492,463
	Indirect Capital Cost	$132,375
	PRSC Costs	$249,698

Alternative 4b: Regional Repository at Black Jack No. 1

Evaluation Factors for Effectiveness		Evaluation Summary
Overall Protection of Human Health and the Environment	Adequate protection of human health and the environment shall be evaluated for long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	The MRM exceeding the action level from the four Homestake mines would be excavated, consolidated, and covered in one regional repository at the Black Jack No. 1 mine site. The repository could accommodate MRM from the Mariano Lake mine site, totaling 1,039,000 CY. These activities would prevent direct contact between the MRM and humans and the environment and would remove contaminants from all sites except Black Jack No. 1. With proper design and construction of the cap, and proper stormwater controls and maintenance of the cap, erosion and release of MRM back into the environment would be mitigated.
Compliance with ARARs and Other Criteria, Advisories, and Guidance	Compliance with chemical-specific ARARs	Met by containing and isolating the MRM exceeding the Action Level in a repository with a cover system. Stormwater controls would be included in the design to mitigate impacts of surface water on the repository. The cover would provide a physical barrier to provide protection from water infiltration to the mine wastes, protecting groundwater, and also provide shielding from ionizing radiation to protect human health and the environment.
	Compliance with location-specific ARARs	Natural and Cultural Resource surveys have been conducted at the site and those surveys would be reviewed and additional surveys would be identified and conducted, if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.
	Compliance with action-specific ARARs	Compliance with action-specific ARARs would be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.
Long-Term Effectiveness and Permanence	Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the response activities	Untreated waste would be consolidated and capped at the Black Jack No. 1 site. The magnitude of residual risk would be low and is dependent on maintenance and monitoring of the cover, erosion, and stormwater controls. Monitoring and maintenance was assumed to occur for 100 years, and the repository is anticipated to be stable long-term.
	Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	Untreated waste would be consolidated and capped with an ET cover. Maintenance and monitoring of the cover until vegetation is established would provide adequate and reliable control to manage untreated wastes.
Short-Term Effectiveness	Short-term risks that might be posed to the community during implementation of the alternative	Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. MRM hauling would take place between each mine site and the repository location and heavy equipment would be present on the highway during construction. Additional measures and plans would be in place to ensure the protection of the public and community while hauling MRM on the highway.
	Potential impacts on workers during response action and the effectiveness and reliability of protective measures	Worker protection, safety equipment, air monitoring protocols, and control of dust during remediation activities will be addressed and comply with OSHA, State, and local standards.
	Potential adverse environmental impacts from implementation of an alternative and the reliability of mitigation measures in preventing or reducing the potential impacts	Dust control, air monitoring, will be implemented and comply with OSHA, State, and local standards. Emergency spill containment and cleanup contingencies would be included in a plan.
	Time until protection is achieved	Approximately 670 working days.

Alternative 4b: Regional Repository at Black Jack No. 1

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	Alternative 4b is technically feasible and would not require unconventional techniques, materials, or labor for the excavation and associated activities.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	Equipment, construction crews are readily available. Schedule delays due to technical problems would not be anticipated.
	Potential future response action, difficulty to implement PRSC or future response actions	PRSC activities are assumed to occur over a 100-year period, but would not be difficult to implement. No future response actions are anticipated.
	Ability to monitor effectiveness of the alternative	The PRSC Plan would include monitoring effectiveness
Administrative Feasibility	Evaluate alternative for compliance with the statutory limits which requires the alternative to remain under $2 million or completed within a 12-month period	Statutory limits may not be applicable if the response action is respondent-financed.
	Evaluate whether alternative will require off-site permits or other factors including easements, right-of-way agreements, or zoning variances	The MRM remains on Navajo Nation and would require coordination and cooperation with other agencies, including BIA, and Navajo Nation. Government to government consultation is ongoing on specific administrative actions such as rights-of-way, permits, and property easements. Depending on the repository location within the site, property easements may be required.
State/Agency Acceptance	State/agency concerns will be considered in determining the recommended alternative in the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Community Acceptance	Acceptance from the community will be considered in determining a recommendation for the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Evaluation Factors for Cost		**Approximate Total Cost**
Cost	Direct Capital Cost	$30,054,501
	Indirect Capital Cost	$132,375
	PRSC Costs	$140,321

Alternative 4c: Two Regional Repositories: one at Mac No. 1 and another at Black Jack No. 1

Evaluation Factors for Effectiveness		Evaluation Summary
Overall Protection of Human Health and the Environment	Adequate protection of human health and the environment shall be evaluated for long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	The MRM exceeding the action level from three Homestake mines (Mac No. 1, Mac No. 2, and Black Jack No. 2) would be consolidated and covered at the Mac No. 1 mine site. The MRM exceeding the action level from Black Jack No. 1 would be consolidated and covered at the Black Jack No. 1 mine site. The repository at Mac No. 1 could accommodate MRM from the Mariano Lake mine site. These activities would prevent direct contact between the MRM and humans and the environment. With proper design and construction of the caps, and proper stormwater controls and maintenance of the caps, erosion and release of MRM back into the environment would be mitigated.
Compliance with ARARs and Other Criteria, Advisories, and Guidance	Compliance with chemical-specific ARARs	Met by containing and isolating the MRM exceeding the Action Level in a repository with a cover system. Stormwater controls would be included in the design to mitigate impacts of surface water on the repository. The cover would provide a physical barrier to provide protection from water infiltration to the mine wastes, protecting groundwater, and also provide shielding from ionizing radiation to protect human health and the environment.
	Compliance with location-specific ARARs	Natural and Cultural Resource surveys have been conducted at the sites and those surveys would be reviewed and additional surveys would be identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.
	Compliance with action-specific ARARs	Compliance with action-specific ARARs would be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.
Long-Term Effectiveness and Permanence	Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the response activities	Untreated waste would be consolidated and capped at one of two repositories at the Mac No. 1 and Black Jack No. 1 sites. The magnitude of residual risk would be low and is dependent on maintenance and monitoring of each cover, erosion, and stormwater controls. Monitoring and maintenance was assumed to occur for 100 years, and the repositories are anticipated to be stable long-term.
	Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	Untreated waste would be consolidated and capped with an ET cover. Maintenance and monitoring of the cover until vegetation is established would provide adequate and reliable control to manage untreated wastes.
Short-Term Effectiveness	Short-term risks that might be posed to the community during implementation of the alternative	Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. MRM hauling would take place between each mine site and the repository location and heavy equipment would be present on the highway during construction. Additional measures and plans would be in place to ensure the protection of the public and community while hauling MRM on the highway.
	Potential impacts on workers during response action and the effectiveness and reliability of protective measures	Worker protection, safety equipment, air monitoring protocols, and control of dust during remediation activities will be addressed and comply with OSHA, State, and local standards.
	Potential adverse environmental impacts from implementation of an alternative and the reliability of mitigation measures in preventing or reducing the potential impacts	Dust control, air monitoring, will be implemented and comply with OSHA, State, and local standards. Emergency spill containment and cleanup contingencies would be included in a plan.
	Time until protection is achieved	Approximately 578 working days

Alternative 4c: Two Regional Repositories: one at Mac No. 1 and another at Black Jack No. 1

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	Alternative 4c is technically feasible and would not require unconventional techniques, materials, or labor for the excavation and associated activities.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	Equipment, construction crews are readily available. Schedule delays due to technical problems would not be anticipated.
	Potential future response action, difficulty to implement PRSC or future response actions	PRSC activities are assumed to occur over a 100-year period, but would not be difficult to implement. No future response actions are anticipated.
	Ability to monitor effectiveness of the alternative	The PRSC Plan would include monitoring effectiveness
Administrative Feasibility	Evaluate alternative for compliance with the statutory limits which requires the alternative to remain under $2 million or completed within a 12-month period	Statutory limits may not be applicable if the response action is respondent-financed.
	Evaluate whether alternative will require off-site permits or other factors including easements, right-of-way agreements, or zoning variances	The MRM remains on Navajo Nation and would require coordination and cooperation with other agencies, including BIA, and Navajo Nation. Government to government consultation is ongoing on specific administrative actions such as rights-of-way, permits, and property easements. Depending on the repository location within the site, property easements may be required.
State/Agency Acceptance	State/agency concerns will be considered in determining the recommended alternative in the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Community Acceptance	Acceptance from the community will be considered in determining a recommendation for the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Evaluation Factors for Cost		**Approximate Total Cost**
Cost	Direct Capital Cost	$24,484,557
	Indirect Capital Cost	$132,375
	PRSC Costs	$293,373

Alternative 5: Excavation and Off-Navajo Disposal within 100 Miles

Evaluation Factors for Effectiveness		Evaluation Summary
Overall Protection of Human Health and the Environment	Adequate protection of human health and the environment shall be evaluated for long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	The MRM exceeding the action level would be excavated, consolidated, and covered in one repository off Navajo Nation near Ambrosia Lake, NM (Township 14N, Range 10W, Section 13). These activities would prevent direct contact between the MRM and humans and the environment and would remove contaminants from all sites. With proper design and construction of the cap, and proper stormwater controls and maintenance of the cap, erosion and release of MRM back into the environment would be mitigated.
Compliance with ARARs and Other Criteria, Advisories, and Guidance	Compliance with chemical-specific ARARs	Met by containing and isolating the MRM exceeding the Action Level in a repository with a cover system. Stormwater controls would be included in the design to mitigate impacts of surface water on the repository. The cover would provide a physical barrier to provide protection from water infiltration to the mine wastes, protecting groundwater, and also provide shielding from ionizing radiation to protect human health and the environment.
	Compliance with location-specific ARARs	Natural and Cultural Resource surveys have been conducted at the site and those surveys would be reviewed and additional surveys would be identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.
	Compliance with action-specific ARARs	Compliance with action-specific ARARs would be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.
Long-Term Effectiveness and Permanence	Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the response activities	Untreated waste would be consolidated and capped at the Ambrosia Lake, NM location. The magnitude of residual risk would be low and is dependent on maintenance and monitoring of the cover, erosion, and stormwater controls. Monitoring and maintenance was assumed to occur for the backfilled and revegetated areas for 5 years at each of the sites.
	Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	Untreated waste would be consolidated and capped with an ET cover. Maintenance and monitoring of the repository location for 12 years would provide adequate and reliable control to manage untreated wastes.
Short-Term Effectiveness	Short-term risks that might be posed to the community during implementation of the alternative	Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. MRM hauling would take place between each mine site and the staging location and heavy equipment would be present on the highway during construction. The increase in traffic on local roads and regional highways would increase dust, greenhouse gas emissions, and also significantly increase the risk for accidents and potentially fatal accidents to occur. Additional measures and plans would be in place to ensure the protection of the public and community while hauling MRM on the highway, to the extent achievable.
	Potential impacts on workers during response action and the effectiveness and reliability of protective measures	Worker protection, safety equipment, air monitoring protocols, and control of dust during remediation activities will be addressed and comply with OSHA, State, and local standards.
	Potential adverse environmental impacts from implementation of an alternative and the reliability of mitigation measures in preventing or reducing the potential impacts	Dust control, air monitoring, will be implemented and comply with OSHA, State, and local standards. Emergency spill containment and cleanup contingencies would be included in a plan.
	Time until protection is achieved	Approximately 898 working days.

Alternative 5: Excavation and Off-Navajo Disposal within 100 Miles

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	Alternative 5 is technically feasible and would not require unconventional techniques, materials, or labor for the excavation and associated activities.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	Equipment, construction crews are readily available. Schedule delays due to technical problems would not be anticipated.
	Potential future response action, difficulty to implement PRSC or future response actions	PRSC activities are assumed to occur over a 5-year period at the four M&BJ sites and for 12 years at the repository location. PRSC activities would not be difficult to implement. No future response actions are anticipated.
	Ability to monitor effectiveness of the alternative	The PRSC Plan would include monitoring effectiveness
Administrative Feasibility	Evaluate alternative for compliance with the statutory limits which requires the alternative to remain under $2 million or completed within a 12-month period	Statutory limits may not be applicable if the response action is respondent-financed.
	Evaluate whether alternative will require off-site permits or other factors including easements, right-of-way agreements, or zoning variances	May require permits depending on where offsite repository would be located. Could be complex due to potential involvement with state regulations and permitting.
State/Agency Acceptance	State/agency concerns will be considered in determining the recommended alternative in the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Community Acceptance	Acceptance from the community will be considered in determining a recommendation for the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Evaluation Factors for Cost		**Approximate Total Cost**
Cost	Direct Capital Cost	$40,368,585
	Indirect Capital Cost	$132,375
	PRSC Costs	$153,486

Alternative 6: Excavation and Off-Navajo Disposal at an Existing Licensed Facility

Evaluation Factors for Effectiveness		Evaluation Summary
Overall Protection of Human Health and the Environment	Adequate protection of human health and the environment shall be evaluated for long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	The MRM exceeding the action level would be excavated and transported to an offsite RCRA Class C disposal facility (Deer Trail, CO). These activities would prevent direct contact between the MRM and humans and the environment and would remove contaminants from all sites. With proper excavation, transportation, and disposal techniques, release of MRM back into the environment would be mitigated.
Compliance with ARARs and Other Criteria, Advisories, and Guidance	Compliance with chemical-specific ARARs	Compliance with chemical-specific ARARs would be met by removing the MRM exceeding the Action Level and disposing of the MRM at a RCRA facility.
	Compliance with location-specific ARARs	Compliance with location-specific ARARs would be met. Natural and Cultural Resource surveys have been conducted at the sites and those surveys would be reviewed and additional surveys would be identified and conducted if necessary. The design would include an environmental plan to review and evaluate potential impacts on protected species and critical habitats. The plan would also include monitoring protocols of potential impacts to historic properties and locations to implement during construction.
	Compliance with action-specific ARARs	Compliance with action-specific ARARs would be met. These include control of stormwater discharges during construction, establishing BMPs for stormwater and erosion control, establishing air quality standards to monitor and mitigate dust, and safe and secure transportation of hazardous waste in commerce. Plans would be created to implement and comply with the action-specific ARARs.
Long-Term Effectiveness and Permanence	Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the response activities	Untreated waste would be excavated and transported to an offsite RCRA Class C disposal facility. The magnitude of residual risk would be low. No waste or residuals would remain at any site.
	Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	No residuals or waste would remain at the sites.
Short-Term Effectiveness	Short-term risks that might be posed to the community during implementation of the alternative	Potential impacts to the community include temporary traffic controls and restricted access, noise, dust, and vehicle emissions from the increased traffic and heavy equipment. MRM hauling would take place between each mine site and the staging location and heavy equipment would be present on the highway during construction. The increase in traffic on local roads and regional highways would increase dust, greenhouse gas emissions, and also significantly increase the risk for accidents and potentially fatal accidents to occur. Additional measures and plans would be in place to ensure the protection of the public and community while hauling MRM on the highway.
	Potential impacts on workers during response action and the effectiveness and reliability of protective measures	Worker protection, safety equipment, air monitoring protocols, and control of dust during remediation activities will be addressed and comply with OSHA, State, and local standards.
	Potential adverse environmental impacts from implementation of an alternative and the reliability of mitigation measures in preventing or reducing the potential impacts	Dust control, air monitoring, will be implemented and comply with OSHA, State, and local standards. Emergency spill containment and cleanup contingencies would be included in a plan.
	Time until protection is achieved	Approximately 1,505 working days.

Alternative 6: Excavation and Off-Navajo Disposal at an Existing Licensed Facility

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	Alternative 6 is technically feasible and would not require unconventional techniques, materials, or labor for the excavation and associated activities.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	Equipment, construction crews are readily available. Schedule delays due to technical problems would not be anticipated.
	Potential future response action, difficulty to implement PRSC or future response actions	PRSC activities include monitoring and maintenance for the backfilled and revegetated areas at each site for a duration of 5 years.
	Ability to monitor effectiveness of the alternative	A post-verification survey would be completed after all wastes are excavated.
Administrative Feasibility	Evaluate alternative for compliance with the statutory limits which requires the alternative to remain under $2 million or completed within a 12-month period	Statutory limits may not be applicable if the response action is respondent-financed.
	Evaluate whether alternative will require off-site permits or other factors including easements, right-of-way agreements, or zoning variances	Off-site permits would be required, as well as permits for transporting waste across state boundaries.
State/Agency Acceptance	State/agency concerns will be considered in determining the recommended alternative in the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Community Acceptance	Acceptance from the community will be considered in determining a recommendation for the EE/CA and in the final selection of the alternative in the Action Memorandum	Not evaluated at this phase
Evaluation Factors for Cost		**Approximate Total Cost**
Cost	Direct Capital Cost	$79,384,998
	Indirect Capital Cost	$89,494,255
	PRSC Costs	$64,085

APPENDIX F
DETAILED COST ESTIMATE

APPENDIX F.1
ALTERNATIVES COST ESTIMATE

Appendix F.1 - Alternatives Cost Estimate

Cost Estimate Summary

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
1.0	**Alternative 1: No Action**											
	Sub-total			$ -		$ -		$ -		$ -	$ -	**$ -**
2.0	**Alternative 2: Consolidate and Cap In-Place at Each Site**											
	Alternate Total			$ 7,948,683		$ 13,297,254		$ 820,782		$ 22,066,719	$ 132,375	**$ 22,199,094**
3.0	**Alternative 3a: Consolidate Four Homestake Sites at One Repository Site (Mac 1 site)**											
	Alternate Total			$ 10,527,900		$ 21,241,504		$ 725,275		$ 32,494,680	$ 132,375	**$ 32,627,055**
4.0	**Alternative 3b: Consolidate Four Homestake Sites at One Repository Site (BJ1 site)**											
	Alternate Total			$ 10,163,470		$ 19,188,207		$ 757,728		$ 30,109,405	$ 132,375	**$ 30,241,781**
6.0	**Alternative 4a: Regional Repository at Mac No. 1**											
	Alternate Total			$ 10,527,054		$ 21,240,259		$ 725,150		$ 32,492,463	$ 132,375	**$ 32,624,838**
7.0	**Alternative 4b: Regional Repository at Black Jack No. 1**											
	Alternate Total			$ 10,142,465		$ 19,158,157		$ 753,879		$ 30,054,501	$ 132,375	**$ 30,186,876**
5.0	**Alternative 4c: Two Regional Repositories: one at Mac No. 1 and another at Black Jack No. 1**											
	Alternate Total			$ 8,403,974		$ 15,320,244		$ 760,339		$ 24,484,557	$ 132,375	**$ 24,616,932**
8.0	**Alternative 5: Excavation and Off-Navajo Disposal within 100 Miles**											
	Alternate Total			$ 14,884,027		$ 24,564,663		$ 919,895		$ 40,368,585	$ 132,375	**$ 40,500,960**
9.0	**Alternative 6: Excavation and Off-Navajo Disposal at an Existing Licensed Facility**											
	Alternate Total			$ 31,896,615	$ -	$ 46,847,933	$ -	$ 640,450		$ 79,384,998	$ 89,494,255	**$ 168,879,252**

Appendix F.1 - Alternatives Cost Estimate

Alternative 1: No Action

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
1												
1.1		-	MO		$ -		$ -		$ -	$ -		$ -
1.2		-	MO		$ -		$ -		$ -	$ -		$ -
					$ -		$ -		$ -	$ -		$ -
	Sub-total				$ -		$ -		$ -	$ -	$ -	$ -
	Total Alternate Cost				**$ -**		**$ -**		**$ -**	**$ -**	**$ -**	**$ -**

Appendix F.1 - Alternatives Cost Estimate

Alternative 2: Consolidate and Cap In-Place at Each Site

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
1	**Design and Site Prep**											
1.1	Design and planning of work	1	LS	$ 15,960.31	$ 15,960.31	$ -	$ -		$ -	$ 15,960.31	$ 750.00	$ 16,710.31
1.2	Preparation of site	1	LS	$ 33,287.76	$ 33,287.76	$ 18,608.74	$ 18,608.74		$ -	$ 51,896.50	$ 1,750.00	$ 53,646.50
1.3	Site Activities (Week)	116	WK	$ 10,131.62	$ 1,173,629.79	$ 250.00	$ 28,959.59	$ 150.00	$ 17,375.75	$ 1,219,965.12		$ 1,219,965.12
		Sub-total			$ 1,222,877.85		$ 47,568.32		$ 17,375.75	$ 1,287,821.93	$ 2,500.00	$ 1,290,321.93
2	**Clear Vegetation**											
2.1	Clearing of Vegetation and Stockpiling Locally	199	AC	$ 478.57	$ 95,065.39	$ 971.72	$ 193,025.50		$ -	$ 288,090.90		$ 288,090.90
2.2	Debris Removal	766	CY	$ 4.29	$ 3,288.30	$ 11.68	$ 8,943.37		$ -	$ 12,231.67		$ 12,231.67
		Sub-total			$ 98,353.69		$ 201,968.87		$ -	$ 300,322.57	$ -	$ 300,322.57
3	**Excavate MRM and place in repository on each site.**											
3.1	Excavation and hauling of MRM materials	391,966	CY	$ 2.04	$ 799,140.46	$ 7.51	$ 2,945,099.75		$ -	$ 3,744,240.21		$ 3,744,240.21
3.2	Placing and spreading material at the repository	391,966	CY	$ 1.59	$ 621,556.74	$ 2.34	$ 918,696.83		$ -	$ 1,540,253.57		$ 1,540,253.57
		Sub-total			$ 1,420,697.19		$ 3,863,796.58		$ -	$ 5,284,493.78	$ -	$ 5,284,493.78
4	**Regrade excavated areas with borrow material**											
4.1	Excavate and haul borrow material found locally	143,041	CY	$ 1.13	$ 161,651.24	$ 2.96	$ 423,063.12		$ -	$ 584,714.36		$ 584,714.36
4.2	Placing and spreading borrow material	143,041	CY	$ 1.59	$ 226,826.05	$ 2.34	$ 335,262.03		$ -	$ 562,088.07		$ 562,088.07
		Sub-total			$ 388,477.29		$ 758,325.14		$ -	$ 1,146,802.43	$ -	$ 1,146,802.43
5	**Place topsoil and revegetate disturbed areas**											
5.1	Excavate and haul topsoil found locally	320,478	CY	$ 1.13	$ 362,172.86	$ 2.96	$ 947,855.27		$ -	$ 1,310,028.12		$ 1,310,028.12
5.2	Placing and spreading topsoil material	320,478	CY	$ 1.59	$ 508,194.30	$ 2.34	$ 751,140.58		$ -	$ 1,259,334.88		$ 1,259,334.88
5.3	Seeding over topsoil materials	199	AC	$ 681.31	$ 135,336.94	$ 408.78	$ 81,202.17	$ 1,635.14	$ 324,808.66	$ 541,347.77		$ 541,347.77
		Sub-total			$ 1,005,704.10		$ 1,780,198.01		$ 324,808.66	$ 3,110,710.77	$ -	$ 3,110,710.77
6	**Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture**											
6.1	Excavation and hauling of on-site borrow for cover	479,363	CY	$ 1.13	$ 541,729.57	$ 2.96	$ 1,417,779.43		$ -	$ 1,959,509.01		$ 1,959,509.01
6.2	Place and spread materials for cover	479,363	CY	$ 1.59	$ 760,144.98	$ 2.34	$ 1,123,538.27		$ -	$ 1,883,683.25		$ 1,883,683.25
6.3	Compaction of ET cover materials	491,654	SY	$ 0.05	$ 25,028.79	$ 0.14	$ 67,656.04		$ -	$ 92,684.83		$ 92,684.83
6.4	Protective cover layer with gravel mixture	12,291	CY		$ -		$ -	$ 15.75	$ 193,588.94	$ 193,588.94		$ 193,588.94
6.5	Place and spread protective layer	81,942	CY	$ 1.59	$ 129,939.31	$ 2.34	$ 192,057.82		$ -	$ 321,997.14		$ 321,997.14
6.6	Seeding over ET cover	102	AC	$ 681.31	$ 69,208.13	$ 408.78	$ 41,524.88	$ 1,635.14	$ 166,099.52	$ 276,832.53		$ 276,832.53
		Sub-total			$ 1,526,050.78		$ 2,842,556.45		$ 359,688.46	$ 4,728,295.70	$ -	$ 4,728,295.70
7	**Dust Suppression and Oversight**											
7.1	Water Truck Operating Full Time Per Day	579	DY	$ 1,502.56	$ 870,269.64	$ 2,140.45	$ 1,239,729.11		$ -	$ 2,109,998.75		$ 2,109,998.75
7.2	Water Tank - Purchase (on-site)	2	LS		$ -		$ -		$ -	$ -	$ 113,500.00	$ 113,500.00
7.3	Water Tank Filling and Maintenance - Allowance	579	DY	$ 175.00	$ 101,358.55		$ -		$ -	$ 101,358.55		$ 101,358.55
7.3	Other Costs - Purchase Water, Permit, Tank	579	DY	$ 227.82	$ 131,952.56		$ -		$ -	$ 131,952.56		$ 131,952.56
7.4	Daily Cost Using Off-Site Water Source	579	DY	$ 344.73	$ 199,662.59	$ 1,585.31	$ 918,195.65		$ -	$ 1,117,858.24		$ 1,117,858.24
7.5	Purchase Water from Source	579	DY		$ -		$ -	$ 30.00	$ 17,375.75	$ 17,375.75		$ 17,375.75
		Sub-total			$ 1,303,243.34		$ 2,157,924.77		$ 17,375.75	$ 3,478,543.86	$ 113,500.00	$ 3,592,043.86
	Sub-Total Alternate Cost				**$ 6,965,404**		**$ 11,652,338**		**$ 719,249**	**$ 19,336,991**	**$ 116,000**	**$ 19,452,991**

Appendix F.1 - Alternatives Cost Estimate

Alternative 2: Consolidate and Cap In-Place at Each Site

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
	Escalation = % per Year Compounded X Years	4.50%	3		$ 983,279		$ 1,644,915		$ 101,534	$ 2,729,728	$ 16,375	$ 2,746,103
	Total Alternate Cost				$ 7,948,683		$ 13,297,254		$ 820,782	$ 22,066,719	$ 132,375	$ 22,199,094

Appendix F.1 - Alternatives Cost Estimate

Alternative 3a: Consolidate Four Homestake Sites at One Repository Site (Mac 1 site)

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
1.0	**Design and Site Prep**											
1.1	Design and planning of work	1	LS	$ 15,960.31	$ 15,960.31	$ -	$ -	$ -	$ -	$ 15,960.31	$ 750.00	$ 16,710.31
1.2	Preparation of site	1	LS	$ 33,287.76	$ 33,287.76	$ 18,608.74	$ 18,608.74	$ -	$ -	$ 51,896.50	$ 1,750.00	$ 53,646.50
1.3	Site Activities (Week)	131	WK	$ 10,131.62	$ 1,331,541.89	$ 250.00	$ 32,856.10	$ 150.00	$ 19,713.66	$ 1,384,111.66	$ -	$ 1,384,111.66
		Sub-total			$ 1,380,789.96		$ 51,464.84		$ 19,713.66	$ 1,451,968.46	$ 2,500.00	$ 1,454,468.46
2.0	**Clear vegetation**											
2.1	Clearing of vegetation and stockpiling locally	273	AC	$ 478.57	$ 130,650.56	$ 971.72	$ 265,279.39		$ -	$ 395,929.94		$ 395,929.94
2.2	Debris Removal	766	CY	$ 4.29	$ 3,288.30	$ 11.68	$ 8,943.37		$ -	$ 12,231.67		$ 12,231.67
		Sub-total			$ 133,938.86		$ 274,222.76		$ -	$ 408,161.62	$ -	$ 408,161.62
3.0	**Excavate MRM and place in one repository.**											
3.1	Excavation and hauling of MRM materials at Mac 1	60,982	CY	$ 2.04	$ 124,329.40	$ 7.51	$ 458,195.39		$ -	$ 582,524.79		$ 582,524.79
3.2	Placing and spreading in the repository at Mac 1	60,982	CY	$ 1.59	$ 96,701.12	$ 2.34	$ 142,929.85		$ -	$ 239,630.96		$ 239,630.96
3.3	Excavation and hauling of MRM materials at other mines to local staging area	644,253	CY	$ 2.04	$ 1,313,501.90	$ 7.51	$ 4,840,693.64		$ -	$ 6,154,195.54		$ 6,154,195.54
3.4	Placing and spreading at the repository Mac 1 from other mine sites	644,253	CY	$ 1.59	$ 1,021,617.60	$ 2.34	$ 1,510,009.94		$ -	$ 2,531,627.54		$ 2,531,627.54
		Sub-total			$ 2,556,150.02		$ 6,951,828.82		$ -	$ 9,507,978.84	$ -	$ 9,507,978.84
4.0	**Regrade excavated areas with borrow material**											
4.1	Excavate and haul borrow material found locally	306,877	CY	$ 1.13	$ 346,802.47	$ 2.96	$ 907,628.90		$ -	$ 1,254,431.37		$ 1,254,431.37
4.2	Placing and spreading cover material	306,877	CY	$ 1.59	$ 486,626.86	$ 2.34	$ 719,262.66		$ -	$ 1,205,889.51		$ 1,205,889.51
		Sub-total			$ 833,429.33		$ 1,626,891.55		$ -	$ 2,460,320.88	$ -	$ 2,460,320.88
5.0	**Place topsoil and revegetate disturbed areas**											
5.1	Excavate and haul topsoil found locally	440,440	CY	$ 1.13	$ 497,742.49	$ 2.96	$ 1,302,659.29		$ -	$ 1,800,401.78		$ 1,800,401.78
5.2	Placing and spreading topsoil material	440,440	CY	$ 1.59	$ 698,423.11	$ 2.34	$ 1,032,309.78		$ -	$ 1,730,732.88		$ 1,730,732.88
5.3	Seeding over topsoil materials	273	AC	$ 681.31	$ 185,996.67	$ 408.78	$ 111,598.00	$ 1,635.14	$ 446,392.02	$ 743,986.69		$ 743,986.69
		Sub-total			$ 1,382,162.27		$ 2,446,567.07		$ 446,392.02	$ 4,275,121.35	$ -	$ 4,275,121.35
6.0	**Transport MRM, weighted average haul distance to Mac 1 site 11 miles**											
6.1	Loading of material for site to site transport	644,253	CY	$ 0.39	$ 252,382.93	$ 1.60	$ 1,033,026.28		$ -	$ 1,285,409.21		$ 1,285,409.21
6.2	Hauling of Materials inter mine sites	1,067	HR	$ 536.63	$ 572,827.23	$ 2,434.07	$ 2,598,239.97		$ -	$ 3,171,067.20		$ 3,171,067.20
		Sub-total			$ 825,210.16		$ 3,631,266.25		$ -	$ 4,456,476.41	$ -	$ 4,456,476.41
7.0	**Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture**											
7.1	Excavation and hauling of on-site borrow for cover	199,557	CY	$ 1.13	$ 225,519.49	$ 2.96	$ 590,214.94		$ -	$ 815,734.43		$ 815,734.43
7.2	Place and spread materials for cover	199,557	CY	$ 1.59	$ 316,444.80	$ 2.34	$ 467,723.73		$ -	$ 784,168.52		$ 784,168.52
7.3	Compaction of ET cover materials	204,673	SY	$ 0.05	$ 10,419.37	$ 0.14	$ 28,164.89		$ -	$ 38,584.26		$ 38,584.26
7.4	Protective cover layer with gravel mixture	5,117	CY		$ -		$ -	$ 15.75	$ 80,590.17	$ 80,590.17		$ 80,590.17
7.5	Place and spread protective layer	34,112	CY	$ 1.59	$ 54,093.13	$ 2.34	$ 79,952.77		$ -	$ 134,045.90		$ 134,045.90
7.6	Seeding over ET cover	42	AC	$ 681.31	$ 28,811.02	$ 408.78	$ 17,286.61	$ 1,635.14	$ 69,146.45	$ 115,244.09		$ 115,244.09
		Sub-total			$ 635,287.80		$ 1,183,342.95		$ 149,736.62	$ 1,968,367.37	$ -	$ 1,968,367.37

Appendix F.1 - Alternatives Cost Estimate

Alternative 3a: Consolidate Four Homestake Sites at One Repository Site (Mac 1 site)

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
8.0	**Dust Suppression and Oversight**											
8.1	Water Truck Operating Full Time Per Day	657	DY	$ 1,502.56	$ 987,364.58	$ 2,140.45	$ 1,406,534.89	$ -	$ -	$ 2,393,899.47		$ 2,393,899.47
8.2	Water Tank - Purchase (on-site)	2	LS	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 113,500.00	$ 113,500.00
8.3	Water Tank Filling and Maintenance - Allowance	657	DY	$ 175.00	$ 114,996.36	$ -	$ -	$ -	$ -	$ 114,996.36		$ 114,996.36
8.4	Other Costs - Permit, Surge Tank	657	DY	$ 227.82	$ 149,706.80		$ -		$ -	$ 149,706.80		$ 149,706.80
8.5	Daily Cost Using Off-Site Water Source	657	DY	$ 344.73	$ 226,527.23	$ 1,585.31	$ 1,041,739.05	$ -	$ -	$ 1,268,266.28		$ 1,268,266.28
8.6	Purchase Water from Source	657	DY	$ -	$ -	$ -	$ -	$ 30.00	$ 19,713.66	$ 19,713.66		$ 19,713.66
		Sub-total			$ 1,478,594.97		$ 2,448,273.94		$ 19,713.66	$ 3,946,582.58	$ 113,500.00	$ 4,060,082.58
	Sub-Total Alternate Cost				**$ 9,225,563**		**$ 18,613,858**		**$ 635,556**	**$ 28,474,978**	**$ 116,000**	**$ 28,590,978**
	Escalation = % per Year Compounded X Years	**4.50%**	**3**		**$ 1,302,337**		**$ 2,627,646**		**$ 89,719**	**$ 4,019,702**	**$ 16,375**	**$ 4,036,078**
	Total Alternate Cost				**$ 10,527,900**	**$ -**	**$ 21,241,504**	**$ -**	**$ 725,275**	**$ 32,494,680**	**$ 132,375**	**$ 32,627,055**

Appendix F.1 - Alternatives Cost Estimate

Alternative 3b: Consolidate Four Homestake Sites at One Repository Site (BJ1 site)

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
1.0	**Design and Site Prep**											
1.1	Design and planning of work	1	LS	$ 15,960.31	$ 15,960.31	$ -	$ -	$ -	$ -	$ 15,960.31	$ 750.00	$ 16,710.31
1.2	Preparation of site	1	LS	$ 33,287.76	$ 33,287.76	$ 18,608.74	$ 18,608.74	$ -	$ -	$ 51,896.50	$ 1,750.00	$ 53,646.50
1.3	Site Activities (Week)	134	WK	$ 10,131.62	$ 1,361,352.77	$ 250.00	$ 33,591.69	$ 150.00	$ 20,155.02	$ 1,415,099.48	$ -	$ 1,415,099.48
		Sub-total			$ 1,410,600.84		$ 52,200.43		$ 20,155.02	$ 1,482,956.28	$ 2,500.00	$ 1,485,456.28
2.0	**Clear vegetation**											
2.1	Clearing of vegetation and stockpiling locally	235	AC	$ 478.57	$ 112,464.77	$ 971.72	$ 228,354.05		$ -	$ 340,818.82		$ 340,818.82
2.2	Debris Removal	766	CY	$ 4.29	$ 3,288.30	$ 11.68	$ 8,943.37		$ -	$ 12,231.67		$ 12,231.67
		Sub-total			$ 115,753.07		$ 237,297.42		$ -	$ 353,050.49	$ -	$ 353,050.49
3.0	**Excavate MRM and place in one repository.**											
3.1	Excavation and hauling of MRM materials at BJ 1	368,693	CY	$ 2.04	$ 751,690.25	$ 7.51	$ 2,770,229.89		$ -	$ 3,521,920.14		$ 3,521,920.14
3.2	Placing and spreading in the repository at BJ 1	368,693	CY	$ 1.59	$ 584,650.84	$ 2.34	$ 864,147.78		$ -	$ 1,448,798.63		$ 1,448,798.63
3.3	Excavation and hauling of MRM materials at other mines to local staging area	336,542	CY	$ 2.04	$ 686,141.05	$ 7.51	$ 2,528,659.14		$ -	$ 3,214,800.19		$ 3,214,800.19
3.4	Placing and spreading at the repository BJ 1 from other mine sites	336,542	CY	$ 1.59	$ 533,667.87	$ 2.34	$ 788,792.01		$ -	$ 1,322,459.88		$ 1,322,459.88
		Sub-total			$ 2,556,150.02		$ 6,951,828.82		$ -	$ 9,507,978.84	$ -	$ 9,507,978.84
4.0	**Regrade excavated areas with borrow material**											
4.1	Excavate and haul borrow material found locally	269,081	CY	$ 1.13	$ 304,089.34	$ 2.96	$ 795,842.86		$ -	$ 1,099,932.20		$ 1,099,932.20
4.2	Placing and spreading cover material	269,081	CY	$ 1.59	$ 426,692.57	$ 2.34	$ 630,676.32		$ -	$ 1,057,368.89		$ 1,057,368.89
		Sub-total			$ 730,781.91		$ 1,426,519.18		$ -	$ 2,157,301.09	$ -	$ 2,157,301.09
5.0	**Place topsoil and revegetate disturbed areas**											
5.1	Excavate and haul topsoil found locally	379,133	CY	$ 1.13	$ 428,459.65	$ 2.96	$ 1,121,336.75		$ -	$ 1,549,796.40		$ 1,549,796.40
5.2	Placing and spreading topsoil material	379,133	CY	$ 1.59	$ 601,206.70	$ 2.34	$ 888,618.31		$ -	$ 1,489,825.01		$ 1,489,825.01
5.3	Seeding over topsoil materials	235	AC	$ 681.31	$ 160,107.03	$ 408.78	$ 96,064.22	$ 1,635.14	$ 384,256.86	$ 640,428.11		$ 640,428.11
		Sub-total			$ 1,189,773.38		$ 2,106,019.27		$ 384,256.86	$ 3,680,049.52	$ -	$ 3,680,049.52
6.0	**Transport MRM, weighted average haul distance to BJ 1 site 8 miles**											
6.1	Loading of material for site to site transport	336,542	CY	$ 0.39	$ 131,838.63	$ 1.60	$ 539,627.49		$ -	$ 671,466.12		$ 671,466.12
6.2	Hauling of Materials inter mine sites	454	HR	$ 536.63	$ 243,798.64	$ 2,434.07	$ 1,105,826.21		$ -	$ 1,349,624.85		$ 1,349,624.85
		Sub-total			$ 375,637.26		$ 1,645,453.70		$ -	$ 2,021,090.96	$ -	$ 2,021,090.96
7.0	**Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture**											
7.1	Excavation and hauling of on-site borrow for cover	319,089	CY	$ 1.13	$ 360,603.76	$ 2.96	$ 943,748.72		$ -	$ 1,304,352.47		$ 1,304,352.47
7.2	Place and spread materials for cover	319,089	CY	$ 1.59	$ 505,992.56	$ 2.34	$ 747,886.29		$ -	$ 1,253,878.85		$ 1,253,878.85
7.3	Compaction of ET cover materials	327,271	SY	$ 0.05	$ 16,660.48	$ 0.14	$ 45,035.43		$ -	$ 61,695.91		$ 61,695.91
7.4	Protective cover layer with gravel mixture	8,182	CY		$ -		$ -	$ 15.75	$ 128,863.00	$ 128,863.00		$ 128,863.00
7.5	Place and spread protective layer	54,545	CY	$ 1.59	$ 86,494.45	$ 2.34	$ 127,843.81		$ -	$ 214,338.27		$ 214,338.27
7.6	Seeding over ET cover	68	AC	$ 681.31	$ 46,068.58	$ 408.78	$ 27,641.15	$ 1,635.14	$ 110,564.60	$ 184,274.33		$ 184,274.33
					$ -							
		Sub-total			$ 1,015,819.83		$ 1,892,155.39		$ 239,427.60	$ 3,147,402.82	$ -	$ 3,147,402.82
8.0	**Dust Suppression and Oversight**											
8.1	Water Truck Operating Full Time Per Day	672	DY	$ 1,502.56	$ 1,009,469.93	$ 2,140.45	$ 1,438,024.73		$ -	$ 2,447,494.66		$ 2,447,494.66
8.2	Water Tank - Purchase (on-site)	2	LS		$ -		$ -		$ -	$ -	$ 113,500.00	$ 113,500.00
8.3	Water Tank Filling and Maintenance - Allowance	672	DY	$ 175.00	$ 117,570.93		$ -		$ -	$ 117,570.93		$ 117,570.93

Appendix F.1 - Alternatives Cost Estimate

Alternative 3b: Consolidate Four Homestake Sites at One Repository Site (BJ1 site)

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
8.4	Other Costs - Purchase Water, Permit, Tank	672	DY	$ 227.82	$ 153,058.48		$ -		$ -	$ 153,058.48		$ 153,058.48
8.5	Daily Cost Using Off-Site Water Source	672	DY	$ 344.73	$ 231,598.77	$ 1,585.31	$ 1,065,061.75		$ -	$ 1,296,660.52		$ 1,296,660.52
8.6	Purchase Water from Source	672	DY		$ -		$ -	$ 30.00	$ 20,155.02	$ 20,155.02		$ 20,155.02
		Sub-total			$ 1,511,698.11		$ 2,503,086.48		$ 20,155.02	$ 4,034,939.61	$ 113,500.00	$ 4,148,439.61
	Sub-Total Alternate Cost				**$ 8,906,214**		**$ 16,814,561**		**$ 663,994**	**$ 26,384,770**	**$ 116,000**	**$ 26,500,770**
	Escalation = % per Year Compounded X Years	**4.50%**	**3**		**$ 1,257,256**		**$ 2,373,646**		**$ 93,734**	**$ 3,724,636**	**$ 16,375**	**$ 3,741,011**
	Total Alternate Cost				**$ 10,163,470**		**$ 19,188,207**		**$ 757,728**	**$ 30,109,405**	**$ 132,375**	**$ 30,241,781**

Appendix F.1 - Alternatives Cost Estimate

Alternative 4a: Regional Repository at Mac No. 1

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
1.0	**Design and Site Prep**											
1.1	Design and planning of work	1	LS	$ 15,960.31	$ 15,960.31	$ -	$ -	$ -	$ -	$ 15,960.31	$ 750.00	$ 16,710.31
1.2	Preparation of site	1	LS	$ 33,287.76	$ 33,287.76	$ 18,608.74	$ 18,608.74	$ -	$ -	$ 51,896.50	$ 1,750.00	$ 53,646.50
1.3	Site Activities (Week)	131.41	WK	$ 10,131.62	$ 1,331,401.82	$ 250.00	$ 32,852.65	$ 150.00	$ 19,711.59	$ 1,383,966.06	$ -	$ 1,383,966.06
		Sub-total			$ 1,380,649.89		$ 51,461.38		$ 19,711.59	$ 1,451,822.86	$ 2,500.00	$ 1,454,322.86
2.0	**Clear vegetation**											
2.1	Clearing of vegetation and stockpiling locally	273	AC	$ 478.57	$ 130,650.56	$ 971.72	$ 265,279.39		$ -	$ 395,929.94		$ 395,929.94
2.2	Debris Removal	766	CY	$ 4.29	$ 3,288.30	$ 11.68	$ 8,943.37		$ -	$ 12,231.67		$ 12,231.67
		Sub-total			$ 133,938.86	$ 983.39	$ 274,222.76	$ -	$ -	$ 408,161.62	$ -	$ 408,161.62
3.0	**Excavate MRM and place in repository at Mac No. 1.**											
3.1	Excavation and hauling of MRM materials at Mac 1	60,982	CY	$ 2.04	$ 124,329.40	$ 7.51	$ 458,195.39		$ -	$ 582,524.79		$ 582,524.79
3.2	Placing and spreading in the repository at Mac 1	60,982	CY	$ 1.59	$ 96,701.12	$ 2.34	$ 142,929.85		$ -	$ 239,630.96		$ 239,630.96
3.3	Excavation and hauling of MRM materials at other mines to local staging area	644,253	CY	$ 2.04	$ 1,313,501.90	$ 7.51	$ 4,840,693.64		$ -	$ 6,154,195.54		$ 6,154,195.54
3.4	Placing and spreading at the repository Mac 1 from other mine sites	644,253	CY	$ 1.59	$ 1,021,617.60	$ 2.34	$ 1,510,009.94		$ -	$ 2,531,627.54		$ 2,531,627.54
		Sub-total			$ 2,556,150.02		$ 6,951,828.82		$ -	$ 9,507,978.84	$ -	$ 9,507,978.84
4.0	**Regrade excavated areas with borrow material**											
4.1	Excavate and haul borrow material found locally	306,877	CY	$ 1.13	$ 346,802.47	$ 2.96	$ 907,628.90		$ -	$ 1,254,431.37		$ 1,254,431.37
4.2	Placing and spreading cover material	306,877	CY	$ 1.59	$ 486,626.86	$ 2.34	$ 719,262.66		$ -	$ 1,205,889.51		$ 1,205,889.51
		Sub-total			$ 833,429.33		$ 1,626,891.55		$ -	$ 2,460,320.88	$ -	$ 2,460,320.88
5.0	**Place topsoil and revegetate disturbed areas**											
5.1	Excavate and haul topsoil found locally	440,440	CY	$ 1.13	$ 497,742.49	$ 2.96	$ 1,302,659.29		$ -	$ 1,800,401.78		$ 1,800,401.78
5.2	Placing and spreading topsoil material	440,440	CY	$ 1.59	$ 698,423.11	$ 2.34	$ 1,032,309.78		$ -	$ 1,730,732.88		$ 1,730,732.88
5.3	Seeding over topsoil materials	273	AC	$ 681.31	$ 185,996.67	$ 408.78	$ 111,598.00	$ 1,635.14	$ 446,392.02	$ 743,986.69		$ 743,986.69
		Sub-total			$ 1,382,162.27		$ 2,446,567.07		$ 446,392.02	$ 4,275,121.35	$ -	$ 4,275,121.35
6.0	**Transport MRM to Mac No. 1 site (11 miles)**											
6.1	Loading of material for off-site transport	644,253	CY	$ 0.39	$ 252,382.93	$ 1.60	$ 1,033,026.28		$ -	$ 1,285,409.21		$ 1,285,409.21
6.2	Hauling of Materials inter mine sites	1,067	HR	$ 536.63	$ 572,827.23	$ 2,434.07	$ 2,598,239.97		$ -	$ 3,171,067.20		$ 3,171,067.20
		Sub-total			$ 825,210.16		$ 3,631,266.25		$ -	$ 4,456,476.41	$ -	$ 4,456,476.41
7.0	**Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture**											
7.1	Excavation and hauling of on-site borrow for cover	199,417	CY	$ 1.13	$ 225,361.19	$ 2.96	$ 589,800.65		$ -	$ 815,161.84		$ 815,161.84
7.2	Place and spread materials for cover	199,417	CY	$ 1.59	$ 316,222.67	$ 2.34	$ 467,395.42		$ -	$ 783,618.09		$ 783,618.09
7.3	Compaction of ET cover materials	204,530	SY	$ 0.05	$ 10,412.05	$ 0.14	$ 28,145.12		$ -	$ 38,557.18		$ 38,557.18
7.4	Protective cover layer with gravel mixture	5,113	CY		$ -		$ -	$ 15.75	$ 80,533.60	$ 80,533.60		$ 80,533.60
7.5	Place and spread protective layer	34,088	CY	$ 1.59	$ 54,055.16	$ 2.34	$ 79,896.65		$ -	$ 133,951.81		$ 133,951.81
7.6	Seeding over ET cover	42	AC	$ 681.31	$ 28,790.80	$ 408.78	$ 17,274.48	$ 1,635.14	$ 69,097.92	$ 115,163.20		$ 115,163.20
		Sub-total			$ 634,841.87		$ 1,182,512.32		$ 149,631.52	$ 1,966,985.71	$ -	$ 1,966,985.71
8.0	**Dust Suppression and Oversight**											
8.1	Water Truck Operating Full Time Per Day	657	DY	$ 1,502.56	$ 987,260.71	$ 2,140.45	$ 1,406,386.94		$ -	$ 2,393,647.65		$ 2,393,647.65
8.2	Water Tank - Purchase (on-site)	2	LS		$ -		$ -		$ -	$ -	$ 113,500.00	$ 113,500.00

Appendix F.1 - Alternatives Cost Estimate

Alternative 4a: Regional Repository at Mac No. 1

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
8.3	Water Tank Filling and Maintenance - Allowance	657	DY	$ 175.00	$ 114,984.27		$ -		$ -	$ 114,984.27		$ 114,984.27
8.4	Other Costs - Purchase Water, Permit, Tank	657	DY	$ 227.82	$ 149,691.06		$ -		$ -	$ 149,691.06		$ 149,691.06
8.5	Daily Cost Using Off-Site Water Source	657	DY	$ 344.73	$ 226,503.40	$ 1,585.31	$ 1,041,629.47		$ -	$ 1,268,132.87		$ 1,268,132.87
8.6	Purchase Water from Source	657	DY		$ -		$ -	$ 30.00	$ 19,711.59	$ 19,711.59		$ 19,711.59
		Sub-total			$ 1,478,439.44		$ 2,448,016.41		$ 19,711.59	$ 3,946,167.43	$ 113,500.00	$ 4,059,667.43
	Sub-Total Alternate Cost				**$ 9,224,822**		**$ 18,612,767**		**$ 635,447**	**$ 28,473,035**	**$ 116,000**	**$ 28,589,035**
	Escalation = % per Year Compounded X Years	**4.50%**	**3**		**$ 1,302,232**		**$ 2,627,492**		**$ 89,704**	**$ 4,019,428**	**$ 16,375**	**$ 4,035,803**
	Total Alternate Cost				**$ 10,527,054**		**$ 21,240,259**		**$ 725,150**	**$ 32,492,463**	**$ 132,375**	**$ 32,624,838**

Appendix F.1 - Alternatives Cost Estimate

Alternative 4b: Regional Repository at Black Jack No. 1

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
1.0	**Design and Site Prep**											
1.1	Design and planning of work	1	LS	$ 15,960.31	$ 15,960.31	$ -	$ -	$ -	$ -	$ 15,960.31	$ 750.00	$ 16,710.31
1.2	Preparation of site	1	LS	$ 33,287.76	$ 33,287.76	$ 18,608.74	$ 18,608.74	$ -	$ -	$ 51,896.50	$ 1,750.00	$ 53,646.50
1.3	Site Activities (Week)	134.02	WK	$ 10,131.62	$ 1,357,882.57	$ 250.00	$ 33,506.07	$ 150.00	$ 20,103.64	$ 1,411,492.28	$ -	$ 1,411,492.28
		Sub-total			$ 1,407,130.64		$ 52,114.80		$ 20,103.64	$ 1,479,349.09	$ 2,500.00	$ 1,481,849.09
2.0	**Clear vegetation**											
2.1	Clearing of vegetation and stockpiling locally	233	AC	$ 478.57	$ 111,507.62	$ 971.72	$ 226,410.61		$ -	$ 337,918.23		$ 337,918.23
2.2	Debris Removal	766	CY	$ 4.29	$ 3,288.30	$ 11.68	$ 8,943.37		$ -	$ 12,231.67		$ 12,231.67
		Sub-total			$ 114,795.92		$ 235,353.98		$ -	$ 350,149.90	$ -	$ 350,149.90
3.0	**Excavate MRM and place in repository at Black Jack No. 1.**											
3.1	Excavation and hauling of MRM materials at Black Jack No. 1	368,693	CY	$ 2.04	$ 751,690.25	$ 7.51	$ 2,770,229.89		$ -	$ 3,521,920.14		$ 3,521,920.14
3.2	Placing and spreading in the repository at Black jack No. 1	368,693	CY	$ 1.59	$ 584,650.84	$ 2.34	$ 864,147.78		$ -	$ 1,448,798.63		$ 1,448,798.63
3.3	Excavation and hauling of MRM materials at other mines to local staging area	336,542	CY	$ 2.04	$ 686,141.05	$ 7.51	$ 2,528,659.14		$ -	$ 3,214,800.19		$ 3,214,800.19
3.4	Placing and spreading at the repository BJ 1 from other mine sites	336,542	CY	$ 1.59	$ 533,667.87	$ 2.34	$ 788,792.01		$ -	$ 1,322,459.88		$ 1,322,459.88
		Sub-total			$ 2,556,150.02		$ 6,951,828.82		$ -	$ 9,507,978.84	$ -	$ 9,507,978.84
4.0	**Regrade excavated areas with borrow material**											
4.1	Excavate and haul borrow material found locally	269,081	CY	$ 1.13	$ 304,089.34	$ 2.96	$ 795,842.86		$ -	$ 1,099,932.20		$ 1,099,932.20
4.2	Placing and spreading cover material	269,081	CY	$ 1.59	$ 426,692.57	$ 2.34	$ 630,676.32		$ -	$ 1,057,368.89		$ 1,057,368.89
		Sub-total			$ 730,781.91		$ 1,426,519.18		$ -	$ 2,157,301.09	$ -	$ 2,157,301.09
5.0	**Place topsoil and revegetate disturbed areas**											
5.1	Excavate and haul topsoil found locally	375,907	CY	$ 1.13	$ 424,813.19	$ 2.96	$ 1,111,793.46		$ -	$ 1,536,606.64		$ 1,536,606.64
5.2	Placing and spreading topsoil material	375,907	CY	$ 1.59	$ 596,090.05	$ 2.34	$ 881,055.60		$ -	$ 1,477,145.65		$ 1,477,145.65
5.3	Seeding over topsoil materials	233	AC	$ 681.31	$ 158,744.41	$ 408.78	$ 95,246.65	$ 1,635.14	$ 380,986.59	$ 634,977.65		$ 634,977.65
		Sub-total			$ 1,179,647.65		$ 2,088,095.70		$ 380,986.59	$ 3,648,729.95	$ -	$ 3,648,729.95
6.0	**Transport MRM to Black Jack No. 1 site (8 miles)**											
6.1	Loading of material for off-site transport	336,542	CY	$ 0.39	$ 131,838.63	$ 1.60	$ 539,627.49		$ -	$ 671,466.12		$ 671,466.12
6.2	Hauling of Materials inter mine sites	454	HR	$ 536.63	$ 243,798.64	$ 2,434.07	$ 1,105,826.21		$ -	$ 1,349,624.85		$ 1,349,624.85
		Sub-total			$ 375,637.26		$ 1,645,453.70		$ -	$ 2,021,090.96	$ -	$ 2,021,090.96
7.0	**Construct ET cover at site - 3.0 foot thick cover with .5 foot thick**											
7.1	Excavation and hauling of on-site borrow for cover	319,089	CY	$ 1.13	$ 360,603.76	$ 2.96	$ 943,748.72		$ -	$ 1,304,352.47		$ 1,304,352.47
7.2	Place and spread materials for cover	319,089	CY	$ 1.59	$ 505,992.56	$ 2.34	$ 747,886.29		$ -	$ 1,253,878.85		$ 1,253,878.85
7.3	Compaction of ET cover materials	327,271	SY	$ 0.05	$ 16,660.48	$ 0.14	$ 45,035.43		$ -	$ 61,695.91		$ 61,695.91
7.5	Protective cover layer with gravel mixture	8,182	CY		$ -		$ -	$ 15.75	$ 128,863.00	$ 128,863.00		$ 128,863.00
7.5	Place and spread protective layer	54,545	CY	$ 1.59	$ 86,494.45	$ 2.34	$ 127,843.81		$ -	$ 214,338.27		$ 214,338.27
7.6	Seeding over ET cover	68	AC	$ 681.31	$ 46,068.58	$ 408.78	$ 27,641.15	$ 1,635.14	$ 110,564.60	$ 184,274.33		$ 184,274.33
		Sub-total			$ 1,015,819.83		$ 1,892,155.39		$ 239,427.60	$ 3,147,402.82	$ -	$ 3,147,402.82
8.0	**Dust Suppression and Oversight**											
8.1	Water Truck Operating Full Time Per Day	670	DY	$ 1,502.56	$ 1,006,896.71	$ 2,140.45	$ 1,434,359.10		$ -	$ 2,441,255.81		$ 2,441,255.81
8.2	Water Tank - Purchase (on-site)	2	LS		$ -		$ -		$ -	$ -	$ 113,500.00	$ 113,500.00

Appendix F.1 - Alternatives Cost Estimate

Alternative 4b: Regional Repository at Black Jack No. 1

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
8.3	Water Tank Filling and Maintenance - Allowance	670	DY	$ 175.00	$ 117,271.23		$ -		$ -	$ 117,271.23		$ 117,271.23
8.4	Other Costs - Purchase Water, Permit, Tank	670	DY	$ 227.82	$ 152,668.32		$ -		$ -	$ 152,668.32		$ 152,668.32
8.5	Daily Cost Using Off-Site Water Source	670	DY	$ 344.73	$ 231,008.41	$ 1,585.31	$ 1,062,346.83		$ -	$ 1,293,355.24		$ 1,293,355.24
8.6	Purchase Water from Source	670	DY		$ -		$ -	$ 30.00	$ 20,103.64	$ 20,103.64		$ 20,103.64
		Sub-total			$ 1,507,844.67		$ 2,496,705.92		$ 20,103.64	$ 4,024,654.23	$ 113,500.00	$ 4,138,154.23
	Total Alternate Cost				**$ 8,887,808**		**$ 16,788,228**		**$ 660,621**	**$ 26,336,657**	**$ 116,000**	**$ 26,452,657**
	Escalation = % per Year Compounded X Years	**4.50%**	**3**		**$ 1,254,657**		**$ 2,369,929**		**$ 93,257**	**$ 3,717,844**	**$ 16,375**	**$ 3,734,219**
	Total Alternate Cost				**$ 10,142,465**		**$ 19,158,157**		**$ 753,879**	**$ 30,054,501**	**$ 132,375**	**$ 30,186,876**

Appendix F.1 - Alternatives Cost Estimate

Alternative 4c: Two Regional Repositories: one at Mac No. 1 and another at Black Jack No. 1

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
1.0	**Design and Site Prep**											
1.1	Design and planning of work	1	LS	$ 15,960.31	$ 15,960.31	$ -	$ -	$ -	$ -	$ 15,960.31	$ 750.00	$ 16,710.31
1.2	Preparation of site	1	LS	$ 33,287.76	$ 33,287.76	$ 18,608.74	$ 18,608.74	$ -	$ -	$ 51,896.50	$ 1,750.00	$ 53,646.50
1.3	Site Activities (Week)	115.53	WK	$ 10,131.62	$ 1,170,502.85	$ 250.00	$ 28,882.43	$ 150.00	$ 17,329.46	$ 1,216,714.73	$ -	$ 1,216,714.73
		Sub-total			$ 1,219,750.91		$ 47,491.17		$ 17,329.46	$ 1,284,571.54	$ 2,500.00	$ 1,287,071.54
2.0	**Clear vegetation**											
2.1	Clearing of vegetation and stockpiling locally	222	AC	$ 478.57	$ 106,243.31	$ 971.72	$ 215,721.70		$ -	$ 321,965.01		$ 321,965.01
2.2	Debris Removal	766	CY	$ 4.29	$ 3,288.30	$ 11.68	$ 8,943.37		$ -	$ 12,231.67		$ 12,231.67
		Sub-total			$ 109,531.61		$ 224,665.07		$ -	$ 334,196.68	$ -	$ 334,196.68
3.0	**Excavate MRM and place in one of two repositories**											
3.1	Excavation and hauling of MRM materials at Mac 1 and BJ 1	461,006	CY	$ 2.04	$ 939,897.52	$ 7.51	$ 3,463,836.57		$ -	$ 4,403,734.08		$ 4,403,734.08
3.2	Placing and spreading in the repository at Mac 1 and BJ 1	461,006	CY	$ 1.59	$ 731,034.98	$ 2.34	$ 1,080,512.02		$ -	$ 1,811,547.00		$ 1,811,547.00
3.3	Excavation and hauling of MRM materials at other mines to local staging area	-	CY	$ 2.04	$ -	$ 7.51	$ -		$ -	$ -		$ -
3.4	Placing and spreading at the repository Mac 1 & BJ 1 from other mine sites	-	CY	$ 1.59	$ -	$ 2.34	$ -		$ -	$ -		$ -
		Sub-total			$ 1,670,932.50		$ 4,544,348.59		$ -	$ 6,215,281.09	$ -	$ 6,215,281.09
4.0	**Regrade excavated areas with borrow material**											
4.1	Excavate and haul borrow material found locally	176,744	CY	$ 1.13	$ 199,738.36	$ 2.96	$ 522,742.25		$ -	$ 722,480.61		$ 722,480.61
4.2	Placing and spreading cover material	176,744	CY	$ 1.59	$ 280,269.19	$ 2.34	$ 414,254.09		$ -	$ 694,523.28		$ 694,523.28
		Sub-total			$ 480,007.55		$ 936,996.34		$ -	$ 1,417,003.89	$ -	$ 1,417,003.89
5.0	**Place topsoil and revegetate disturbed areas**											
5.1	Excavate and haul topsoil found locally	358,160	CY	$ 1.13	$ 404,757.63	$ 2.96	$ 1,059,305.36		$ -	$ 1,464,062.98		$ 1,464,062.98
5.2	Placing and spreading topsoil material	358,160	CY	$ 1.59	$ 567,948.46	$ 2.34	$ 839,460.70		$ -	$ 1,407,409.16		$ 1,407,409.16
5.3	Seeding over topsoil materials	222	AC	$ 681.31	$ 151,250.04	$ 408.78	$ 90,750.03	$ 1,635.14	$ 363,000.10	$ 605,000.17		$ 605,000.17
		Sub-total			$ 1,123,956.13		$ 1,989,516.08		$ 363,000.10	$ 3,476,472.31	$ -	$ 3,476,472.31
6.0	**Transport MRM to Mac No. 1 Site (9.5 miles)**											
6.1	Loading of material for off-site transport	275,560	CY	$ 0.39	$ 107,949.34	$ 1.60	$ 441,846.49		$ -	$ 549,795.83		$ 549,795.83
6.2	Hauling of Materials inter mine sites	397	HR	$ 536.63	$ 212,784.54	$ 2,434.07	$ 965,151.90		$ -	$ 1,177,936.44		$ 1,177,936.44
		Sub-total			$ 320,733.88		$ 1,406,998.39		$ -	$ 1,727,732.27	$ -	$ 1,727,732.27
7.0	**Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture**											
7.1	Excavation and hauling of on-site borrow for cover	357,999	CY	$ 1.13	$ 404,576.15	$ 2.96	$ 1,058,830.41		$ -	$ 1,463,406.56		$ 1,463,406.56
7.2	Place and spread materials for cover	357,999	CY	$ 1.59	$ 567,693.82	$ 2.34	$ 839,084.32		$ -	$ 1,406,778.14		$ 1,406,778.14
7.3	Compaction of ET cover materials	367,179	SY	$ 0.05	$ 18,692.08	$ 0.14	$ 50,527.09		$ -	$ 69,219.17		$ 69,219.17
7.4	Protective cover layer with gravel mixture	9,179	CY		$ -		$ -	$ 15.75	$ 144,576.69	$ 144,576.69		$ 144,576.69
7.5	Place and spread protective layer	61,196	CY	$ 1.59	$ 97,041.68	$ 2.34	$ 143,433.22		$ -	$ 240,474.90		$ 240,474.90
7.6	Seeding over ET cover	76	AC	$ 681.31	$ 51,686.23	$ 408.78	$ 31,011.74	$ 1,635.14	$ 124,046.96	$ 206,744.93		$ 206,744.93
					$ -		$ -		$ -	$ -		$ -
		Sub-total			$ 1,139,689.95		$ 2,122,886.78		$ 268,623.64	$ 3,531,200.38	$ -	$ 3,531,200.38

Appendix F.1 - Alternatives Cost Estimate

Alternative 4c: Two Regional Repositories: one at Mac No. 1 and another at Black Jack No. 1

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
8.0	**Dust Suppression and Oversight**											
8.1	Water Truck Operating Full Time Per Day	578	DY	$ 1,502.56	$ 867,950.95	$ 2,140.45	$ 1,236,426.06		$ -	$ 2,104,377.01		$ 2,104,377.01
8.2	Water Tank - Purchase (on-site)	2	LS		$ -		$ -		$ -	$ -	$ 113,500.00	$ 113,500.00
8.3	Water Tank Filling and Maintenance - Allowance	578	DY	$ 175.00	$ 101,088.50		$ -		$ -	$ 101,088.50		$ 101,088.50
8.4	Other Costs - Purchase Water, Permit, Tank	578	DY	$ 227.82	$ 131,601.00		$ -		$ -	$ 131,601.00		$ 131,601.00
8.5	Daily Cost Using Off-Site Water Source	578	DY	$ 344.73	$ 199,130.62	$ 1,585.31	$ 915,749.28		$ -	$ 1,114,879.90		$ 1,114,879.90
8.6	Purchase Water from Source	578	DY		$ -		$ -	$ 30.00	$ 17,329.46	$ 17,329.46		$ 17,329.46
			Sub-total		$ 1,299,771.07		$ 2,152,175.34		$ 17,329.46	$ 3,469,275.86	$ 113,500.00	$ 3,582,775.86
	Total Alternate Cost				**$ 7,364,374**		**$ 13,425,078**		**$ 666,283**	**$ 21,455,734**	**$ 116,000**	**$ 21,571,734**
	Escalation = % per Year Compounded X Years	**4.50%**	**3**		**$ 1,039,600**		**$ 1,895,166**		**$ 94,057**	**$ 3,028,823**	**$ 16,375**	**$ 3,045,198**
	Total Alternate Cost				**$ 8,403,974**		**$ 15,320,244**		**$ 760,339**	**$ 24,484,557**	**$ 132,375**	**$ 24,616,932**

Appendix F.1 - Alternatives Cost Estimate

Alternative 5: Excavation and Off-Navajo Disposal within 100 Miles

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
1.0	**Design and Site Prep**											
1.1	Design and planning of work	1	LS	$ 15,960.31	$ 15,960.31	$ -	$ -	$ -	$ -	$ 15,960.31	$ 750.00	$ 16,710.31
1.2	Preparation of site	1	LS	$ 33,287.76	$ 33,287.76	$ 18,608.74	$ 18,608.74	$ -	$ -	$ 51,896.50	$ 1,750.00	$ 53,646.50
1.3	Site Activities (Week)	179.54	WK	$ 10,131.62	$ 1,818,993.34	$ 250.00	$ 44,884.08	$ 150.00	$ 26,930.45	$ 1,890,807.87	$ -	$ 1,890,807.87
			Sub-total		$ 1,868,241.41		$ 63,492.82		$ 26,930.45	$ 1,958,664.67	$ 2,500.00	$ 1,961,164.67
2.0	**Clear vegetation**											
2.1	Clearing of vegetation and stockpiling locally	288	AC	$ 478.57	$ 137,829.16	$ 971.72	$ 279,855.18		$ -	$ 417,684.34		$ 417,684.34
2.2	Debris Removal	766	CY	$ 4.29	$ 3,288.30	$ 11.68	$ 8,943.37		$ -	$ 12,231.67		$ 12,231.67
			Sub-total		$ 141,117.46		$ 288,798.55		$ -	$ 429,916.01	$ -	$ 429,916.01
3.0	**Excavate total of 710,000 CY of MRM and place in repository near Ambrosia Lake**											
3.1	Excavation and hauling of MRM materials to a local staging area.	705,235	CY	$ 2.04	$ 1,437,831.30	$ 7.51	$ 5,298,889.03		$ -	$ 6,736,720.33		$ 6,736,720.33
3.2	Placing and spreading at the repository located off site	705,235	CY	$ 1.59	$ 1,118,318.72	$ 2.34	$ 1,652,939.79		$ -	$ 2,771,258.51		$ 2,771,258.51
3.3	Not Used											
3.4	Not Used											
			Sub-total		$ 2,556,150.02		$ 6,951,828.82		$ -	$ 9,507,978.84	$ -	$ 9,507,978.84
4.0	**Regrade excavated areas with borrow material**											
4.1	Excavate and haul borrow material found locally	340,925	CY	$ 1.13	$ 385,280.08	$ 2.96	$ 1,008,329.98		$ -	$ 1,393,610.06		$ 1,393,610.06
4.2	Placing and spreading cover material	340,925	CY	$ 1.59	$ 540,617.92	$ 2.34	$ 799,064.58		$ -	$ 1,339,682.50		$ 1,339,682.50
			Sub-total		$ 925,898.00		$ 1,807,394.56		$ -	$ 2,733,292.57	$ -	$ 2,733,292.57
5.0	**Place topsoil and revegetate disturbed areas**											
5.1	Excavate and haul topsoil found locally	464,640	CY	$ 1.13	$ 525,090.98	$ 2.96	$ 1,374,233.98		$ -	$ 1,899,324.95		$ 1,899,324.95
5.2	Placing and spreading topsoil material	464,640	CY	$ 1.59	$ 736,798.00	$ 2.34	$ 1,089,030.09		$ -	$ 1,825,828.10		$ 1,825,828.10
5.3	Seeding over topsoil materials	288	AC	$ 681.31	$ 196,216.27	$ 408.78	$ 117,729.76	$ 1,635.14	$ 470,919.05	$ 784,865.08		$ 784,865.08
			Sub-total		$ 1,458,105.25		$ 2,580,993.83		$ 470,919.05	$ 4,510,018.13	$ -	$ 4,510,018.13
6.0	**Transport 710,000 CY of MRM to Ambrosia lake area**											
6.1	Loading of material for off-site transport	705,235	CY	$ 0.24	$ 170,660.29	$ 0.90	$ 636,832.47		$ -	$ 807,492.76		$ 807,492.76
6.2	Hauling of Materials from mine sites to off site repository area	4,532	HR	$ 597.86	$ 2,709,208.55	$ 800.80	$ 3,628,817.21		$ -	$ 6,338,025.76		$ 6,338,025.76
			Sub-total		$ 2,879,868.84		$ 4,265,649.68		$ -	$ 7,145,518.52	$ -	$ 7,145,518.52
7.0	**Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture**											
7.1	Excavation and hauling of on-site borrow for cover	374,922	CY	$ 1.13	$ 423,699.99	$ 2.96	$ 1,108,880.07		$ -	$ 1,532,580.06		$ 1,532,580.06
7.2	Place and spread materials for cover	374,922	CY	$ 1.59	$ 594,528.03	$ 2.34	$ 878,746.84		$ -	$ 1,473,274.87		$ 1,473,274.87
7.3	Compaction of ET cover materials	384,535	SY	$ 0.05	$ 19,575.63	$ 0.14	$ 52,915.45		$ -	$ 72,491.08		$ 72,491.08
7.4	Protective cover layer with gravel mixture	9,613	CY		$ -		$ -	$ 15.75	$ 151,410.66	$ 151,410.66		$ 151,410.66
7.5	Place and spread protective layer	64,089	CY	$ 1.59	$ 101,628.72	$ 2.34	$ 150,213.14		$ -	$ 251,841.86		$ 251,841.86
7.6	Seeding over ET cover	79	AC	$ 681.31	$ 54,129.38	$ 408.78	$ 32,477.63	$ 1,635.14	$ 129,910.51	$ 216,517.52		$ 216,517.52
			Sub-total		$ 1,193,561.75		$ 2,223,233.12		$ 281,321.17	$ 3,698,116.04	$ -	$ 3,698,116.04

Appendix F.1 - Alternatives Cost Estimate

Alternative 5: Excavation and Off-Navajo Disposal within 100 Miles

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
8.0	**Dust Suppression and Oversight**											
8.1	Water Truck Operating Full Time Per Day	898	DY	$ 1,502.56	$ 1,348,819.44	$ 2,140.45	$ 1,921,439.81		$ -	$ 3,270,259.25		$ 3,270,259.25
8.2	Water Tank - Purchase (on-site)	2	LS		$ -		$ -		$ -	$ -	$ 113,500.00	$ 113,500.00
8.3	Water Tank Filling and Maintenance - Allowance	898	DY	$ 175.00	$ 157,094.28		$ -		$ -	$ 157,094.28		$ 157,094.28
8.4	Other Costs - Purchase Water, Permit, Tank	898	DY	$ 227.82	$ 204,511.54		$ -		$ -	$ 204,511.54		$ 204,511.54
8.5	Daily Cost Using Off-Site Water Source	898	DY	$ 344.73	$ 309,454.42	$ 1,585.31	$ 1,423,099.34		$ -	$ 1,732,553.76		$ 1,732,553.76
8.6	Purchase Water from Source	898	DY		$ -		$ -	$ 30.00	$ 26,930.45	$ 26,930.45		$ 26,930.45
		Sub-total			$ 2,019,879.67		$ 3,344,539.16		$ 26,930.45	$ 5,391,349.28	$ 113,500.00	$ 5,504,849.28
	Total Alternate Cost				**$ 13,042,822**		**$ 21,525,931**		**$ 806,101**	**$ 35,374,854**	**$ 116,000**	**$ 35,490,854**
	Escalation = % per Year Compounded X Years	**4.50%**	**3**		**$ 1,841,205**		**$ 3,038,732**		**$ 113,794**	**$ 4,993,731**	**$ 16,375**	**$ 5,010,106**
	Total Alternate Cost				**$ 14,884,027**		**$ 24,564,663**		**$ 919,895**	**$ 40,368,585**	**$ 132,375**	**$ 40,500,960**

Appendix F.1 - Alternatives Cost Estimate

Alternative 6: Excavation and Off-Navajo Disposal at an Existing Licensed Facility

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
1.0	**Design and Site Prep**											
1.1	Design and planning of work	1	LS	$ 15,960.31	$ 15,960.31	$ -	$ -	$ -	$ -	$ 15,960.31	$ 750.00	$ 16,710.31
1.2	Preparation of site	1	LS	$ 33,287.76	$ 33,287.76	$ 18,608.74	$ 18,608.74	$ -	$ -	$ 51,896.50	$ 1,750.00	$ 53,646.50
1.3	Site Activities (Week)	301.02	WK	$ 10,131.62	$ 3,049,776.93	$ 250.00	$ 75,253.95	$ 150.00	$ 45,152.37	$ 3,170,183.25	$ -	$ 3,170,183.25
		Sub-total			$ 3,099,025.00		$ 93,862.69		$ 45,152.37	$ 3,238,040.06	$ 2,500.00	$ 3,240,540.06
2.0	**Clear vegetation**											
2.1	Clearing of vegetation and stockpiling locally	288	AC	$ 478.57	$ 137,829.16	$ 971.72	$ 279,855.18		$ -	$ 417,684.34		$ 417,684.34
2.2	Debris Removal	766	CY	$ 4.29	$ 3,288.30	$ 11.68	$ 8,943.37		$ -	$ 12,231.67		$ 12,231.67
		Sub-total			$ 141,117.46		$ 288,798.55		$ -	$ 429,916.01	$ -	$ 429,916.01
3.0	**Excavate total of 710,000 CY of MRM and haul to offsite disposal facility**											
3.1	Excavation and hauling of MRM materials at BJ 1 to local staging area	368,693	CY	$ 2.04	$ 751,690.25	$ 7.51	$ 2,770,229.89		$ -	$ 3,521,920.14		$ 3,521,920.14
3.2	Excavation and hauling of MRM materials at Mac 1, Mac 2, and BJ 2 to local staging area	336,542	CY	$ 2.04	$ 686,141.05	$ 7.51	$ 2,528,659.14		$ -	$ 3,214,800.19		$ 3,214,800.19
3.3	Not Used											
3.4	Not Used											
		Sub-total			$ 1,437,831.30		$ 5,298,889.03		$ -	$ 6,736,720.33	$ -	$ 6,736,720.33
4.0	**Regrade excavated areas with borrow material**											
4.1	Excavate and haul borrow material found locally	340,925	CY	$ 1.13	$ 385,280.08	$ 2.96	$ 1,008,329.98		$ -	$ 1,393,610.06		$ 1,393,610.06
4.2	Placing and spreading cover material	340,925	CY	$ 1.59	$ 540,617.92	$ 2.34	$ 799,064.58		$ -	$ 1,339,682.50		$ 1,339,682.50
		Sub-total			$ 925,898.00		$ 1,807,394.56		$ -	$ 2,733,292.57	$ -	$ 2,733,292.57
5.0	**Place topsoil and revegetate disturbed areas**											
5.1	Excavate and haul topsoil found locally	464,640	CY	$ 1.13	$ 525,090.98	$ 2.96	$ 1,374,233.98		$ -	$ 1,899,324.95		$ 1,899,324.95
5.2	Placing and spreading topsoil material	464,640	CY	$ 1.59	$ 736,798.00	$ 2.34	$ 1,089,030.09		$ -	$ 1,825,828.10		$ 1,825,828.10
5.3	Seeding over topsoil materials	288	AC	$ 681.31	$ 196,216.27	$ 408.78	$ 117,729.76	$ 1,635.14	$ 470,919.05	$ 784,865.08		$ 784,865.08
		Sub-total			$ 1,458,105.25		$ 2,580,993.83		$ 470,919.05	$ 4,510,018.13	$ -	$ 4,510,018.13
6.0	**Load and Transport materials to staging area at BJ 1**											
6.1	Loading of material for site to site transport	336,542	CY	$ 0.39	$ 131,838.63	$ 1.60	$ 539,627.49		$ -	$ 671,466.12		$ 671,466.12
6.2	Hauling of Materials inter mine sites	409	HR	$ 536.63	$ 219,418.77	$ 2,434.07	$ 995,243.59		$ -	$ 1,214,662.36		$ 1,214,662.36
		Sub-total			$ 351,257.40		$ 1,534,871.08		$ -	$ 1,886,128.48	$ -	$ 1,886,128.48
7.0	**Transport 710,000 CY of MRM 528 miles to offsite disposal facility**											
7.1	Loading of material for off-site transport	705,235	CY	$ 0.24	$ 170,660.29	$ 0.90	$ 636,832.47		$ -	$ 807,492.76		$ 807,492.76
7.2	Hauling of Materials from mine sites to off site repository area	28,975	HR	$ 597.86	$ 17,323,302.01	$ 800.80	$ 23,203,491.03		$ -	$ 40,526,793.04		$ 40,526,793.04
		Sub-total			$ 17,493,962.29		$ 23,840,323.50		$ -	$ 41,334,285.80	$ -	$ 41,334,285.80
8.0	**Environmental waste disposal fee**											
8.1	Clean Harbors - Deer Trail Proposal July 20, 2022	952,067	TN		$ -		$ -		$ -	$ -	$ 78,307,511.52	$ 78,307,511.52
		Sub-total			$ -		$ -		$ -	$ -	$ 78,307,511.52	$ 78,307,511.52

Appendix F.1 - Alternatives Cost Estimate

Alternative 6: Excavation and Off-Navajo Disposal at an Existing Licensed Facility

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M Amount	Other Costs	Total Field Cost
9.0	**Dust Suppression and Oversight**											
9.1	Water Truck Operating Full Time Per Day	1,505	DY	$ 1,502.56	$ 2,261,469.75	$ 2,140.45	$ 3,221,541.66		$ -	$ 5,483,011.42		$ 5,483,011.42
9.2	Water Tank - Purchase (on-site)	2	LS		$ -		$ -		$ -	$ -	$ 113,500.00	$ 113,500.00
9.3	Water Tank Filling and Maintenance - Allowance	1,505	DY	$ 175.00	$ 263,388.83		$ -		$ -	$ 263,388.83		$ 263,388.83
8.4	Daily Cost Using Off-Site Water Source	1,505	DY	$ 344.73	$ 518,840.24	$ 1,585.31	$ 2,386,009.59		$ -	$ 2,904,849.83		$ 2,904,849.83
8.5	Purchase Water from Source	1,505	DY		$ -		$ -	$ 30.00	$ 45,152.37	$ 45,152.37		$ 45,152.37
			Sub-total		$ 3,043,698.82		$ 5,607,551.25		$ 45,152.37	$ 8,696,402.44	$ 113,500.00	$ 8,809,902.44
	Total Alternate Cost				**$ 27,950,896**		**$ 41,052,684**		**$ 561,224**	**$ 69,564,804**	**$ 78,423,512**	**$ 147,988,315**
	Escalation = % per Year Compounded X Years	**4.50%**	**3**		**$ 3,945,720**		**$ 5,795,248**		**$ 79,226**	**$ 9,820,194**	**$ 11,070,743**	**$ 20,890,937**
	Total Alternate Cost				**$ 31,896,615**		**$ 46,847,933**		**$ 640,450**	**$ 79,384,998**	**$ 89,494,255**	**$ 168,879,252**

APPENDIX F.2
TRUCKING DETAILS

Appendix F.2 - Trucking Details

Item No.	Description	CY	Days	Trucks	Payload (CY)	RT HR / Load	Hrs / Day / Truck	Total Truck Loads	Truck Loads / Day	Loads / Truck / Day	Total CY / Day
	Alternative 3a: Consolidate Four Homestake Sites at One Repository Site (Mac 1 site)										
6.0	**Transport MRM, weighted average haul distance to Mac 1 site 11 miles**										
6.2	Hauling of Materials inter mine sites	644,253.11	129	9	40.00	0.60	8.25	16,106	124	14	4,979
	Alternative 3b: Consolidate Four Homestake Sites at One Repository Site (BJ1 site)										
6.0	**Transport MRM, weighted average haul distance to BJ 1 site 8 miles**										
6.2	Hauling of Materials inter mine sites	336,541.96	55	9	40.00	0.50	8.25	8,414	153	16	6,111
	Alternative 4a: Regional Repository at Mac No. 1										
6.2	Transport MRM to Mac No. 1 site (11 miles)	644,253.11	129	9	40.00	0.60	8.25	16,106	124	14	4,979
	Alternative 4b: Regional Repository at Black Jack No. 1										
6.2	Transport MRM to Black Jack No. 1 site (8 miles)	336,541.96	55	9	40.00	0.50	8.25	8,414	153	16	6,111
	Alternative 4c: Two Regional Repositories: one at Mac No. 1 and another at Black Jack No. 1										
6.0	**Transport MRM to Mac No. 1 Site (9.5 miles)**										
6.2	Hauling of Materials inter mine sites	275,560.24	48	9	40.00	0.32	8.25	6,889	143	25	5,733
	Alternative 5: Excavation and Off-Navajo Disposal within 100 Miles										
6.0	**Transport 710,000 CY of MRM to Ambrosia lake area**										
6.2	Hauling of Materials from mine sites to off site repository area	705,234.82	412	22	40.00	2.90	11.00	17,631	43	4	1,712
	Alternative 6: Excavation and Off-Navajo Disposal at an Existing Licensed Facility										
6.0	**Load and Transport materials to staging area at BJ 1**										
6.2	Hauling of Materials inter mine sites	336,541.96	50	9	40.00	0.40	8.25	8,414	170	21	6,790
7.2	Hauling of Materials from mine sites to off site repository area	705,234.82	1,317	22	40.00	18.08	11.00	17,631	13	0.61	535
	Total							26,044	183		

APPENDIX F.3
CREWS

Appendix F.3 - Crews

Crew A	Clearing and Grubbing Vegetation	Units	AC
Crew B	Excavation, Loading, and Hauling to Repository or Staging Area	Units	CY
Crew C	Spreading Materials in Repository Area	Units	CY
Crew D	Excavations of local fill materials	Units	CY
Crew E	Grading and Leveling	Units	AC
Crew F	Mine Waste Loading for Transportation to other Mine Site	Units	CY
Crew G	Mine Waste Hauling Site to Site	Units	HR
Crew H	Compaction of Materials	Units	SY
Crew I	Dust Control During Removal Activities	Units	DY
Crew J	Mine Waste Loading for Hauling over the Road	Units	CY
Crew K	Mine Waste Hauling Over the Road	Units	HR
Crew L	Stockpile Management and Materials Handling	Units	DY
Crew M	Removal of debris - metal, wood, concrete	Units	LCY

Crew A	**Clearing and Grubbing Vegetation**					Units	AC	**Acres / Hr.**	**0.52**	
Asset	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units per asset	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
Dozer Operator	1	$ 75.42	$ 75.42	20%	$ 90.51	0.52	0.52	$ 174.80		$ 174.80
Loader Operator	1	$ 69.14	$ 69.14	20%	$ 82.97	0.52	0.52	$ 160.24		$ 160.24
Mechanic	0.25	$ 60.46	$ 15.12	20%	$ 18.14	2.07	0.52	$ 35.03		$ 35.03
Laborer	1	$ 46.81	$ 46.81	20%	$ 56.18	0.52	0.52	$ 108.50		$ 108.50
spare		$ -								
Cat D6T Dozer	1	$ 155.07	$ 155.07	20%	$ 186.09	0.52	0.52		$ 359.40	$ 359.40
Cat 980H Wheel Loader	1	$ 259.89	$ 259.89	20%	$ 311.87	0.52	0.52		$ 602.34	$ 602.34
Ford F350 Service Truck	0.25	$ 17.22	$ 4.30	20%	$ 5.17	2.07	0.52		$ 9.98	$ 9.98
spare		$ -								
				TOTAL COST PER HOUR	$ 750.91	TOTAL COST PER UNIT		**$ 478.57**	**$ 971.72**	$ 1,450.29

Crew B	**Excavation, Loading, and Hauling to Repository or Staging Area**					Units	CY	**Units / Hr.**	**187**	
	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units per asset	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
Excavator Operator	1	$ 75.42	$ 75.42	20%	$ 90.51	187	187	$ 0.48		$ 0.48
Loader Operator	1	$ 69.14	$ 69.14	20%	$ 82.97	187	187	$ 0.44		$ 0.44
Truck Driver - Off Hwy	2.4	$ 47.78	$ 112.89	20%	$ 135.47	79	187	$ 0.72		$ 0.72
Mechanic	1	$ 60.46	$ 60.46	20%	$ 72.55	187	187	$ 0.39		$ 0.39
Cat 390 Excavator	1	$ 377.83	$ 377.83	20%	$ 453.39	187	187		$ 2.42	$ 2.42
Cat 980H Wheel Loader	1	$ 259.89	$ 259.89	20%	$ 311.87	187	187		$ 1.67	$ 1.67
Cat 730 Articulated Truck	2.4	$ 218.66	$ 516.68	20%	$ 620.02	79	187		$ 3.31	$ 3.31
Ford F350 Service Truck	1.0	$ 17.22	$ 17.22	20%	$ 20.66	187	187		$ 0.11	$ 0.11
spare		$ -	$ -		$ -	0	187		$ -	$ -
				TOTAL COST PER HOUR	$ 1,787.44	TOTAL COST PER UNIT		**$ 2.04**	**$ 7.51**	$ 9.55

Appendix F.3 - Crews

Crew C	Spreading Materials in Repository Area					Units	CY	Units / Hr.	196	
Asset	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units per asset	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
Dozer Operator	1	$ 75.42	$ 75.42	20%	$ 90.51	196	196	$ 0.46		$ 0.46
Motor Grader Operator	1	$ 75.42	$ 75.42	20%	$ 90.51	196	196	$ 0.46		$ 0.46
Mechanic	0.25	$ 60.46	$ 15.12	20%	$ 18.14	786	196	$ 0.09		$ 0.09
Laborer	2	$ 46.81	$ 93.63	20%	$ 112.35	98	196	$ 0.57		$ 0.57
spare		$ -								
Cat D6T Dozer	1	$ 155.07	$ 155.07	20%	$ 186.09	196	196		$ 0.95	$ 0.95
Cat 14M Grader	1	$ 224.31	$ 224.31	20%	$ 269.17	196	196		$ 1.37	$ 1.37
Ford F350 Service Truck	0.25	$ 17.22	$ 4.30	20%	$ 5.17	786	196		$ 0.03	$ 0.007
spare		$ -								
				TOTAL COST PER HOUR	$ 771.93	TOTAL COST PER UNIT		**$ 1.59**	**$ 2.34**	$ 3.91

Crew D	Excavations of local fill materials					Units	CY	Units / Hr.	390	
	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units / Asset / Hour	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
Loader Operator	1	$ 69.14	$ 69.14	20%	$ 82.97	390	390	$ 0.21		$ 0.21
Dozer Operator	1	$ 75.42	$ 75.42	20%	$ 90.51	390	390	$ 0.23		$ 0.23
Truck Driver - Off Hwy	2.4	$ 47.78	$ 115.79	20%	$ 138.94	161	390	$ 0.36		$ 0.36
Mechanic	1	$ 60.46	$ 60.46	20%	$ 72.55	390	390	$ 0.19		$ 0.19
Laborer	1	$ 46.81	$ 46.81	20%	$ 56.18	390	390	$ 0.14		$ 0.14
spare		$ -								
Cat 980H Wheel Loader	1	$ 259.89	$ 259.89	20%	$ 311.87	390	390		$ 0.80	$ 0.80
Cat D6T Dozer	1	$ 155.07	$ 155.07	20%	$ 186.09	390	390		$ 0.48	$ 0.48
Cat 730 Articulated Truck	2.4	$ 218.66	$ 529.94	20%	$ 635.93	161	390		$ 1.63	$ 1.63
Ford F350 Service Truck	1	$ 17.22	$ 17.22	20%	$ 20.66	390	390		$ 0.05	$ 0.05
spare										
				TOTAL COST PER HOUR	$ 1,595.69	TOTAL COST PER UNIT		**$ 1.13**	**$ 2.96**	$ 4.09

Crew E	Grading and Leveling					Units	AC	Acres / Hr.	3.14	
	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units per hour	Units per hour	Labor cost per hour	Equip. cost per hour	Total cost per hours
Motor Grader Operator	1	$ 75.42	$ 75.42	20%	$ 90.51	3	3.14	$ 28.83		$ 28.83
Truck Driver - Off Hwy	0.5	$ 47.78	$ 23.89	20%	$ 28.67	6.28	3.14	$ 28.83		$ 28.83
spare										
Cat 14M Grader	1	$ 224.31	$ 224.31	20%	$ 269.17	3.14	3.14		$ 85.74	$ 85.74
CAT 740 8000 gal water truck	0.5	$ 218.66	$ 109.33	20%	$ 131.20	6.28	3.14		$ 41.79	$ 41.79
spare										
				TOTAL COST PER HOUR	$ 519.54			**$ 57.66**	**$ 127.53**	$ 185.19

Appendix F.3 - Crews

Crew F	Mine Waste Loading for Transportation to other Mine Site					Units	CY	Units / Hr.	383	
	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units / asset / Hour	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
Excavator Operator	1	$ 75.42	$ 75.42	20%	$ 90.51	383	383	$ 0.24		$ 0.24
Loader Operator	0.5	$ 69.14	$ 34.57	20%	$ 41.48	766	383	$ 0.11		$ 0.11
Mechanic	0.25	$ 60.46	$ 15.12	20%	$ 18.14	1533	383	$ 0.05		$ 0.05
spare		$ -	$ -	20%	$ -		383	$ -		$ -
spare		$ -								
Cat 390 Excavator	1	$ 377.83	$ 377.83	20%	$ 453.39	383	383		$ 1.18	$ 1.18
Cat 980H Wheel Loader	0.5	$ 259.89	$ 129.95	20%	$ 155.94	766	383		$ 0.41	$ 0.41
Ford F350 Service Truck	0.25	$ 17.22	$ 4.30	20%	$ 5.17	1533	383		$ 0.01	$ 0.01
spare		$ -	$ -	20%	$ -		383		$ -	$ -
spare		$ -								
				TOTAL COST PER HOUR	$ 764.62	TOTAL COST PER UNIT		**$ 0.39**	**$ 1.60**	$ 2.00

Crew G	Mine Waste Hauling Site to Site					Units	HR	Units / Hr.	1	
	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units / asset / Hour	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
Truck Driver - Off Hwy	9	$ 47.78	$ 429.98	20%	$ 515.97	0	1	$ 515.97		$ 515.97
Ford F350 Service Truck	1	$ 17.22	$ 17.22	20%	$ 20.66	1	1	$ 20.66		$ 20.66
spare		$ -	$ -	20%	$ -	0	1	$ -		$ -
spare		$ -	$ -	20%	$ -		1	$ -		$ -
spare		$ -								
Cat 730 Articulated Truck	9	$ 218.66	$ 1,967.93	20%	$ 2,361.52	0	1		$ 2,361.52	$ 2,361.52
Mechanic	1	$ 60.46	$ 60.46	20%	$ 72.55	1	1		$ 72.55	$ 72.55
spare		$ -	$ -	20%	$ -	0	1		$ -	$ -
spare		$ -	$ -	20%	$ -		1		$ -	$ -
spare		$ -								
				TOTAL COST PER HOUR	$ 2,970.70	TOTAL COST PER UNIT		**$ 536.63**	**$ 2,434.07**	$ 2,970.70

Crew H	Compaction of Materials					Units	SY	Units / Hr.	2400	
Asset	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units per asset	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
General Machinery Operator	1	$ 54.04	$ 54.04	20%	$ 64.85	2400	2400	$ 0.03		$ 0.03
Truck Driver - Off Hwy	1	$ 47.78	$ 47.78	20%	$ 57.33	2400	2400	$ 0.02		$ 0.02
Mechanic	0.25	$ 60.46	$ 15.12	20%	$ 18.14	9600	2400			
Cat CS56B Roller	1	$ 52.25	$ 52.25	20%	$ 62.71	2400	2400		$ 0.03	$ 0.03
CAT 740 8000 gal water truck	1	$ 218.66	$ 218.66	20%	$ 262.39	2400	2400		$ 0.11	$ 0.11
Ford F350 Service Truck	0.25	$ 17.22	$ 4.30	20%	$ 5.17	9600	2400		$ 0.002	$ 0.002
				TOTAL COST PER HOUR	$ 470.58	TOTAL COST PER UNIT		**$ 0.05**	**$ 0.14**	$ 0.19

Appendix F.3 - Crews

Crew I	Dust Control During Removal Activities					Units	DY	Hours / Day	8.00	
	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units per asset	Units per Day	Labor cost per unit	Equip cost per unit	total cost per unit
Truck Driver - Off Hwy	1	$ 47.78	$ 47.78	20%	$ 57.33	8.00	8.00	$ 458.64		$ 458.64
Mechanic	0.25	$ 60.46	$ 15.12	20%	$ 18.14	32.00	8.00	$ 145.10		$ 145.10
Laborer	2	$ 46.81	$ 93.63	20%	$ 112.35	4.00	8.00	$ 898.81		$ 898.81
spare		$ -				0.00	0.00			
CAT 740 8000 gal water truck	1	$ 218.66	$ 218.66	20%	$ 262.39	8.00	8.00		$ 2,099.13	$ 2,099.13
Ford F350 Service Truck	0.25	$ 17.22	$ 4.30	20%	$ 5.17	32.00	8.00		$ 41.32	$ -
spare		$ -								
			TOTAL COST PER HOUR		$ 455.38	TOTAL COST PER DAY		**$ 1,502.56**	**$ 2,140.45**	$ 3,601.69

Crew J	Mine Waste Loading for Hauling over the Road					Units	CY	Units / Hr.	386	
	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units / asset / Hour	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
Loader Operator	1	$ 69.14	$ 69.14	20%	$ 82.97	386	386	$ 0.22		$ 0.22
Ford F350 Service Truck	0.5	$ 17.22	$ 8.61	20%	$ 10.33	771	386	$ 0.03		$ 0.03
spare		$ -	$ -	20%	$ -	0	386	$ -		$ -
spare		$ -	$ -	20%	$ -		386	$ -		$ -
spare		$ -								
Cat 980H Wheel Loader	1	$ 259.89	$ 259.89	20%	$ 311.87	386	386		$ 0.81	$ 0.81
Mechanic	0.5	$ 60.46	$ 30.23	20%	$ 36.28	771	386		$ 0.09	$ 0.09
spare		$ -	$ -	20%	$ -	0	386		$ -	$ -
spare		$ -	$ -	20%	$ -		386		$ -	$ -
spare		$ -								
			TOTAL COST PER HOUR		$ 441.45	TOTAL COST PER UNIT		**$ 0.24**	**$ 0.90**	$ 1.14

Crew K	Mine Waste Hauling Over the Road					Units	HR	Units / Hr.	1	
	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units / asset / Hour	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
Truck Driver - OTR	11	$ 45.29	$ 498.22	20%	$ 597.86	0	1	$ 597.86		$ 597.86
Ford F350 Service Truck	0	$ 17.22	$ -	20%	$ -	0	1	$ -		$ -
spare		$ -	$ -	20%	$ -	0	1	$ -		$ -
spare		$ -	$ -	20%	$ -		1	$ -		$ -
spare		$ -								
Western Star 4900SA	11	$ 60.67	$ 667.33	20%	$ 800.80	0	1		$ 800.80	$ 800.80
Mechanic	0	$ 60.46	$ -	20%	$ -	0	1		$ -	$ -
spare		$ -	$ -	20%	$ -	0	1		$ -	$ -
spare		$ -	$ -	20%	$ -		1		$ -	$ -
spare		$ -								
			TOTAL COST PER HOUR		$ 1,398.66	TOTAL COST PER UNIT		**$ 597.86**	**$ 800.80**	$ 1,398.66

Appendix F.3 - Crews

Crew L	Stockpile Management and Materials Handling					Units	DY	Units / Hr.	1.0	
	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units / asset / Hour	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
Loader Operator	16	$ 69.14	$ 1,106.23	20%	$ 1,327.48	0	1	$ 1,327.48		$ 1,327.48
Excavator Operator	16	$ 75.42	$ 1,206.77	20%	$ 1,448.13	0	1	$ 1,448.13		$ 1,448.13
Truck Driver - Off Hwy	8	$ 47.78	$ 382.20	20%	$ 458.64	0	1	$ 458.64		$ 458.64
Mechanic	4	$ 60.46	$ 241.84	20%	$ 290.21	0	1	$ 290.21		$ 290.21
spare		$ -								
Cat 980H Wheel Loader	16	$ 259.89	$ 4,158.28	20%	$ 4,989.94	0	1		$ 4,989.94	$ 4,989.94
Cat 390 Excavator	16	$ 377.83	$ 6,045.26	20%	$ 7,254.31	0	1		$ 7,254.31	$ 7,254.31
CAT 740 8000 gal water truck	8	$ 218.66	$ 1,749.27	20%	$ 2,099.13	0	1		$ 2,099.13	$ 2,099.13
Ford F350 Service Truck	4	$ 17.22	$ 68.87	20%	$ 82.64	0	1		$ 82.64	$ 82.64
spare		$ -								
			TOTAL COST PER HOUR		$ 17,950.48	TOTAL COST PER UNIT		**$ 3,524.46**	**$ 14,426.02**	$ 17,950.48

Crew M	Removal of debris - metal, wood, concrete					Units	LCY	Units / Hr.	79.1	
	Qty	Cost each per hour	Cost per hour	MU %	Total cost per hour	Units / asset / Hour	Units per hour	Labor cost per unit	Equip cost per unit	total cost per unit
Excavator Operator	1	$ 75.42	$ 75.42	20%	$ 90.51	79	79	$ 1.14		$ 1.14
Truck Driver - Off Hwy	2	$ 47.78	$ 83.76	20%	$ 100.52	45	79	$ 1.27		$ 1.27
Laborer	2	$ 46.81	$ 93.63	20%	$ 112.35	40	79	$ 1.42		$ 1.42
Mechanic	0.5	$ 60.46	$ 30.23	20%	$ 36.28	0	79.1208791	$ 0.46		$ 0.46
spare		$ -								
CAT Excavator 390F L W/thu	1	$ 377.83	$ 377.83	20%	$ 453.39	79	79		$ 5.73	$ 5.73
CAT Articulated 740 EJ Dum	2	$ 218.66	$ 383.37	20%	$ 460.04	45	79		$ 5.81	$ 5.81
Ford F350 Service Truck	0.5	$ 17.22	$ 8.61	20%	$ 10.33	158	79		$ 0.13	$ 0.13
spare	0	$ -	$ -	20%	$ -	158	79		$ -	$ -
spare		$ -								
			TOTAL COST PER HOUR		$ 1,263.42	TOTAL COST PER UNIT		**$ 4.29**	**$ 11.68**	$ 15.97

APPENDIX F.4
CALCULATIONS

Appendix F.4 - Calculations

Estimate Version Information: Rev L September 15, 2023

Alternative 1: No Action
Common to all Alternates

1.1 Inspection of 4 Sites

	Hours	Rate	Labor
Senior Engineer	3	$ 64.14	$ 192.43
Engineer	24	$ 47.94	$ 1,150.49
Project Mgmt.	24	$ 39.49	$ 947.70
Vehicle	24	$ 17.22	$ 413.20
			$ 2,703.82

Inspection of two sites

	Hours	Rate	Labor
Senior Engineer	2	$ 64.14	$ 128.28
Engineer	16	$ 47.94	$ 766.99
Project Mgmt.	16	$ 39.49	$ 631.80
Vehicle	16	$ 17.22	$ 275.47
			$ 1,802.55

Inspection of one site

	Hours	Rate	Labor
Senior Engineer	1	$ 64.14	$ 64.14
Engineer	8	$ 47.94	$ 383.50
Project Mgmt.	8	$ 39.49	$ 315.90
Vehicle	8	$ 17.22	$ 137.73
			$ 901.27

1.2 Maintenance of ALL access roads

	Hours	Rate	Labor	Equipment	Area	Miles
Site Access	0		$ -	$ -	Mac 1 Sec 2	1.53
Supervisor	10.81	$ 129.73	$ 1,402.51	$ -	Mac 1 Sec 1	0.77
Labor	10.81	$ 46.81	$ 506.09	$ -	BJ 2 Sec 1	0.47
Operator	10.81	$ 54.04	$ 584.21	$ -	Mac 2 Sec 1	0.19
Equipment	10.81	$ 155.07	$ -	$ 1,676.46	BJ 1 Sec 1	1.04
			$ -	$ -		
			$ 2,492.81	$ 1,676.46		

Blade Width	Road Width	Passes	Speed - MPH	Efficiency	MPH	Work Hours
9	20	3.00	3.70	30%	0.37	10.81

CAT MG 14M, grading of rural roadway

Maintenance of MAC 1 access roads

	Hours	Rate	Labor	Equipment	Area	Miles
Site Access	0		$ -	$ -	Mac 1 Sec 2	1.53
Supervisor	9.32	$ 129.73	$ 1,209.67	$ -	Mac 1 Sec 1	0.77
Labor	9.32	$ 46.81	$ 436.50	$ -	BJ 2 Sec 1	0.47
Operator	9.32	$ 54.04	$ 503.88	$ -	Mac 2 Sec 1	0.19
Equipment	9.32	$ 155.07	$ -	$ 1,445.95	BJ 1 Sec 1	1.04
			$ -	$ -		
			$ 2,150.05	$ 1,445.95		

Blade Width	Road Width	Passes	Speed - MPH	Efficiency	MPH	Work Hours
9	20	3.00	3.70	20%	0.25	9.32

CAT MG 14M, grading of rural roadway

Maintenance of BJ 1 access roads

	Hours	Rate	Labor	Equipment	Area	Miles
Site Access	0		$ -	$ -	Mac 1 Sec 2	1.53
Supervisor	4.22	$ 129.73	$ 546.98	$ -	Mac 1 Sec 1	0.77
Labor	4.22	$ 46.81	$ 197.37	$ -	BJ 2 Sec 1	0.47
Operator	4.22	$ 54.04	$ 227.84	$ -	Mac 2 Sec 1	0.19
Equipment	4.22	$ 155.07	$ -	$ 653.82	BJ 1 Sec 1	1.04
			$ -	$ -		
			$ 972.20	$ 653.82		

Blade Width	Road Width	Passes	Speed - MPH	Efficiency	MPH	Work Hours
9	20	3.00	3.70	20%	0.25	4.22

CAT MG 14M, grading of rural roadway

Maintenance of MAC 1 and BJ 1 access roads

	Hours	Rate	Labor	Equipment	Area	Miles
Site Access	0		$ -	$ -	Mac 1 Sec 2	1.53
Supervisor	9.03	$ 129.73	$ 1,171.10	$ -	Mac 1 Sec 1	0.77
Labor	9.03	$ 46.81	$ 422.58	$ -	BJ 2 Sec 1	0.47
Operator	9.03	$ 54.04	$ 487.81	$ -	Mac 2 Sec 1	0.19
Equipment	9.03	$ 155.07	$ -	$ 1,399.85	BJ 1 Sec 1	1.04
			$ -	$ -		
			$ 2,081.50	$ 1,399.85		

Blade Width	Road Width	Passes	Speed - MPH	Efficiency	MPH	Work Hours
9	20	3.00	3.70	30%	0.37	9.03

CAT MG 14M, grading of rural roadway

PRSC Costs

	Alt 1	Alt 2	Alt 3a, 4a	Alt 3b, 4b	Alt 4c	Alt 5	Alt 6
Cost of Inspections M&BJ Sites	$ -	$ 2,703.82	$ 901.27	$ 901.27	$ 1,802.55	$ 2,703.82	$ 2,703.82
Cost of Inspections Off-Site Repository	$ -	$ -	$ -	$ -	$ -	$ 901.27	$ -
Cost of Road Maintenance M&BJ Sites - Labor	$ -	$ 2,492.81	$ 2,150.05	$ 972.20	$ 2,081.50	$ 2,492.81	$ 2,492.81
Cost of Road Maintenance M&BJ Sites - Equipment	$ -	$ 1,676.46	$ 1,445.95	$ 653.82	$ 1,399.85	$ 1,676.46	$ 1,676.46
Cost of Road Maintenance Off-site Repository- Labor	$ -	$ -	$ -	$ -	$ -	$ 2,150.05	$ -
Cost of Road Maintenance Off-site Repository - Equipment	$ -	$ -	$ -	$ -	$ -	$ 1,445.95	$ -
Years Required to inspect M&BJ sites	0	100	100	100	100	5	5
Years Required to inspect off-site Repository site	N/A	N/A	N/A	N/A	N/A	12	N/A
	$ -	$ 1,374,618.13	$ 899,454.06	$ 505,457.80	$ 1,056,777.60	$ 176,665.39	$ 68,730.91
Average Depreciation at 3.5%	$ -	$ 381,609.06	$ 249,698.31	$ 140,320.62	$ 293,373.04	$ 153,485.71	$ 64,085.21
Total Cost after Depreciation	$ -	$ 381,609.06	$ 249,698.31	$ 140,320.62	$ 293,373.04	$ 153,485.71	$ 64,085.21

Alternate 1 : Requires no future inspections or road maintenance
Alternate 2 : Requires inspections and road maintenance to Mac 1&2 and BJ 1&2 sites. Assuming 100 years for this estimate.
Alternate 3a: Requires inspections and road maintenance to MAC 1 site. Assuming 100 years for this estimate.
Alternate 3b: Requires inspections and road maintenance to BJ 1 site. Assuming 100 years for this estimate.
Alternate 4a : Requires inspections and road maintenance to MAC 1 site. Assuming 100 years for this estimate.
Alternate 4b: Requires inspections and road maintenance to BJ 1 site. Assuming 100 years for this estimate.
Alternate 4c: Requires inspections to all sites and road maintenance to MAC 1 and BJ 1 site. Assuming 100 years for this estimate.
Requires inspections and road maintenance to Mac 1&2 and BJ 1&2 sites. Assuming 5 years for this estimate.
Alternate 5 : Requires inspections and road maintenance to Off-Site Repository location in Ambrosia Lake area. Assuming 12 years for this estimate and using Mac No 1 site for distance of road maintenance (2.3 miles).
Alternate 6: Requires inspections and road maintenance to Mac 1&2 and BJ 1&2 sites. Assuming 5 years for this estimate.

PRSC Costs Depreciated

Year	Amount of Depreciation 3.5%		
1	$ -	$ 1,000,000.00	100%
2	$ 35,000.00	$ 965,000.00	96.5%
3	$ 33,775.00	$ 931,225.00	93.1%
4	$ 32,592.88	$ 898,632.13	89.9%
5	$ 31,452.12	$ 867,180.00	86.7%
6	$ 30,351.30	$ 836,828.70	83.7%
7	$ 29,289.00	$ 807,539.70	80.8%
8	$ 28,263.89	$ 779,275.81	77.9%
9	$ 27,274.65	$ 752,001.15	75.2%
10	$ 26,320.04	$ 725,681.11	72.6%
11	$ 25,398.84	$ 700,282.27	70.0%
12	$ 24,509.88	$ 675,772.39	67.6%
13	$ 23,652.03	$ 652,120.36	65.2%
14	$ 22,824.21	$ 629,296.15	62.9%
15	$ 22,025.37	$ 607,270.78	60.7%
16	$ 21,254.48	$ 586,016.31	58.6%
17	$ 20,510.57	$ 565,505.73	56.6%
18	$ 19,792.70	$ 545,713.03	54.6%
19	$ 19,099.96	$ 526,613.08	52.7%
20	$ 18,431.46	$ 508,181.62	50.8%
21	$ 17,786.36	$ 490,395.26	49.0%
22	$ 17,163.83	$ 473,231.43	47.3%
23	$ 16,563.10	$ 456,668.33	45.7%
24	$ 15,983.39	$ 440,684.94	44.1%
25	$ 15,423.97	$ 425,260.96	42.5%
26	$ 14,884.13	$ 410,376.83	41.0%
27	$ 14,363.19	$ 396,013.64	39.6%
28	$ 13,860.48	$ 382,153.16	38.2%
29	$ 13,375.36	$ 368,777.80	36.9%
30	$ 12,907.22	$ 355,870.58	35.6%
31	$ 12,455.47	$ 343,415.11	34.3%
32	$ 12,019.53	$ 331,395.58	33.1%
33	$ 11,598.85	$ 319,796.74	32.0%
34	$ 11,192.89	$ 308,603.85	30.9%
35	$ 10,801.13	$ 297,802.72	29.8%
36	$ 10,423.10	$ 287,379.62	28.7%
37	$ 10,058.29	$ 277,321.33	27.7%
38	$ 9,706.25	$ 267,615.09	26.8%
39	$ 9,366.53	$ 258,248.56	25.8%
40	$ 9,038.70	$ 249,209.86	24.9%
41	$ 8,722.35	$ 240,487.51	24.0%
42	$ 8,417.06	$ 232,070.45	23.2%
43	$ 8,122.47	$ 223,947.99	22.4%
44	$ 7,838.18	$ 216,109.81	21.6%
45	$ 7,563.84	$ 208,545.96	20.9%
46	$ 7,299.11	$ 201,246.85	20.1%
47	$ 7,043.64	$ 194,203.21	19.4%
48	$ 6,797.11	$ 187,406.10	18.7%
49	$ 6,559.21	$ 180,846.89	18.1%
50	$ 6,329.64	$ 174,517.25	17.5%
51	$ 6,108.10	$ 168,409.14	16.8%
52	$ 5,894.32	$ 162,514.82	16.3%
53	$ 5,688.02	$ 156,826.80	15.7%
54	$ 5,488.94	$ 151,337.87	15.1%
55	$ 5,296.83	$ 146,041.04	14.6%
56	$ 5,111.44	$ 140,929.60	14.1%
57	$ 4,932.54	$ 135,997.07	13.6%
58	$ 4,759.90	$ 131,237.17	13.1%
59	$ 4,593.30	$ 126,643.87	12.7%
60	$ 4,432.54	$ 122,211.33	12.2%
61	$ 4,277.40	$ 117,933.94	11.8%
62	$ 4,127.69	$ 113,806.25	11.4%

Average % for a 100 year depreciation at 3.5% $ 277,610.96 28%

PRSC Costs Depreciated

Year	Amount of Depreciation 3.5%		
1	$ -	$ 393,748.79	100%
2	$ 13,781.21	$ 379,967.58	96.5%
3	$ 13,298.87	$ 366,668.72	93.1%
4	$ 12,833.41	$ 353,835.31	89.9%
5	$ 12,384.24	$ 341,451.08	86.7%

Average % for a 5 year depreciation at 3.5% $ 367,134.29 93.2%

Average % for a 12 year depreciation at 3.5% $ 828,284.86 83%

Common to all Alternates
1.0 Design and Site Prep

1.1 Design and planning of work

	Hours	Rate	Allowance	Labor
Senior Engineer	80	$ 64.14	$ -	$ 5,131.38
Engineer	160	$ 47.94	$ -	$ 7,669.92
Project Mgmt.	80	$ 39.49	$ -	$ 3,159.00
Other Costs			$ 750.00	$ -
			$ 750.00	$ 15,960.31

1.2 Preparation of site

	Hours	Rate	Allowance	Labor	Equipment
Site Access	0		$ 1,500.00	$ -	$ -
Supervisor	120	$ 129.73	$ -	$ 15,567.91	$ -
Labor	240	$ 46.81	$ -	$ 11,235.14	$ -
Operator	120	$ 54.04	$ -	$ 6,484.71	$ -
Equipment	120	$ 155.07	$ -	$ -	$ 18,608.74
TC Plan			$ 250.00	$ -	$ -
			$ 1,750.00	$ 33,287.76	$ 18,608.74

1.3 Site Activities (Week)

	Hours	Rate	Equipment	Labor	Materials
Site Security	168.00	$ 46.81	$ -	$ 7,864.60	$ -
Flaggers	50.00	$ 45.34	$ -	$ 2,267.02	$ -
TC Signage	1	$ 150.00	$ -	$ -	$ 150.00
Security Vehicle	1	$ 250.00	$ 250.00	$ -	$ -
			$ 250.00	$ 10,131.62	$ 150.00

* one site security personnel full time (24 hours)
* average of one traffic control/flagger full time (working hours)

Alternative 2: Consolidate and Cap In-Place at Each Site

2.1 Clear Vegetation

Engineers estimate including Mac 1, Mac 2, BJ 1, BJ 2. 199 AC of disturbed area

CY	AC	CY / AC
391,966	199	1973

Appendix F.4 - Calculations

Estimate Version Information: **Rev** **L** **September 15, 2023**

Updated SSM-M&BJ Repository Layouts - 30 September 2022

SHEET NUMBER	Location	ALTERNATIVE	VOLUME CY	2D AREA SF	3D AREA SF	OVERLAP LIMITS OF IMPACTED AREA SF	OVERLAP MRM DEPTH SF	Volume under repository CY	Volume Outside Repository to Haul CY	Backfill/ Revegetate Areas (AC)	Volume of >2 OUTSIDE of repository footprint CY
2	MAC No. 1	2	60,982	529,818.00	529,982.00	529,818.00	306,169.00	38,725.08	22,296.77	10.25	6,076.88
3	MAC No.2	2	87,930	662,526.00	663,625.00	661,002.00	128,349.00	33,832.42	54,716.19	27.54	9,334.76
4	Black Jack No. 1	2	368,693	2,427,203.00	2,428,948.00	1,899,248.00	457,516.00	117,179.58	258,760.14	114.95	98,132.65
5	Black Jack No. 2	2	187,630	801,981.00	802,335.00	801,981.00	342,357.00	101,461.70	56,193.39	45.90	5,656.69
			705,235	4,421,528	4,424,890	3,892,049	1,234,391	291,199	391,966	199	119,201

2.2 Debris Removal — Typical for Alternatives 2-6

	Total
MAC 1	237.3
MAC 2	40.1
BJ 1	405.5
BJ 2	83.1
	766.0
	766

CY	%	Concrete	Wood	Metal
237	31%	198	38	0.9
40	5%	33	6	0.2
405	53%	338	66	1.6
83	11%	69	13	0.3
765	100%	639	124	3
		639	124	3

3.0 Excavate MRM and place in repository on each site.
Note: For this comparison, assuming an average of 2,000 feet from loading area to repository/staging area for each mine. Calculated from assumptions

4.0 Regrade excavated areas with borrow material
Note: For alternate estimate, assume replacement of fill materials in MRM >2 ft depth areas, with 20% swell factor.

199	acres	square feet	inches of fill materials	- Square feet
				- Cubic feet
				1.20 Swell Factor
				143,041.18 Cubic yards

5.0 Place topsoil and revegetate disturbed areas
Note: For alternate estimate, assume 12 inches of topsoil recovered on-site to cover the 199 acres of disturbed area.

199	acres	43,560	square feet/AC	12	inches of fill materials

8,652,900.39 Square feet
8,652,900.39 Cubic feet
320,477.79 Cubic yards

5.3 Seeding over topsoil materials

Seeding	per 1,000 S.F.	$ 62.56	$ 2,725.23	Acre
	Labor	25%	$ 681.31	
	Equipment	15%	$ 408.78	
	Materials	60%	$ 1,635.14	

Seeding rye, fine textured, with mulch and fertilizer, 10 lb. per M.S.F., hydro or air seeding

6.0 Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture

MRM materials — Placed in multiple repositories, at each site

Cubic Yards	Avg Depth - FT	Sq. Feet	Sq. Yards	Acre
705,234.82	~~6.65~~	4,424,890.00	491,654.44	101.58

3 foot section comprised of 30" of local materials and 6" of imported gravel mix

Inches	Cubic Feet	Cubic Yards	Inches	Cubic Feet	Cubic Yards
30	11,062,225.00	409,712.04	6	2,212,445.00	81,942.41
			Admixture	Gravel	12,291.36
				Soil	69,651.05

7.0 Dust Suppression and Oversight
A water truck will be working full time while response action is taking place. One truck to service two fronts at a mine site.
~~Assumption that water is available. If water is not available on site, hauling of water will be consistent for each of the alternatives.~~
The cost of purchasing and hauling water from Gallup was added to each alternative in revG1 2/24/2022
Above ground portable water tanks (Typical Rain for Rent) - One tank will be purchased for the fill point and two tanks purchased to be located strategically on-site. These can be sold at the end of the project.

Alternative 3a: Consolidate Four Homestake Sites at One Repository Site (Mac 1 site)

2.0 Clear vegetation
Engineers estimate including Mac 1, Mac 2, BJ 1, BJ 2. 273 AC of disturbed area at 710,000 CY of MRM excavation

CY	AC	CY / AC
638,851	273	2340

Updated SSM-M&BJ Repository Layouts - 30 September 2022

SHEET NUMBER	Location	ALTERNATIVE	VOLUME CY	2D AREA SF	3D AREA SF	OVERLAP LIMITS OF IMPACTED AREA SF	OVERLAP MRM DEPTH SF	Volume under repository CY	Volume Outside Repository to Haul CY	Backfill/ Revegetate Areas (AC)	Volume of >2 OUTSIDE of repository footprint CY
6	MAC No. 1	3A	705,235	1,840,768.00	1,842,061.00	638,416.00	321,557.00	44,314.48	638,850.78	273.34	255,730.77
			705,235	1,840,768	1,842,061	638,416	321,557				

4.0 Regrade excavated areas with borrow material
Note: For alternate estimate, assume replacement of fill materials in MRM >2 ft depth areas, with 20% swell factor.

273	acres	square feet	inches of fill materials	- Square feet
				- Cubic feet
				1.20 Swell Factor
				306,876.92 Cubic yards

5.0 Place topsoil and revegetate disturbed areas
Note: For alternate estimate, assume 12 inches of topsoil recovered on-site to cover the 273 acres of disturbed area.

273	acres	43,560	square feet/AC	12	inches of fill materials

11,891,880.00 Square feet
11,891,880.00 Cubic feet
440,440.00 Cubic yards

6.0 Transport MRM, weighted average haul distance to Mac 1 site 11 miles (from engineers estimate)

	Roundtrip Miles	Average MPH	Time Minutes	5% inefficiency	Loading Time	Unload Time	Total RT Minutes	Total Hours RT	Total CY	CY per Load	Total Loads	Qty of Trucks	Total Hours	CY Per Hour	CY / Day	Hours Per Day		Total Days
BJ1	19.14	45	25.5	26.8	6.23	2.12	35.14	0.59	368,693	40	9,217	9	599.83	615	5071	8.25		73
Mac 2	19.84	45	26.5	27.8	6.23	2.12	36.12	0.60	87,930	40	2,198	9	147.04	598	4933	8.25		18
BJ 2	20.40	45	27.2	28.6	6.23	2.12	36.91	0.62	187,630	40	4,691	9	320.58	585	4829	8.25		39
Total	19.79	45	26.4	27.7	6.23	2.12	36.06	0.60	644,253	40	16,106	9	1,067.45	599	4944	8.25		129

NOTE: Stockpile management is performed as part of Crew F Mine Waste Loading for Transportation to other Mine Site

3a	From	Cubic Yards	Distance	CY Miles	To	
	Mac 2	87,930	9.92	872,265	Mac 1	60,982
	Black Jack 1	368,693	9.57	3,528,391		
	Black Jack 2	187,630	10.20	1,913,829		
		644,253		6,314,485		

63	$ 3,983.22	$ 109,823.03	11.0%
64	$ 3,843.81	$ 105,979.23	10.6%
65	$ 3,709.27	$ 102,269.95	10.2%
66	$ 3,579.45	$ 98,690.50	9.9%
67	$ 3,454.17	$ 95,236.34	9.5%
68	$ 3,333.27	$ 91,903.06	9.2%
69	$ 3,216.61	$ 88,686.46	8.9%
70	$ 3,104.03	$ 85,582.43	8.6%
71	$ 2,995.39	$ 82,587.05	8.3%
72	$ 2,890.55	$ 79,696.50	8.0%
73	$ 2,789.38	$ 76,907.12	7.7%
74	$ 2,691.75	$ 74,215.37	7.4%
75	$ 2,597.54	$ 71,617.83	7.2%
76	$ 2,506.62	$ 69,111.21	6.9%
77	$ 2,418.89	$ 66,692.32	6.7%
78	$ 2,334.23	$ 64,358.09	6.4%
79	$ 2,252.53	$ 62,105.55	6.2%
80	$ 2,173.69	$ 59,931.86	6.0%
81	$ 2,097.62	$ 57,834.24	5.8%
82	$ 2,024.20	$ 55,810.05	5.6%
83	$ 1,953.35	$ 53,856.69	5.4%
84	$ 1,884.98	$ 51,971.71	5.2%
85	$ 1,819.01	$ 50,152.70	5.0%
86	$ 1,755.34	$ 48,397.36	4.8%
87	$ 1,693.91	$ 46,703.45	4.7%
88	$ 1,634.62	$ 45,068.83	4.5%
89	$ 1,577.41	$ 43,491.42	4.3%
90	$ 1,522.20	$ 41,969.22	4.2%
91	$ 1,468.92	$ 40,500.30	4.1%
92	$ 1,417.51	$ 39,082.79	3.9%
93	$ 1,367.90	$ 37,714.89	3.8%
94	$ 1,320.02	$ 36,394.87	3.6%
95	$ 1,273.82	$ 35,121.05	3.5%
96	$ 1,229.24	$ 33,891.81	3.4%
97	$ 1,186.21	$ 32,705.60	3.3%
98	$ 1,144.70	$ 31,560.90	3.2%
99	$ 1,104.63	$ 30,456.27	3.0%
100	$ 1,065.97	$ 29,390.30	2.9%

Appendix F.4 - Calculations

Estimate Version Information: **Rev** **L** **September 15, 2023**

7.0 Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture

MRM materials — Placed at Mac 1 site

Cubic Yards	Avg Depth - FT	Sq. Feet	Sq. Yards	Acre
705,234.82	11.2	1,842,061.00	204,673.44	42.29

3 foot section comprised of 30" of local materials and 6" of imported gravel mix

Inches	Cubic Feet	Cubic Yards	Inches	Cubic Feet	Cubic Yards
30	4,605,152.50	170,561.20	6	921,030.50	34,112.24
			Admixture	Gravel	5,116.84
				Soil	28,995.40

Alternative 3b: Consolidate Four Homestake Sites at One Repository Site (BJ1 site)

2.0 Clear vegetation

Engineers estimate including Mac 1, Mac 2, BJ 1, BJ 2. 235 AC of disturbed area at 700,000 CY of MRM excavation

CY	AC	CY / AC
549,982	235	2340

Updated SSM-M&BJ Repository Layouts - 30 September 2022

SHEET NUMBER	Location	ALTERNATIVE	VOLUME CY	2D AREA SF	3D AREA SF	OVERLAP LIMITS OF IMPACTED AREA SF	OVERLAP MRM DEPTH SF	Volume under repository CY	Volume Outside Repository to Haul CY	Backfill/ Revegetate Areas (AC)	Volume of >2 OUTSIDE of repository footprint CY
7	Black Jack No. 1	3B	705,235	2,942,566.00	2,945,440.00	2,315,347.00	457,516.00	133,183.39	549,981.87	234.84	224,234.27
			705,235	2,942,566	2,945,440	2,315,347	457,516				

4.0 Regrade excavated areas with borrow material

Note: For alternate estimate, assume replacement of fill materials in MRM >2 ft depth areas, with 20% swell factor.

235 acres — square feet — inches of fill materials

-	Square feet
-	Cubic feet
1.20	Swell Factor
269,081.13	Cubic yards

5.0 Place topsoil and revegetate disturbed areas

Note: For alternate estimate, assume 12 inches of topsoil recovered on-site to cover the 235 acres of disturbed area.

235 acres — 43,560 square feet/AC — 12 inches of fill materials

10,236,600.00	Square feet
10,236,600.00	Cubic feet
379,133.33	Cubic yards

6.0 Transport MRM, weighted average haul distance to BJ 1 site 8 miles

inefficiency

	Miles	Roundtrip Miles	Average MPH	Time Minutes	5%	Loading Time	Unload Time	Total RT Minutes	Total Hours RT	Total CY	CY per Load	Total Loads	Qty of Trucks	Total Hours	CY Per Hour	Hours Per Day		Total Days
Mac 1	9.57	19.14	45	25.5	26.8	6.23	2.12	35.14	0.59	60,982	40	1,525	9	99.21	615	8.25		12
Mac 2	6.77	13.54	45	18.1	19.0	6.23	2.12	27.30	0.46	87,930	40	2,198	9	111.14	791	8.25		13
BJ 2	7.05	14.1	45	18.8	19.7	6.23	2.12	28.09	0.47	187,630	40	4,691	9	243.96	769	8.25		30
Total	7.80	15.59	45	20.8	21.8	6.23	2.12	30.18	0.50	336,542	40	8,414	9	454.31	725	8.25		55

NOTE: Stockpile management is performed as part of Crew F Mine Waste Loading for Transportation to other Mine Site

7.0 Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture

MRM materials — Placed at Mac 1 site

Cubic Yards	Avg Depth - FT	Sq. Feet	Sq. Yards	Acre
8.68	11.2	2,945,440.00	327,271.11	67.62

3 foot section comprised of 30" of local materials and 6" of imported gravel mix

Inches	Cubic Feet	Cubic Yards	Inches	Cubic Feet	Cubic Yards
30	7,363,600.00	272,725.93	6	1,472,720.00	54,545.19
			Admixture	Gravel	8,181.78
				Soil	46,363.41

Alternative 4a: Regional Repository at Mac No. 1

2.0 Clear vegetation

Engineers estimate including Mac 1, Mac 2, BJ 1, BJ 2. 273 AC of disturbed area at 700,000 CY of MRM excavation

CY	AC	CY / AC
638,587.89	273	2339
0	0	2339
Total	273	

Updated SSM-M&BJ Repository Layouts - 30 Sept 2022

SHEET NUMBER	Location	ALTERNATIVE	VOLUME CY	2D AREA SF	3D AREA SF	OVERLAP LIMITS OF IMPACTED AREA SF	OVERLAP MRM DEPTH SF	Volume under repository CY	Volume Outside Repository to Haul CY	Backfill/ Revegetate Areas (AC)	Volume of >2 OUTSIDE of repository footprint CY
8	MAC No. 1	4A	1,039,000	3,347,813.00	3,349,288.00	644,331.00	321,557.00	44,577.37	638,587.89	273.20	255,730.77
			1,039,000	3,347,813	3,349,288	644,331	321,557				

4.0 Regrade excavated areas with borrow material

Note: For alternate estimate, assume replacement of fill materials in MRM >2 ft depth areas, with 20% swell factor.

273 acres — square feet — inches of fill materials

-	Square feet
-	Cubic feet
1.20	Swell Factor
306,876.92	Cubic yards

5.0 Place topsoil and revegetate disturbed areas

Note: For alternate estimate, assume 12 inches of topsoil recovered on-site to cover the 273 acres of disturbed area.

273 acres — 43560 square feet — 12 inches of fill materials

11,891,880.00	Square feet
11,891,880.00	Cubic feet
440,440.00	Cubic yards

Appendix F.4 - Calculations

Estimate Version Information: **Rev** **L** **September 15, 2023**

6.0 Transport MRM to Mac No. 1 site (11 miles) Covered in MAC 1 MAC 1, MAC 2, BJ 1,BJ 2

	Miles	Roundtrip Miles	Average MPH	Time Minutes	5% inefficiency	Loading Time	Unload Time	Total RT Minutes	Total Hours RT	Total CY	CY per Load	Total Loads	Qty of Trucks	Total Hours	CY Per Hour	Hours Per Day		Total Days
Mac 2	9.92	19.84	45	26.5	27.8	6.23	2.12	36.12	0.60	87,930	40	2,198	9	147.04	598	8.25		18
BJ 1	10.20	20.4	45	27.2	28.6	6.23	2.12	36.91	0.62	368,693	40	9,217	9	629.94	585	8.25		76
BJ 2	10.20	20.4	45	27.2	28.6	6.23	2.12	36.91	0.62	187,630	40	4,691	9	320.58	585	8.25		39
Eng. Est Mat	10.11	20.21	45	27.0	28.3	6.23	2.12	36.64	0.61	-	40	-	9	-	#DIV/0!	8.25		0
Total	10.11	20.21	45	27.0	28.3	6.23	2.12	36.64	0.61	644,253	40	16,106	9	1,097.56	#DIV/0!	8.25		133

NOTE: Stockpile management is performed as part of Crew F Mine Waste Loading for Transportation to other Mine Site

7.0 Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture

MRM materials Placed in multiple repositories, at each site

Cubic Yards	Avg Depth - FT	Sq. Feet	Sq. Yards	Acre
705,234.82	11.2	1,840,768.00	204,529.78	42.26

3 foot section comprised of 30" of local materials and 6" of imported gravel mix

Inches	Cubic Feet	Cubic Yards	Inches	Cubic Feet	Cubic Yards
30	4,601,920.00	170,441.48	6	920,384.00	34,088.30
			Admixture	Gravel	5,113.24
				Soil	28,975.05

Alternative 4b: Regional Repository at Black Jack No. 1

2.0 Clear vegetation

Engineers estimate including Mac 1, Mac 2, BJ 1, BJ 2. 233 AC of disturbed area at 700,000 CY of MRM excavation

	CY	AC	CY / AC
	546,247.07	233	2344
	0	0	2344
Total	546247.0651	233	

Updated SSM-M&BJ Repository Layouts - Sept 30 2022

SHEET NUMBER	Location	ALTERNATIVE	VOLUME CY	2D AREA SF	3D AREA SF	OVERLAP LIMITS OF IMPACTED AREA SF	OVERLAP MRM DEPTH SF	Volume under repository CY	Volume Outside Repository to Haul CY	Backfill/ Revegetate Areas (AC)	Volume of >2 OUTSIDE of repository footprint CY
9	Black Jack No. 1	4B	1,039,000	3,386,260.00	3,389,932.00	2,412,452.00	457,516.00	136,918.20	546,247.07	232.61	224,234.27
			1,039,000	3,386,260	3,389,932	2,412,452	457,516				

4.0 Regrade excavated areas with borrow material

Note: For alternate estimate, assume replacement of fill materials in MRM >2 ft depth areas, with 20% swell factor.

233 acres square feet inches of fill materials

-	Square feet
-	Cubic feet
1.20	Swell Factor
269,081.13	Cubic yards

5.0 Place topsoil and revegetate disturbed areas

Note: For alternate estimate, assume 12 inches of topsoil recovered on-site to cover the 233 acres of disturbed area.

233 acres 43560 square feet 12 inches of fill materials

10,149,480.00	Square feet
10,149,480.00	Cubic feet
375,906.67	Cubic yards

6.0 Transport MRM to Black Jack No. 1 site (8 miles) Covered in Black Jack No. 1 MAC 1, MAC 2, BJ 1,BJ 2, MARIANO LAKES

Note: The engineers estimate has a quantity of 69,235 CY less than the sum of each of the areas. Assumption is that the additional material is spread evenly over each site.

Mine	Cubic Yards
Mac 1	**60,982**
Mac 2	**87,930**
BJ 1	**368,693**
BJ 2	**187,630**
Mariano	-
	-
	-
Eng. Est Mat	-
TOTAL MRM	**705,235**

	Miles	Roundtrip Miles	Average MPH	Time Minutes	5% inefficiency	Loading Time	Unload Time	Total RT Minutes	Total Hours RT	Total CY	CY per Load	Total Loads	Qty of Trucks	Total Hours	CY Per Hour	Hours Per Day		Total Days
Mac 1	9.57	19.14	45	25.5	26.8	6.23	2.12	35.14	0.59	60,982	40	1,525	10	89.29	683	8.25		11
Mac 2	6.77	13.54	45	18.1	19.0	6.23	2.12	27.30	0.46	87,930	40	2,198	10	100.02	879	8.25		12
BJ 1	-	0	45	0.0	0.0	6.23	2.12	8.35	0.14	-	40	-	10	-	0	8.25		0
BJ 2	7.05	14.1	45	18.8	19.7	6.23	2.12	28.09	0.47	187,630	40	4,691	10	219.57	855	8.25		27
Eng. Est Mat	7.80	15.59	45	20.8	21.8	6.23	2.12	30.18	0.50	-	40	-	10	-	#DIV/0!	8.25		0
Total	7.80	12.47	45	16.6	17.5	6.23	2.12	25.81	0.43	336,542	40	6,889	10	319.59	#DIV/0!	8.25		39

NOTE: Stockpile management is performed as part of Crew F Mine Waste Loading for Transportation to other Mine Site

Appendix F.4 - Calculations

Estimate Version Information: **Rev** **L** **September 15, 2023**

7.0 Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture

MRM materials — Placed in multiple repositories, at each site

Cubic Yards	Avg Depth - FT	Sq. Feet	Sq. Yards	Acre
705,234.82	11.2	2,945,440.00	327,271.11	67.62

3 foot section comprised of 30" of local materials and 6" of imported gravel mix

Inches	Cubic Feet	Cubic Yards
30	7,363,600.00	272,725.93

Admixture

Inches	Cubic Feet	Cubic Yards
6	1,472,720.00	54,545.19
Gravel		8,181.78
Soil		46,363.41

Alternative 4c: Two Regional Repositories: one at Mac No. 1 and another at Black Jack No. 1

2.0 Clear vegetation

Previous alternates including Mac 1, Mac 2, BJ 1, BJ 2. 222 AC of disturbed area at 700,000 CY of MRM excavation

	CY	AC	CY / AC
	461,006	222	2077
			2077
Total	461005.722	222	

Updated SSM-M&BJ Repository Layouts - 30 Sept 2022

SHEET NUMBER	Location	ALTERNATIVE	VOLUME CY	2D AREA SF	3D AREA SF	OVERLAP LIMITS OF IMPACTED AREA SF	OVERLAP MRM DEPTH SF	Volume under repository CY	Volume Outside Repository to Haul CY	Backfill/ Revegetate Areas (AC)	Volume of >2 OUTSIDE of repository
10	MAC No. 1	4C	471,000	2,143,136.00	2,144,023.00	587,386.00	298,988.00	40,927.67	266,297.87	115.96	113,692.50
11	Black Jack No. 1	4C	568,000	2,855,925.00	2,858,225.00	2,294,819.00	457,516.00	181,231.87	194,707.85	105.87	33,593.77
			1,039,000	4,999,061	5,002,248	2,882,205	756,504	222,160	461,006	222	147,286

4.0 Regrade excavated areas with borrow material

Note: For alternate estimate, assume replacement of fill materials in MRM >2 ft depth areas, with 20% swell factor.

222 acres — square feet — inches of fill materials

-	Square feet
-	Cubic feet
1.20	Swell Factor
176,743.53	Cubic yards

5.0 Place topsoil and revegetate disturbed areas

Note: For alternate estimate, assume 12 inches of topsoil recovered on-site to cover the 222 acres of disturbed area.

222 acres — 43560 square feet — 12 inches of fill materials

9,670,320.00	Square feet
9,670,320.00	Cubic feet
358,160.00	Cubic yards

4b	From	Cubic Yards	Distance	CY Miles	To	Local mat	total mat
	Mac 2	87,930	9.92	872,265	Mac 1	-	275,560
	Black Jack 2	187,630	10.20	1,913,829			
		275,560		2,786,094			

4b	From	Cubic Yards	Distance	CY Miles	To	Local mat	total mat
				-	BJ 1	-	-
				-			
	Eng. Est Mat			-			
				-			

6.0 Transport MRM to Mac No. 1 Site (9.5 miles) — Covered in MAC 1 — MAC 1, MAC 2, BJ 2, MARIANO LAKES

	Miles	Roundtrip Miles	Average MPH	Time Minutes	5% inefficiency	Loading Time	Unload Time	Total RT Minutes	Total Hours RT	Total CY	CY per Load	Total Loads	Qty of Trucks	Total Hours	CY Per Hour	Hours Per Day		Total Days
Mac 2	9.92	19.84	45	26.5	27.8	6.23	0.00	34.00	0.57	87,930	40	2,198	10	124.57	706	8.25		15
BJ 2	10.20	20.4	45	27.2	28.6	6.23	0.00	34.79	0.58	187,630	40	4,691	10	271.95	690	8.25		33
	0.77	1.54	45	2.1	2.2	6.23	0.00	8.38	0.14	-	40	-	10	-	0	8.25		0
Eng. Est Mat	6.96	13.93	45	18.6	19.5	6.23	0.00	25.72	0.43	-	40	-	10	-	0	8.25		0
Total	6.96	13.93	45	18.6	19.5	0.00	0.00	19.50	0.32	275,560	40	6,889	10	396.52	349	8.25		48

NOTE: Stockpile management is performed as part of Crew F — Mine Waste Loading for Transportation to other Mine Site

7.0 Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture

MRM materials — Placed in multiple repositories, at each site

Cubic Yards	Avg Depth - FT	Sq. Feet	Sq. Yards	Acre
705,234.82	10.9	3,304,610.00	367,178.89	75.86

3 foot section comprised of 30" of local materials and 6" of imported gravel mix

Inches	Cubic Feet	Cubic Yards
30	8,261,525.00	305,982.41

Admixture

Inches	Cubic Feet	Cubic Yards
6	1,652,305.00	61,196.48
Gravel		9,179.47
Soil		52,017.01

Alternative 5: Excavation and Off-Navajo Disposal within 100 Miles

2.0 Clear vegetation

Previous alternates including Mac 1, Mac 2, BJ 1, BJ 2 accepted 288 AC of disturbed area at 700,000 CY of MRM excavation

	CY	AC	CY / AC
	705,235	288	2449
Total		288	

4.0 Regrade excavated areas with borrow material

Note: For alternate estimate, assume replacement of fill materials in MRM >2 ft depth areas, with 20% swell factor.

288 acres — square feet — inches of fill materials

-	Square feet
-	Cubic feet
1.20	Swell Factor
340,924.80	Cubic yards

Volume > 2 ft (total, C.Y.)
34862 M1
21163 M2
159861 BJ1
68218 BJ2

5.0 Place topsoil and revegetate disturbed areas

Note: For alternate estimate, assume 12 inches of topsoil recovered on-site to cover the 288 acres of disturbed area.

288 acres — 43560 square feet — 12 inches of fill materials

12,545,280.00	Square feet
12,545,280.00	Cubic feet
464,640.00	Cubic yards

Appendix F.4 - Calculations

Estimate Version Information: **Rev** **L** **September 15, 2023**

6.0 Transport 710,000 CY of MRM to Ambrosia lake area — Covered Offsite — MAC 1, MAC 2, BJ 1,BJ 2

Mine	Cubic Yards
Mac 1	60,982
Mac 2	87,930
BJ 1	368,693
BJ 2	187,630
TOTAL MRM	705,235

***CREW K - LONG HAUL (near Ambrosia Lake area)** — inefficiency

	Miles	Roundtrip Miles	Average MPH	Time Minutes	5%	Loading Time	Unload Time	Total RT Minutes	Total Hours RT	Total CY	CY per Load	Total Loads	Qty of Trucks	Total Hours	CY Per Hour	Hours Per Day		Total Days
Mac 1	69	138	50	165.6	173.9	5.44	2.12	181.44	3.02	60,982	40	1,525	11	419.10	146	11.00		38
Mac 2	66.53	133.06	50	159.7	167.7	5.44	2.12	175.21	2.92	87,930	40	2,198	11	583.58	151	11.00		53
BJ 1	62	123.6	50	148.3	155.7	5.44	2.12	163.29	2.72	368,693	40	9,217	11	2,280.50	162	11.00		207
BJ 2	67	133.4	50	160.1	168.1	5.44	2.12	175.64	2.93	187,630	40	4,691	11	1,248.32	150	11.00		113
Total	66.01	132.02	50	158.4	166.3	5.44	2.12	173.90	2.90	705,235	40	17,631	11	4,531.50	152	11.00		412

NOTE: Stockpile management is performed as part of Crew F — Mine Waste Loading for Transportation to other Mine Site

7.0 Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture

MRM materials — Placed in one repository, off-site

Cubic Yards	Avg Depth - FT	Sq. Feet	Sq. Yards	Acre
705,234.82	6.65	3,460,815.00	384,535.00	79.45

3 foot section comprised of 30" of local materials and 6" of imported gravel mix

Inches	Cubic Feet	Cubic Yards	Inches	Cubic Feet	Cubic Yards
30	8,652,037.50	320,445.83	6	1,730,407.50	64,089.17
			Admixture	Gravel	9,613.38
				Soil	54,475.79

Alternative 6: Excavation and Off-Navajo Disposal at an Existing Licensed Facility

2.0 Clear vegetation

Engineers estimate including Mac 1, Mac 2, BJ 1, BJ 2 accepted 79 AC of disturbed area at 362,000 CY of MRM excavation

CY	AC	CY / AC
710000	288	2465
Total	288	

3.0 Excavate total of 710,000 CY of MRM and haul to offsite disposal facility
Stage the material at Black Jack One, same as Alternate 3b

4.0 Regrade excavated areas with borrow material

Note: For alternate estimate, assume replacement of fill materials in MRM >2 ft depth areas, with 20% swell factor.

288	acres	square feet	inches of fill materials	

-	Square feet
-	Cubic feet
1.20	Swell Factor
340,924.80	Cubic yards

Volume > 2 ft (total, C.Y.)
34862 M1
21163 M2
159861 BJ1
68218 BJ2

5.0 Place topsoil and revegetate disturbed areas

Note: For alternate estimate, assume 12 inches of topsoil recovered on-site to cover the 288 acres of disturbed area.

288	acres	43560	square feet	12	inches of fill materials

12,545,280.00	Square feet
12,545,280.00	Cubic feet
464,640.00	Cubic yards

7.0 Transport 710,000 CY of MRM 528 miles to offsite disposal facility — Disposal Facility — MAC 1, MAC 2, BJ 1,BJ 2, MARIANO LAKES

Mine	Cubic Yards
Mac 1	60,982
Mac 2	87,930
BJ 1	368,693
BJ 2	187,630
TOTAL MRM	705,235

Haul materials from Mac 1, Mac 2, and BJ 2 to staging area at BJ 1 — inefficiency

	Miles	Roundtrip Miles	Average MPH	Time Minutes	5%	Loading Time	Unload Time	Total RT Minutes	Total Hours RT	Total CY	CY per Load	Total Loads	Qty of Trucks	Total Hours	CY Per Hour	Hours Per Day		Total Days
Mac 1	9.57	19.14	45	25.5	26.8	6.23	2.12	35.14	0.59	60,982	40	1,525	10	89.29	683	8.25		11
Mac 2	6.77	13.54	45	18.1	19.0	6.23	2.12	27.30	0.46	87,930	40	2,198	10	100.02	879	8.25		12
BJ 2	7.05	14.1	45	18.8	19.7	6.23	2.12	28.09	0.47	187,630	40	4,691	10	219.57	855	8.25		27
Total	7.80	15.59	45	20.8	21.8	0.00	2.12	23.95	0.40	336,542	40	8,414	10	408.88	806	8.25		50

Transport material from BJ 1 staging area to Deer Trail - Colorado

***CREW I - LONG HAUL** — inefficiency

	Miles	Roundtrip Miles	Average MPH	Time Minutes	2%	Loading Time	Unload Time	Total RT Minutes	Total Hours RT	Total CY	CY per Load	Total Loads	Qty of Trucks	Total Hours	CY Per Hour	Hours Per Day		Total Days
Mac 1	528	1056	60	1056.0	1077.1	5.44	2.12	1084.68	18.08	60,982	40	1,525	11	2,505.51	24	11.00		228
Mac 2	528	1056	60	1056.0	1077.1	5.44	2.12	1084.68	18.08	87,930	40	2,198	11	3,612.71	24	11.00		328
BJ 1	528	1056	60	1056.0	1077.1	5.44	2.12	1084.68	18.08	368,693	40	9,217	11	15,148.21	24	11.00		1377
BJ 2	528	1056	60	1056.0	1077.1	5.44	2.12	1084.68	18.08	187,630	40	4,691	11	7,709.03	24	11.00		701
Total	528.00	1056.00	60	1056.0	1077.1	5.44	2.12	1084.68	18.08	705,235	40	17,631	11	28,975.47	24	11.00		2634

NOTE: Stockpile management is performed as part of Crew F — Mine Waste Loading for Transportation to other Mine Site

Using 2 crews of trucks to meet the performance schedule	1317

Appendix F.4 - Calculations

Estimate Version Information: **Rev** **L** **September 15, 2023**

Disposal Fee

	Cubic Yards	TON/CY	Weight -Tons	Swell	Total Tons	Cost/Ton	Total Disposal Fee
Weight of Materials	705,235	1.35	952,067	20%	1,142,480	$ 60.00	$ 68,548,824.67

Deer Trail Low End Price (large volume)

Facility	Cost of disposal		Distance		
White Mesa	$ 76.00	per ton	215	miles	*EPA Region 9 determined White Mesa as not a viable CERCLA waste disposal facility (see text in EECA Section 4.1)
Waste Control Specialists Facility - Andrews, Texas	$ 10.00	per cf	473	miles	*This facility was ruled out because it cannot accept all MRM - facility has concentration based limits (Ra-226/Ra-228 limit of 30 pCi/g)
Energy Solutions Facility - Clive, Utah	Unknown		586	miles	*Ruled out based on haul route through Navajo Nation and communities like Moab, UT. Haul Route on interstates would be very long (~1,200 miles) and impractical.
Deer Trail - Colorado	$60.00 - $70.00	per ton	528	miles	*Selected as preferred disposal facility for this EE/CA

****UPDATE - Clean Harbor - Deer Trail Proposal July 20, 2022****

Disposal Fee **Rev I - Updated Pricing**

	Cubic Yards	TON/CY	Weight -Tons	Swell	Total Tons	Cost/Ton	Total Disposal Fee
Weight of Materials	705,235	1.35	952,067	**0%**	952,067	**$ 82.25**	$ 78,307,511.52

*Removed the swell factor, this is in the excavation **Clean Harbors - Deer Trail Proposal - July 20, 2022**

Clean Harbors - Deer Trail Proposal July 20, 2022

DISPOSAL

TENORM Direct Landfill Non-RCRA	**$ 75.00**		528	miles
Adams County Fee	**$ 2.25**			
Rocky Mountain Compact Fee	**$ 5.00**			
TOTAL	**$ 82.25**	**per ton**		

TRUCKING

End dump Trailer, Long Haul - 23 Tons per load	**$ 171.80**	**per ton**
Rail Car Service (Gondolas) - 100 tons per gondola	**$ 146.80**	**per ton**

Clean Harbors Environmental Services, Inc.
42 Longwater Drive, P.O. Box 9149
Norwell, MA 02061-9149
781.792.5000
www.cleanharbors.com

Chris Vidovich — VP Project Services — 724-980-2839
Mark Atkinson — Project Services Sales – Western Region — 805-208-8518

TRI Facility Name: CLEAN HARBORS DEER TRAIL LLC
Address: 108555 EAST HIGHWAY 36, DEER TRAIL COLORADO 80105
County: ADAMS
Public Contact: MIKE COMEAU WILLIAM KETNER Mark Atkinson Michael Hall
Phone Number: 781-361-4392 970 386-2293 801 214-4963

APPENDIX F.5
PERFORMANCE

Appendix F.5 - Performance

Crew A — **Clearing and Grubbing Vegetation** — Units: **AC**

Effective blade width - FT	One sq. acre width - FT	Passes to cover road	Actual passes	One sq. acre length - FT	Traveled distance - Mile	Working speed - MPH	Time - Hours	Turning / Repositioning	passes	Hours	Production per Hour - AC
10.7	209	19.53	20.00	209	0.792	1.70	0.466	0.500	2	1.93	**0.518**
						Minutes	28	30.0			

CATD6 Dozer based crew with a CAT980 Loader assisting with moving excavated materials.
Excavated vegetation is assumed to be stockpiled / spread near excavation and not require loading or transporting.
A service truck is available 25% of the time for fueling and normal maintenance.
One laborer is to assist with grade checking and spotting gravel import

Crew B — **Excavation, Loading, and Hauling to Repository or Staging Area** — Units: **CY**

Loading time Minute	Loads per Hour	LCY per load	LCY / Hour			Truck Match
7.38	8.1	23	**187**			**2.4**
Dumping time Minute	Avg Distance to Repository/Stage		Miles round Trip	MPH	Enroute Min	Truck time per load - Minute
4.37	2000		0.76	8	5.7	17.4

CAT390 Excavator based crew, with CAT980 Loader assisting to dig and pile materials. CAT740 trucks matched by average haul distances.
Loading and hauling of PTW from removal areas to repository area
Used 3.5 times the estimated cycle time for loading to compensate for care in loading PTW materials. CAT Performance Handbook edition 44

Cycle Time	Load Bucket	Swing Loaded	Dump Bucket	Swing Empty	Total Cycle Time	Passes	Truck Spot	Time - Minutes
Load	0.67	0.21	0.11	0.245	1.23	5.0	1.25	**7.375**
	Truck Spot	Eject	Retract	Pullout	Time Minutes	Bucket CY	% of Capacity	LCY per Load
Dump	2.25	0.27	0.35	1.50	**4.37**	6.1	75%	**23**

Note: cost is approximately $ 8.99 per cubic yard - not including support activities (road maintenance, final grading)

Crew C — **Spreading Materials in Repository Area** — Units: **CY**

Effective blade width - FT	Amount carried per pass - CY	Distance to spread - LF	Traveled distance - Mile	Working speed - MPH	Time to spread - HR	Reversing speed - MPH	Time to reverse - HR	Time per pass - HR	Passes per hour	Production per hour - CY
10.7	7.26	250	0.047	1.70	0.028	5.20	0.009	0.037	27.06	196.44
					Minutes		Minutes			
					1.671		0.546	2.217		

CAT D6 Dozer based crew with a CAT14M Motor Grader spreading material to grade
Spread loose materials being actively placed and by dump trucks.
A service truck is available 25% of the time for fueling and normal maintenance.
Two laborers available to assist with grade checking and spotting

Crew D — **Excavations of local fill materials** — Units: **CY**

Loading time Minute	Loads per Hour	CY per load	CY / Hour			Truck Match
4.15	14.5	27	**390**			2.4
Dumping time Minute	Average Haul Distance	Additional Haul Distance	Miles round Trip	MPH	Enroute Min	Truck time per load - Minute
2.12	2000	0	0.76	12	3.8	10.1

CAT980 Loader based crew - loading trucks - misc. earthmoving. CATD6 Dozer piling materials. CAT740 trucks matched by average haul distances.
Loading and hauling cover material to removal area, and other miscellaneous excavations

Cycle Time	Load Bucket	Travel Loaded	Dump Bucket	Travel Empty	Total Cycle Time	Passes	Truck Spot	Time - Minutes
Load	0.25	0.25	0.10	0.25	0.85	4.0	0.75	**4.15**
	Truck Spot	Eject	Retract	Pullout	Time Minutes	Bucket CY	% of Capacity	LCY per Load
Dump	0.75	0.27	0.35	0.75	**2.12**	7.1	95%	**27**

Appendix F.5 - Performance

Crew E	Grading and Leveling				Units	Acres / Hr.
	Blade Width - FT	Speed - MPH	Factor	Acres / Hour	Efficiency	Acres / Hour
	14	3.7	8.25	6.28	50.0%	3.14

CAT MG 14M based crew, final grading of repository, stormwater areas, and other large areas
One CAT740 8000 gallon water truck for soil amending and dust control
CAT Handbook 416C - tillage performance (factor formula for acres per hour)

Crew F	Mine Waste Loading for Transportation to other Mine Site				Units	CY		
	Loading time Minute	Loads per Hour	CY per load	CY / Hour		Passes	Truck Spot	Time - Minutes
	6.26	9.6	40.0	**383**		7.0	0.75	**6.26**

	Load Bucket	Swing Loaded	Dump Bucket	Swing Empty	Total Cycle Time	Bucket CY	% of Capacity	CY per Load
Cycle Time								
Load	0.43	0.135	0.07	0.1575	0.79	6.1	94%	**40**

CAT390 Excavator based crew loading trucks, and a CAT980 Loader 50% of the time assisting loading and performing stockpile management.
A service truck is available 25% of the time for fueling and normal maintenance.
Loading of mine waste material from stockpile areas to on-highway trucks.
Used 2.25 times the estimated cycle time for loading to compensate for care in loading waste materials. CAT Performance Handbook edition 44

Note: cost is approximately $ 1.60 per cubic yard - not including support activities (traffic control, road maintenance)

Crew G	Mine Waste Hauling Site to Site				0	Minute	
Loading time	Truck Spot	Load Bucket	Swing Loaded	Dump Bucket	Swing Empty	Total Cycle Time	
	0.75	0.43	0.135	0.07	0.1575	0.79	

Bucket CY	% of Capacity	CY per Load	Passes	Pullout	Load Time	Trucks / Hour
6.1	94%	**40**	7.0	0.75	**7.01**	9

Dump	Truck Spot	Eject	Retract	Pullout	Unload Time
	1.00	0.27	0.35	0.50	**2.12**

Off-road 40 CY articulated dump truck based crew. Hauling materials from mine site to site.
Service truck and mechanic available full time for maintenance and fueling.
Number of trucks matched to loading equipment

Crew H	Compaction of Materials				Units	SY						
Drum width - FT	Area Width - FT	Area Length - FT	Passes to cover	Actual passes	Traveled distance - Mile	Working speed - MPH	Time - Hours	Turning / Repositioning	Passes for % of compaction	Hours	SF in Area	Production* per Hour - SY
6.5	100	100	15.38	16.00	0.303	2.00	0.152	0.080	2	0.46	10,000	**2,400**
	Compacting of repository cover and roadways					Minutes	9	4.8				

CATCS56B Roller based crew with a CAT740 water trucks assisting for compaction and dust control
*CAT CS56 specifications - publication HEHG3672 (10/2007)

250 Cubic Meters per hour at 6" depth = 1,965 SY per Hour - 95-98% compaction
250 Cubic Meters per hour at 4" depth = 2,947 SY per Hour - 95-98% compaction

Crew I	Dust Control During Removal Activities	Units	DY

Appendix F.5 - Performance

Crew J — **Mine Waste Loading for Hauling over the Road** — **Units** Minute — CY / Hour: **386**

Loading time

Truck Spot	Load Bucket	Swing Loaded	Dump Bucket	Swing Empty	Total Cycle Time
0.75	0.43	0.135	0.07	0.1575	0.79

Bucket CY	% of Capacity	CY per Load	Passes	Pullout	Load Time	Trucks / Hour
7.1	95%	**40**	6.0	0.75	**6.23**	10

Dump

Truck Spot	Eject	Retract	Pullout	Unload Time
1.00	0.27	0.35	0.50	**2.12**

Loader based crew. Loading on-road 40 CY dump truck based crew. Hauling materials over the road to a disposal facility.
Number of trucks matched to loading equipment.

Crew K — **Mine Waste Hauling Over the Road** — **Minute**

Loading time

Truck Spot	Load Bucket	Swing Loaded	Dump Bucket	Swing Empty	Total Cycle Time
0.75	0.43	0.135	0.07	0.1575	0.79

Bucket CY	% of Capacity	CY per Load	Passes	Pullout	Load Time	Trucks / Hour
8.0	99%	**40**	5.0	0.75	**5.44**	11

Dump

Truck Spot	Eject	Retract	Pullout	Unload Time
1.00	0.27	0.35	0.50	**2.12**

On-road 40 CY dump truck based crew. Hauling materials from mine site to off-site repository and dumping stationary in a dump site.
Oversized - sand bucket for loading loose materials

Crew L — **Stockpile Management and Materials Handling** — **Units** **DY**

Cycle time - minute	Cycles per hour	LCY per load	LCY / Hour
1.60	37.4	4.30	**161**

CATD6 Dozer and CAT390 Excavator based crew - segregating fill materials imported or cut by other crew.
CAT980 Loader assisting in movement of materials being dumped by trucks.
Service truck and mechanic available 50% of the time

Cycle Time

Load time - minute	Carry speed - mph	Carry distance - feet	Spread time - min	Prod. Time - min	Return speed - mph	Return time	Efficiency %	Time - Minutes
0.25	2.5	150	0.1	1.03	6.80	0.25	80.0	**1.60**

Blade width - in	Blade height - in	Capacity - CY
126.00	44.5	4.30

Crew M — **Removal of debris - metal, wood, concrete** — **Units** **LCY**

Loading time Minute	Loads per Hour	LCY per load	LCY / Hour			Truck Match
9.1	6.6	12	**79**			1.8
Dumping time Minute	Avg Distance Dump/Transfer	Distance to Repository	Miles round Trip	MPH	Enroute Min	Truck time per load - Minute
2.12	2500	0	0.95	12	4.7	16.0

CAT390 Excavator with thumb based crew, CAT740 trucks matched by average haul distances.
2 laborers for spotting and assisting with loading activities
Excavation and removal of scrap materials at the TPH stockpile to the repository

Cycle Time

	Load Bucket	Swing Loaded	Dump Bucket	Swing Empty	Total Cycle Time	Passes	Truck Spot*	Time - Minutes
Load	0.50	0.25	0.10	0.1	0.95	8.0	1.50	**9.1**
	Truck Spot	Eject	Retract	Pullout	Time Minutes	Bucket CY	% of Capacity	LCY per Load
Dump	0.75	0.27	0.35	0.75	**2.12**	3.0	50%	**12**

*Truck spot includes multiple spots per load

APPENDIX F.6
UNITARY COSTS

Appendix F.6 - Unitary Costs

LABOR			CALCULATIONS				
Description	Unit	Total Labor Cost	Base Rate	Burden 35%	With Burden	Efficiency Factor	New Mexico Department of Workforce - Prevailing Wage Type H - 2019 Base Rate + Fringe Rate + Apprenticeship
Supervisor	Hour	$ 129.73	$ 66.07	$ 23.12	$ 89.19	1.455	
Excavator Operator	Hour	$ 75.42	$ 38.41	$ 13.44	$ 51.85	1.455	Operator Group X
Dozer Operator	Hour	$ 75.42	$ 38.41	$ 13.44	$ 51.85	1.455	Operator Group X
Loader Operator	Hour	$ 69.14	$ 35.21	$ 12.32	$ 47.53	1.455	Operator Group IX
General Machinery Operator	Hour	$ 54.04	$ 27.52	$ 9.63	$ 37.15	1.455	Operator Group V
Motor Grader Operator	Hour	$ 75.42	$ 38.41	$ 13.44	$ 51.85	1.455	Operator Group X
Truck Driver - Off Hwy	Hour	$ 47.78	$ 24.33	$ 8.52	$ 32.85	1.455	Truck Driver Group V
Truck Driver - OTR	Hour	$ 45.29	$ 33.55	$ 11.74	$ 45.29	1.000	From previous NM estimates
Mechanic	Hour	$ 60.46	$ 30.79	$ 10.78	$ 41.57	1.455	
Laborer	Hour	$ 46.81	$ 23.84	$ 8.34	$ 32.18	1.455	Laborer Group II
Flagger	Hour	$ 45.34	$ 23.09	$ 8.08	$ 31.17	1.455	Laborer Group I
Security Guard	Hour	$ 46.81	$ 23.84	$ 8.34	$ 32.18	1.455	Laborer Group II

	Hours of Work	Start of Shift	Travel (2)	Inspection of Equipment	Lunch	Break (2)	Available Hours	Labor efficiency - minutes	Shift Hours	Efficiency factor
Efficiency of work hours	10	0.25	0.25	0.25	0.5	0.5	8.25	50/60	**6.875**	**1.455**

EQUIPMENT			CONSEQUENTIAL COSTS							DEPRECIATION COSTS				
Description	Unit	Total Equipment Hourly Rate	Routine & Maintenance	Fuel	Lubrication	Tires & Chains	GET/Wear	No Fuel ($/hr.)	All in	Market Value	Replacement value	Rental Rate (Monthly)	Hrs/Mo	Hourly Rate
Cat 390 Excavator	Hour	$ 377.83	$ 26.55	$ 70.50	$ 3.66		$ 4.47	$ 34.68	$ 105.18	$ 1,890,000.00	2.5%	$ 47,250	173.3	$ 272.65
CAT Excavator 390F L W/thumb	Hour	$ 377.83	$ 26.55	$ 70.50	$ 3.66		$ 4.47	$ 34.68	$ 105.18	$ 1,890,001.00	2.5%	$ 47,250	173.3	$ 272.65
Cat 14M Grader	Hour	$ 224.31	$ 44.79	$ 35.37	$ 1.88	$ 1.99	$ 1.43	$ 50.09	$ 85.46	$ 962,500.00	2.5%	$ 24,063	173.3	$ 138.85
Cat 980H Wheel Loader	Hour	$ 259.89	$ 45.60	$ 31.85	$ 1.73	$ 6.91	$ 7.64	$ 61.88	$ 93.73	$ 1,151,875.00	2.5%	$ 28,797	173.3	$ 166.17
Cat D6T Dozer	Hour	$ 155.07	$ 56.05	$ 30.39	$ 1.20	$ -	$ 2.41	$ 59.66	$ 90.05	$ 450,750.00	2.5%	$ 11,269	173.3	$ 65.02
Western Star 4900SA	Hour	$ 60.67	$ 3.56	$ 21.15	$ 1.15	$ 1.44	$ -	$ 6.16	$ 27.31	$ 231,250.00	2.5%	$ 5,781	173.3	$ 33.36
Western Star WT6900 - Water Truck	Hour	$ 352.29	$ 58.28	$ 69.77	$ 3.65	$ 10.52	$ -	$ 72.44	$ 142.22	$ 1,456,250.00	2.5%	$ 36,406	173.3	$ 210.08
Cat 730 Articulated Truck	Hour	$ 218.66	$ 56.08	$ 30.27	$ 2.40	$ 3.69	$ -	$ 62.16	$ 92.43	$ 875,000.00	2.5%	$ 21,875	173.3	$ 126.23
CAT Articulated 740 EJ Dump Truck	Hour	$ 218.66	$ 56.08	$ 30.27	$ 2.40	$ 3.69	$ -	$ 62.16	$ 92.43	$ 875,001.00	2.5%	$ 21,875	173.3	$ 126.23
CAT 740 8000 gal water truck	Hour	$ 218.66	$ 56.08	$ 30.27	$ 2.40	$ 3.69	$ -	$ 62.16	$ 92.43	$ 875,000.00	2.5%	$ 21,875	173.3	$ 126.23
Tri-axle Single Drop Gooseneck Trailer	Hour	$ 21.63	$ 1.25	$ -	$ -	$ 1.44	$ -	$ 2.69	$ 2.69	$ 131,250.00	2.5%	$ 3,281	173.3	$ 18.93
Western Star 4900SB - Vacuum tank	Hour	$ 69.68	$ 3.56	$ 21.15	$ 1.15	$ 1.44	$ -	$ 6.16	$ 27.31	$ 293,750.00	2.5%	$ 7,344	173.3	$ 42.38
Cat CS56B Roller	Hour	$ 52.25	$ 3.33	$ 20.66	$ 1.13	$ 0.46	$ -	$ 4.91	$ 25.58	$ 184,927.00	2.5%	$ 4,623	173.3	$ 26.68
Cat CS54B Roller	Hour	$ 42.33	$ 3.33	$ 20.66	$ 1.13	$ 0.46	$ -	$ 4.91	$ 25.58	$ 116,115.00	2.5%	$ 2,903	173.3	$ 16.75
Mobile Crushing/Screening Plant	Hour	$ 437.71	$ 136.63	$ 138.58	$ 9.24	$ -	$ -	$ 145.86	$ 284.44	$ 1,062,500.00	2.5%	$ 26,563	173.3	$ 153.27
Ford F350 Service Truck	Hour	$ 17.22	$ 1.13	$ 5.11	$ 0.28	$ 1.33	$ -	$ 2.73	$ 7.84	$ 65,000.00	2.5%	$ 1,625	173.3	$ 9.38
Grove 65t Rough Terrain Crane	Hour	$ 183.05	$ 4.75	$ 48.62	$ 2.27	$ 5.69	$ -	$ 12.71	$ 61.33	$ 843,750.00	2.5%	$ 21,094	173.3	$ 121.72
Klein KPT120 12,000 gal Porto Tower water tank	Hour	$ 6.35	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 44,000.00	2.5%	$ 1,100	173.3	$ 6.35
Vermeer BC1000XL Wood Chipper	Hour	$ 24.89	$ 3.33	$ 14.95	$ 1.13	$ -	$ -	$ 4.46	$ 19.41	$ 38,000.00	2.5%	$ 950	173.3	$ 5.48
Bobcat T595 tracked skid steer with auger	Hour	$ 34.52	$ 3.33	$ 20.66	$ 1.13	$ 0.46	$ -	$ 4.91	$ 25.58	$ 61,995.00	2.5%	$ 1,550	173.3	$ 8.94
spare														

Appendix F.6 - Unitary Costs

MATERIALS		
Description	**Unit**	**Price**
Jobsite 40' Office Containers	Each	$ 32,068.38
Jobsite trailers	Each	
Security trailers	Each/Month	
Sanitation facilities	Each/Month	
Decontamination Station	Month	
Jersey barriers	Each	$ 621.12
Traffic control signage	Month	$ 1,369.00
Traffic control signals	Month	$ 5,000.00
Gates - 40' wide	Each	$ 3,000.00
Mud grates - 40' wide	Each	$ 5,000.00
Fencing	LF	$ 150.00
24" corrugated culverts	LF	$ 843.22
12" corrugated culverts	LF	$ 434.12
Gabion basket materials	S.Y.	$ 138.26
Gabion basket labor and materials	CY	$ 216.84
Geotextile fabric incl mat, equip, labor	SY	$ 3.10
Road Gravel - 1" minus	TON	$ 18.87
Concrete - 3,000 lb. mix - delivered	CY	$ 152.50
Type I filter material - delivered	TON	$ 15.75
Type II filter material - delivered	TON	$ 15.75
D50 = 3.0 in.	CY	$ 17.55
D50 = 6.0 in.	CY	$ 17.55
D50 = 9.0 in	CY	$ 20.25
D50 = 15.0 in.	CY	$ 20.25
D50 = 18.0 in.	CY	$ 24.30
D50 = 27.0 in.	CY	$ 25.65
Seeding	M.S.F.	$ 62.56
		$ -

OTHER					
Concrete culvert, headwall concrete, precast, 30 degree skewed wingwall, 30" diameter pipe				Ea.	$ 2,881.32
Rip-rap and rock lining, random, broken stone, 18" minimum thickness, machine placed for slope protection, not grouted				S.Y.	$ 82.74
Synthetic erosion control, polyethylene, 3 dimensional geomatrix, 50 mil thick				S.Y.	$ 5.16
Soil preparation, structural soil mixing, remove topsoil & stock pile on site, 12" deep, 50' haul, 75 HP dozer				M.S.F.	$ 72.19
Gabion boxes, galvanized steel mesh mats or boxes, stone filled, 36" deep				S.Y.	$ 138.26
Fencing Supply & Install				LF	$ 150.00
Traffic signals, vertical mast and foundation, mast sized for single arm up to 40'; no lighting or transmission function				Ea.	$ 20,439.69
Traffic signals, horizontal arm, per linear foot of arm				Ea.	$ 320.69
Traffic signal, traffic signals, includes signal, bracket, sensor, and wiring				Ea.	$ 2,919.41
Traffic signals, pedestrian signals and callers, includes four signals with brackets and two call buttons				Ea.	$ 5,246.38
Traffic signals, controller, design, and underground conduit, includes miscellaneous signage and adjacent surface work				Ea.	$ 40,945.97
Senior Engineer		Year	$ 133,416.00	Hour	$ 64.14
Project Engineer		Year	$ 99,709.00	Hour	$ 47.94
Project Manager		Year	$ 82,134.00	Hour	$ 39.49
Field personnel, clerk, average	1	Week	$ 559.18	Hour	$ 13.98
Field personnel, field engineer, average	1	Week	$ 1,742.65	Hour	$ 43.57
Field personnel, project manager, average	1	Week	$ 2,834.20	Hour	$ 70.86
Field personnel, superintendent, average	1	Week	$ 2,642.70	Hour	$ 66.07
Field personnel, timekeeper, average	1	Week	$ 1,532.00	Hour	$ 38.30
12,000 gal mobile elevated water tank. Purchase with delivery					$ 56,750.00

Appendix F.6 - Unitary Costs

Conversions				
1	Acre	=	4,840.00	SY
1	Acre	=	43,560.00	SF
1	CY	=	27.00	CF
1	SY	=	9.00	SF
1	Mile	=	1,760.00	SY
1	Mile	=	5,280.00	FT
1	Square Mile	=	640.00	Acre
1	Square Mile	=	259.00	Hectare
1	MPH	=	1.47	FT / Second
1	US Ton	=	2,000.00	lbs.
1	Metric Ton	=	2,204.62	lbs.
1	Cubic Meter	=	35.37	CF
1	Cubic Meter	=	1.31	CY
1	Cubic Yard	=	0.76	CM
1	Meter	=	3.28	FT
1	Foot	=	0.30	Meter
1	Month	=	4.33	Weeks

APPENDIX F.7
SCOPE OF WORK

Appendix F.7 - Scope of Work

Alternative/Criteria Response Activity

Alternative 1: No Action

Alternative 2: Consolidate and Cap In-Place at Each Site

1.0 Design and Site Prep
2.0 Clear Vegetation
3.0 **Excavate MRM and place in repository on each site.**
4.0 Regrade excavated areas with borrow material
5.0 Place topsoil and revegetate disturbed areas
6.0 Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture
7.0 Dust Suppression and Oversight

Alternative 3a: Consolidate Four Homestake Sites at One Repository Site (Mac 1 site)

1.0 Design and Site Prep
2.0 Clear vegetation
3.0 **Excavate MRM and place in one repository.**
4.0 Regrade excavated areas with borrow material
5.0 Place topsoil and revegetate disturbed areas
6.0 **Transport MRM, weighted average haul distance to Mac 1 site 11 miles**
7.0 Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture
8.0 Dust Suppression and Oversight

Alternative 3b: Consolidate Four Homestake Sites at One Repository Site (BJ1 site)

1.0 Design and Site Prep
2.0 Clear vegetation
3.0 **Excavate MRM and place in one repository.**
4.0 Regrade excavated areas with borrow material
5.0 Place topsoil and revegetate disturbed areas
6.0 **Transport MRM, weighted average haul distance to BJ 1 site 8 miles**
7.0 Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture
8.0 Dust Suppression and Oversight

Alternative 4a: Regional Repository at Mac No. 1

1.0 Design and Site Prep
2.0 Clear vegetation
3.0 **Excavate MRM and place in repository at Mac No. 1.**
4.0 Regrade excavated areas with borrow material
5.0 Place topsoil and revegetate disturbed areas
6.0 **Transport MRM to Mac No. 1 site (11 miles)**
7.0 Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture
8.0 Dust Suppression and Oversight

Alternative 4b: Regional Repository at Black Jack No. 1

1.0 Design and Site Prep
2.0 Clear vegetation
3.0 **Excavate MRM and place in repository at Black Jack No. 1.**
4.0 Regrade excavated areas with borrow material
5.0 Place topsoil and revegetate disturbed areas
6.0 **Transport MRM to Black Jack No. 1 site (8 miles)**
7.0 Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture
8.0 Dust Suppression and Oversight

Appendix F.7 - Scope of Work

Alternative 4c: Two Regional Repositories: one at Mac No. 1 and another at Black Jack No. 1

1.0 Design and Site Prep
2.0 Clear vegetation
3.0 **Excavate MRM and place in one of two repositories**
4.0 Regrade excavated areas with borrow material
5.0 Place topsoil and revegetate disturbed areas
6.0 **Transport MRM to Mac No. 1 Site (9.5 miles)**
7.0 Construct ET cover at each site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture
8.0 Dust Suppression and Oversight

Alternative 5: Excavation and Off-Navajo Disposal within 100 Miles

1.0 Design and Site Prep
2.0 Clear vegetation
3.0 **Excavate total of 710,000 CY of MRM and place in repository near Ambrosia Lake**
4.0 Regrade excavated areas with borrow material
5.0 Place topsoil and revegetate disturbed areas
6.0 **Transport 710,000 CY of MRM to Ambrosia lake area**
7.0 Construct ET cover at site - 3.0 foot thick cover with .5 foot thick protective cover layer with 15% gravel admixture
8.0 Dust Suppression and Oversight

Alternative 6: Excavation and Off-Navajo Disposal at an Existing Licensed Facility

1.0 Design and Site Prep
2.0 Clear vegetation
3.0 **Excavate total of 710,000 CY of MRM and haul to offsite disposal facility**
4.0 Regrade excavated areas with borrow material
5.0 Place topsoil and revegetate disturbed areas
6.0 Load and Transport materials to staging area at BJ 1
7.0 **Transport 710,000 CY of MRM 528 miles to offsite disposal facility**
8.0 Environmental waste disposal fee
9.0 Dust Suppression and Oversight

APPENDIX F.8
ASSUMPTIONS

Appendix F.8 - Assumptions

Description	Value	Comment
Contractor Markup	20%	Percent
Contingency	0.00%	Percent
Escalation %	4.50%	Current % being used by Stantec Estimating Dept is 4.5% FEB2022
Years of Escalation	3	Number of Years
Total Amount of Escalation	14.12%	Compounded Escalation Rate
AACE Cost Estimate - Class	3	See footnote
Maturity Level of Project Definition	10% to 40%	Funding authorization
Estimate Accuracy: Low	-10% to -20%	Percent
Estimate Accuracy: High	+10% to +30%	Percent
Efficiency factor	1.45	Factor
10 hour work day results in 8.25 available hours	8.25	Effective work hours
Over the road truck drivers maximum daily housrs	11.00	after a 10 hour rest period
Work Hours - 10 hour days, 5 days per week	50.00	Hours per week
Swell factor of Bank Material to Loose Cubic Yards	20%	Add swell to engineers estimate where bank quantity are provided
Average weight of one cubic yard of material	1.35	tons - 2,700 lbs./CY
Wage rate burden	35%	taxes and markup
Equipment Replacement Value	2.5%	Used to calculate the hourly rate of contractors equipment
Average Distance haul in each mine site	2,000	Feet From Excavation area to Repository or Staging Area
NOTES:		
1. RS Means was used as a performance and cost check for typical construction items. The final costs and performance rates used for the Crews in this estimate were calculated using the Performance and Calculations tabs, not from specific RS Means crew rates.		
2. The labor base rate used is from the New Mexico Department of Workforce 2019 Prevailing Wage Type H.		
3. Where available, the McKinley County labor base rate was used, otherwise the rate is general for New Mexico.		
4. The labor rates are Prevailing / Davis Bacon rates, however no union fees, fringe, training, nor allowances are included in the base rate.		

Note: **AACE International CLASS 3 Cost Estimate** - Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase "control estimates" against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. Typical accuracy ranges for Class 3 estimates are -10% to -20% on the low side, and +10% to +30% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.

APPENDIX F.9
WATER COST CALCULATIONS

Appendix F.9 - Water Cost Calculations

Item No.	Description	QTY	Unit	Labor Unit Cost	Total Labor	Equipment Unit Cost	Total Equipment	Materials Unit Cost	Total Materials	Total L/E/M	Other Costs	Total Field Cost
1.0	**Off-Site Water Source**											
1.1	Purchase water from source	3,000,000	GAL		$ -		$ -	$ 0.0025	$ 7,500.00	$ 7,500.00		$ 7,500
1.2	Hauling from source	250	DAY	$ 344.73	$ 86,181.56	$ 1,585.31	$ 396,326.30			$ 482,507.87		$ 482,508
1.3	Storage Tank - At Fill Location	1	EA		$ -		$ -		$ -	$ -	$ 56,750.00	$ 56,750
1.4	Permitting - $25.00 Per Month	1	LS		$ -		$ -		$ -	$ -	$ 205.48	$ 205
			Sub-total		$ 86,182		$ 396,326		$ 7,500	$ 490,008	$ 56,955	$ 546,963
1.5	**Daily Cost Using Off-Site Water Source**											
1.6	Daily Cost of Purchasing and Transporting Water From Gallup	1	Day		$ 344.73		$ 1,585.31			$ 1,960.03	$ 227.82	$ 2,188
	Purchase Water from Source	12,000	Gal						$ 30.00			
			Sub-total		$ 345		$ 1,585		$ 30	$ 1,960	$ 227.82	$ 2,188
2.0	**Drill Well Near-Site**											
2.1	Well Drilling & Installation of 8-inch well	500	FT	$ 250.00	$ 125,000.00	$ -	$ -	$ -	$ -	$ 125,000.00	$ -	$ 125,000
2.2	Well Collection - 2-inch DI	100	FT			$ 21.00	$ 2,100.00			$ 2,100.00		$ 2,100
2.3	Well Collection - 2-inch PVC	400	FT			$ 11.00	$ 4,400.00			$ 4,400.00		$ 4,400
2.4	Pump	1	EA		$ -	$ 3,000.00	$ 3,000.00		$ -	$ 3,000.00		$ 3,000
2.5	Motor	1	EA			$ 6,000.00	$ 6,000.00		$ -	$ 6,000.00		$ 6,000
2.6	Drop pipe	490	FT			$ 8.00	$ 3,920.00		$ -	$ 3,920.00		$ 3,920
2.7	Valves, Pad, Etc.	1	EA			$ 3,000.00	$ 3,000.00	$ -	$ -	$ 3,000.00	$ -	$ 3,000
2.8	LP Gas to run the generator 1 day (20 hours)	250	DAY								$ 126.20	$ 31,550
2.9	Generator - 32kW 120/240V (Generac)	1	EA		$ -		$ -		$ -	$ -	$ 12,477.00	$ 12,477
2.10	Fuel Tank (natural gas or diesel) 500 gal	1	EA		$ -		$ -		$ -	$ -	$ 1,200.00	$ 1,200
2.11	Storage Tank	1	EA		$ -		$ -		$ -	$ -	$ 56,750.00	$ 56,750
2.12	Archaeological clearance	1	AC	$ 300.00	$ 300.00		$ -		$ -	$ 300.00		$ 300
2.13	Permitting	1	LS		$ -		$ -		$ -	$ -	$ 25.00	$ 25
2.14	Construction water use fee	3,000,000	Gal		$ -	$ 6.00	$ 18,000.00		$ -	$ 18,000.00		$ 18,000
			Sub-total		$ 125,300		$ 40,420		$ -	$ 165,720	$ 70,578.20	$ 267,722

Appendix F.9 - Water Cost Calculations

General

Workdays	500
Water days	250

Off-site Hauling Assumptions

Hauling from Gallup ~ 35 miles
Two trips per day would fill the above ground tank.
On-site water trucks will be loading +/- 2000 gallons.
The dust suppression effort will have 6 loads per day
Water can be bought with a meter from a hydrant for about $2.50 per 1,000 gallons

Hauling Costs

Resource	Hourly cost	Distance - Miles	MPH	Time enroute - Hour	Round trip - Hr	Loading Water -Hr	Unloading Water - Hr	Total	Cost Per Load	Gallons	Cost per day	Gallons
Western Star WT6900 - Water Truck	$ 208.29	35	45	0.78	1.6	0.75	1.5	3.8	$ 792.65	6500	$ 1,585.31	13000
Truck Driver - OTR	$ 45.29								$ 172.36		$ 344.73	
									$ 965.02		$ 1,930.03	

12,000 gal mobile elevated water tank.
Purchase with delivery $ 56,750.00 **Sell tank after construction**

Near-site well fuel for pump	LP Fuel Consumption @ 50% Load	2.7	gallons per hour
		$ 2.34	per gallon
		$ 6.31	per hour
		$ 126.20	20 hours per day

Construction and industrial use fee is $6.00 per 1000 gallons on Navajo Land
Excluded water filling stations - part of tank/gravity fill

Other Considerations

NNDWR would likely operate well after given to community - consider their design

APPENDIX G
GREENER CLEANUPS ANALYSIS

Appendix G: Greener Cleanups Analysis

Mac and Black Jack Mines EE/CA

September 29, 2023

Prepared for:

Homestake Mining Company of California

Prepared by:
Stantec Consulting Services Inc.

APPENDIX G: GREENER CLEANUPS ANALYSIS

This document entitled Appendix G: Greener Cleanups Analysis was prepared by Stantec Consulting Services Inc. (“Stantec”) for the account of Homestake Mining Company of California (the “Client”). Any reliance on this document by any third party other than any governmental agency to which Client is obligated to report is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

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APPENDIX G: GREENER CLEANUPS ANALYSIS

Abbreviations

CO_2e	carbon dioxide equivalents
CY	cubic yards
EE/CA	Engineering Evaluation/Cost Analysis
ET	evapotranspiration
GSR	green and sustainable remediation
HAP	hazardous air pollutant
ITRC	Interstate Technology & Regulatory Council
MMBtu	millions of British thermal units
NO_x	nitrogen oxides
PM_{10}	particulate matter
RAO	Response Action Objective
SEFA	Spreadsheets for Environmental Footprint Analysis
SO_x	sulfur oxides
USEPA	United States Environmental Protection Agency

1 Introduction

The United States Environmental Protection Agency's (USEPA) provided guidance on the consideration of "greener cleanup activities" throughout the remedy selection process, including during response action selection (USEPA, 2009 and 2016). The goal is to evaluate cleanup actions comprehensively to protect human health and the environment and to reduce the environmental footprint of cleanup activities, to the maximum extent possible (USEPA, 2016).

To align with this guidance, a green and sustainable remediation (GSR) assessment is incorporated in the Engineering Evaluation/Cost Analysis (EE/CA) Report for the Mac and Black Jack mine sites. GSR is defined as the "site-specific employment of products, processes, technologies, and procedures that mitigate contaminant risk to receptors while balancing community goals, economic impacts, and environmental effects" (ITRC, 2021).

The GSR assessment evaluated the environmental, economic, and social impacts associated with the eight remedial alternatives (Alternatives 2, 3a, 3b, 4a, 4b, 4c, 5 and 6) identified to mitigate risks from mining-related material (MRM).

In accordance with USEPA guidance (USEPA, 2012), the GSR assessment is comprised of five core green remediation metrics:

- Energy
- Air
- Water (used on-site)
- Materials & Waste
- Land & Ecosystems

2 Scope and Boundaries

The objective of remedy implementation is to meet the proposed Response Action Objectives (RAOs), as presented in the Engineering Evaluation/Cost Analysis (EE/CA) Report. Nine alternatives are retained in the EE/CA and evaluated during this GSR assessment, including:

- Alternative 1: No Action.
- Alternative 2: Consolidate and cover in-place at each of the four Homestake Mining Company of California (HMC) sites.
- Alternative 3: Consolidate four HMC sites at one repository site.
  - 3a: Repository location at Mac No. 1 site.
  - 3b: Repository location at Black Jack No. 1 site.
- Alternative 4: Regional repositories:
  - 4a: Regional repository at Mac No. 1.
  - 4b: Regional repository at Black Jack No. 1.
  - 4c: Two regional repositories: one at Mac No. 1 and another at Black Jack No. 1.
- Alternative 5: Excavation and Off-Navajo disposal.
- Alternative 6: Excavation and Off-Navajo disposal at an existing licensed facility.

For this GSR assessment, the environmental footprint for Alternative 1 (No Action) was not evaluated since no environmental footprint is associated with no action. Input data incorporated into this assessment are presented in the detailed cost estimate located in Appendix F of the EE/CA. Assumptions made for cost analysis purposes and used to support the GSR assessment are provided in subsection Appendix F.8 – Assumptions of the EE/CA Report and in footnote 1.[1]This analysis considers the impacts of active construction for each alternative and does not include the operations and maintenance period following construction.

[1] Additional assumptions to aid in the footprint analysis calculations include:
For work completed within New Mexico: Average roundtrip commuting distance from Gallup, NM assumed to be 70 miles. Average roundtrip distance for equipment transportation from Albuquerque, NM assumed to be 270 miles. For the disposal facility location in Alternative 6: Average roundtrip commuting distance from Bennett, CO to the disposal facility assumed to be 85 miles. Average roundtrip distance for equipment transportation from Denver, CO assumed to be 200 miles. Once a piece of equipment has been delivered to the site for one component, it is assumed that the equipment will remain on-site.
Average weights of materials used on-site: 47 pounds per cubic yard (lbs/CY) for vegetation, 2,700 lbs/CY for MRM, 2,570 lbs/CY for fill, 2,565 lbs/CY for gravel mixture, and 1,855 lbs/CY for debris removed from the sites (USEPA, 2006). The thickness of hydroseed averages 0.0625 inches.

3 Footprint Evaluation Results

The calculations conducted as part of this footprint analysis were based on information from the detailed cost estimate (i.e., activities, quantities, crew, equipment, duration, etc.) in conjunction with use of USEPA's Spreadsheets for Environmental Footprint Analysis (SEFA) tool Version 3.0, November 2019. Please reference the EE/CA Report for a complete description of the alternatives and a comprehensive summary of the assumptions used in the EE/CA process.

Each alternative requires clearing of vegetation, excavation of MRM, backfilling and revegetation, transportation of waste materials, construction of an evapotranspiration (ET) cover, and dust suppression activities. Each component is included in the environmental footprint analysis shown in Table 3-1. Figures comparing the environmental footprint results for each alternative are shown in Attachment A. The impact to the land and ecosystem is qualitatively evaluated and discussed in the next section.

3.1 Energy

Energy use includes on-site gasoline and diesel use, diesel and gasoline use for transportation, and material manufacturing along with other off-site activities that support the remedy (USEPA, 2012). As seen in Figure A-1, the common elements that contributed most to energy use were importing fill, backfilling and revegetation, and construction of ET covers. Alternatives 5 and 6 assume MRM would be disposed of at Off-Navajo locations where an ET cover would be constructed in place[2]. In these cases, hauling MRM to an off-site location increases energy consumption due to the increase in diesel and gasoline use for transportation. Alternatives 5 and 6 also have higher energy consumption due to the larger area that would need to be backfilled and revegetated compared to other alternatives. Alternatives 2, 3a, 3b, 4a, 4b, and 4c use approximately the same amount of energy, with slight variations based on the inter-site haul distances and the sizes of each associated ET cover.

3.2 Air

Air emissions are presented as the total greenhouse gas emissions for each remediation alternative. Greenhouse gas emissions include on-site gasoline and diesel use, diesel and gasoline use for transportation, and material manufacturing along with other off-site activities that support the remedy (USEPA, 2012). As seen in Figure B-1, the common elements that contributed to greenhouse gas emissions production were excavation of MRM, importing fill, backfilling, transport of waste, and dust suppression. However, hauling of MRM to Off-Navajo disposal sites was the main differentiator between alternatives. Alternative 6 has the largest emission footprint with approximately 98,000 tons of carbon dioxide equivalents[3] (CO_2e). This larger emission footprint is primarily due to the long off-site haul

[2] Alternative 6 calls for MRM to be disposed of at an off-site RCRA landfill. Design and construction details for the disposal facility's RCRA cover are unknown at this time. To enable comparison of the alternatives within this assessment, the same design and construction details for the repository's ET cover in Alternative 5 were assumed.

[3] Carbon dioxide equivalents (CO_2e) is the number of metric tons of CO_2 emissions with the same global warming impact potential as one metric ton of another greenhouse gas (USEPA, 2012).

distance for waste to be transported to an off-site disposal facility required for Alternative 6. Alternative 5 has a lower emission footprint with approximately 30,000 tons of CO_2e. This decrease compared to Alternative 6 is attributed to the shorter haul distance for waste transportation. Alternative 2 has the smallest footprint with 6,000 tons of CO_2e produced in total greenhouse gases due to the minimal need for transportation of MRM due to the local repositories on each site, effectively eliminating emissions from waste transport. Alternatives 3a, 3b, 4a, 4b, and 4c produce approximately the same total greenhouse gases (8,000-11,000 tons of CO_2e) due to the similarities in transportation distances. The same pattern in emissions among alternatives is evident for the other emissions evaluated (e.g., nitrogen oxides [NO_x], sulfur oxides [SO_x], particulate matter [PM_{10}], and hazardous air pollutants [HAPs]).

3.3 Water (Used on Site)

Water use considers the source and amount of water used on-site, as well as the fate of the water after use (USEPA, 2012). As seen in Figure C-1, the common elements that contributed most to water use were backfilling and revegetation, construction of ET covers, and dust suppression. Dust suppression efforts were the number one contributor to water use across all alternatives. Because Alternative 6 has the longest duration of construction, it has the highest water use with approximately 13 million gallons of water expected to be used during response action construction. Alternative 5 has the second longest construction period and a water use of 8 million gallons. Alternatives 2, 3a, 3b, 4a, 4b, and 4c have similar construction durations and approximately the same water use of 5 million to 6 million gallons of water.

3.4 Materials and Waste (On Site)

Materials analyses consider the total amount of materials used on-site and the percentage of those materials that are produced from recycled material, reused material, or waste material (USEPA, 2012). As seen in Figure D-1 the common elements that contributed most to unrefined materials used were excavation of fill materials for backfilling and construction of the ET covers. For the purposes of this analysis unrefined materials refers to materials that are used on-site, come from off-site sources, and generally have not undergone significant processing or refinement (USEPA, 2012). Though Alternatives 5 and 6 had the smallest volume of materials used on-site, they do include construction of an ET cover at the Off-Navajo repositories. Therefore, to make the overall footprint of Alternatives 5 and 6 comparable to the other alternatives, the materials used for the off-site repositories are included in the analysis and Figure D-1.

Figure D-2 illustrates the amount of waste remaining on-site after remedial action. For Alternatives 2, 3a, 3b, 4a, 4b, and 4c, 960,000 tons (710,000 CY) of MRM remains on-site. For Alternatives 5 and 6, the waste is removed from the site and transported to the Off-Navajo repository and disposal facility locations, respectively.

4 Land and Ecosystems

The evaluation of land and ecosystem impact was performed qualitatively considering the on-site physical footprint and the construction timeframes of each alternative. Each alternative includes removal of habitat during vegetation clearing and site excavation, as well as noise and activity disturbance of biological species while heavy equipment operates in the area. Since areas identified for repositories will be fenced and would potentially require greater land use restriction than other areas within the response action, the alternatives with the largest physical footprint will have the largest impact on the land, ecosystems, and the potential future land uses.

As seen in Figure E-1, Alternative 2 has the largest physical footprint of approximately 102 acres of on-site repository area. Alternatives 3b, 4b, and 4c have a physical footprint of approximately 68 acres, 68 acres, and 76 acres, respectively. Alternatives 3a and 4a have physical footprints of approximately 42 acres. Therefore, Alternatives 3a through 4c have a lower impact on land management and ecosystems protection, in comparison to Alternative 2, because the areas used for placement of MRM are more consolidated thereby lowering the effects on land, ecosystems, and potential future land uses. Alternatives 5 and 6 have no on-site repository footprint resulting in additional long-term benefits for land management and ecosystems protection and the site will not have area restrictions. However, these two alternatives have extended construction timeframes compared to the other alternatives where noise and activity may have a greater impact on biological species in the short-term.

5 GSR Assessment Conclusion

5.1 Energy

This GSR assessment illustrates that for each alternative the total energy used on-site and off-site results in footprints ranging from 18 to 25 million MMBtu.

5.2 Air

For total greenhouse gas emissions Alternatives 2 through 4c have similar environmental footprints. Alternative 5 is higher than Alternatives 2 through 4c but lower than Alternative 6 which is 89-94% higher than Alternatives 2 through 4c.

5.3 Water (Used on Site)

For public water use Alternatives 2 though 4c have similar environmental footprints and vary from 5-6 million gallons of water. Alternative 5 uses 8 million gallons and Alternative 6 uses 13 million gallons.

5.4 Materials and Waste (On Site)

Alternatives 2 though 4c have similar environmental footprints and vary from 1.2 to 1.3 million tons of unrefined materials used on-site. Alternatives 5 and 6 use 1.5 million tons of unrefined materials. For Alternatives 5 and 6, no waste remains on-site as it is transported to the Off-Navajo repository location or disposal facility, whereas the other alternatives result in the waste remaining on-site.

5.5 Land and Ecosystems

Over the long-term, Alternative 2 has the highest impact; Alternatives 3a through 4c have moderate impacts; and Alternatives 5 and 6 have the lowest impacts on land management and ecosystems protection. In the short-term Alternatives 5 and 6 may have a greater impact on biological species in the area due to noise and activity on site during the extended construction timeframes.

5.6 Comparison of Remedial Alternatives

To summarize these findings, Figure 5-1 is included below to illustrate the relative impact that each remedial alternative has when compared to the other alternatives.

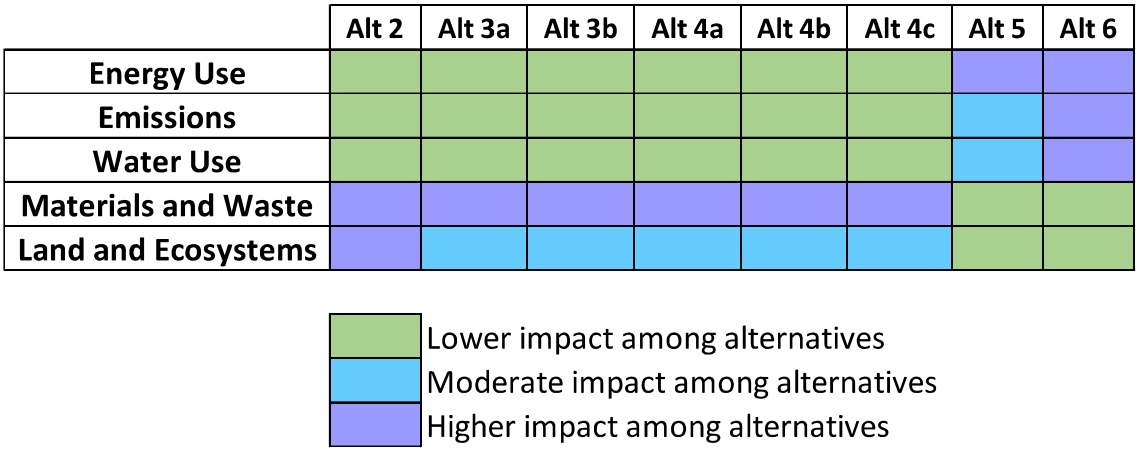


Figure 5-1 Impact of Each Remedial Alternative

6 References

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USEPA, 2009. Assistant Administrator Mathy Stanislaus, Office of Solid Waste and Emergency Response, "Principles for Greener Cleanups." August.

USEPA, 2012. Methodology for Understanding and Reducing a Project's Environmental Footprint. EPA 542-R-12-002. February.

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Table 3-1 Environmental Footprint Evaluation Results

Core Element	Metric		Unit of Measure	Footprint Totals							
				Alt 2	Alt 3a	Alt 3b	Alt 4a	Alt 4b	Alt 4c	Alt 5	Alt 6
Materials & Waste	M&W-3	Unrefined materials used	Tons	1,200,000	1,200,000	1,300,000	1,200,000	1,300,000	1,200,000	1,500,000	1,500,000
	M&W-5	Waste remaining on-site	Tons	960,000	960,000	960,000	960,000	960,000	960,000	0	0
Water	W-1	Public water use	MG	6	6	6	6	6	5	8	13
Energy	E-1	Total energy used (on-site and off-site)	MMBtu	19,000,000	19,000,000	20,000,000	19,000,000	20,000,000	18,000,000	24,000,000	25,000,000
Air	A-3	Total NOx, SOx, and PM10 emissions	Pounds	69,000	120,000	97,000	120,000	94,000	85,000	850,000	1,700,000
	A-3A	Total NOx emissions	Pounds	59,000	101,000	84,000	102,000	82,000	73,000	330,000	1,100,000
	A-3B	Total SOx emissions	Pounds	5,200	7,500	6,600	7,600	6,500	5,900	92,000	140,000
	A-3C	Total PM emissions	Pounds	4,100	7,600	6,300	7,600	6,000	5,300	430,000	470,000
	A-4	Total HAP emissions	Pounds	600	1,130	900	1,100	870	760	3,100	9,500
	A-5	Total greenhouse gas emissions	Tons CO_2e*	6,200	11,000	9,000	11,000	8,700	7,800	30,000	98,000
Land & Ecosystems	Refer to GSR Assessment										

** Total greenhouse gases emissions (in CO_2e) include consideration of CO_2, CH_4, and N_2O (Nitrous oxide) emissions.*
** Footprint totals have been rounded to two significant figures.*
** Metrics resulting in 0 for all alternatives were not included in the above table to enhance clarity and readability.*
** Alternative 6 calls for MRM to be disposed of at an off-site RCRA facility. Design and construction details for the disposal facility's RCRA cover are unknown at this time. To enable comparison of the alternatives within this assessment, the same design and construction details for the repository's ET cover in Alternative 5 were assumed.*

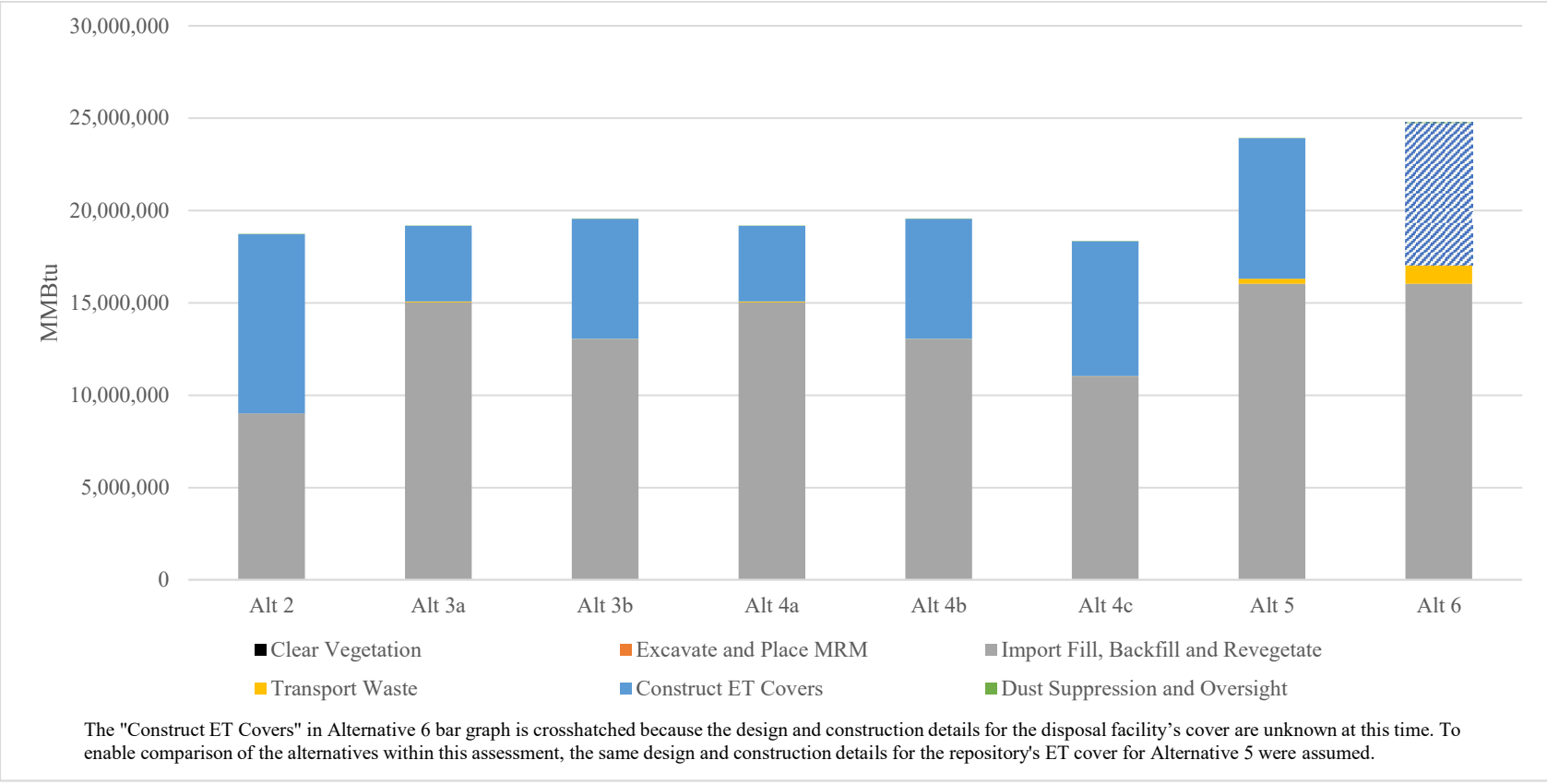
The above metrics are consistent with EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002), February 2012

"MMBtu" = millions of Btus
"MG" = millions of gallons
"CO_2e" = carbon dioxide equivalents of global warming potential
"Tons" = short tons (2,000 pounds)

Notes:
"HAPs" = hazardous air pollutants (USEPA, 2016a. Appendix 1 of Life cycle Inventory Data)
"NOx" = nitrogen oxides, "SOx" = sulfur oxides
"PM10" = particulate matter with aerodynamic diateters less than or equal to 10 micrometers

Note:
Mac & Black Jack Mines, Navajo Nation, McKinley County, NM

ATTACHMENT A ENERGY

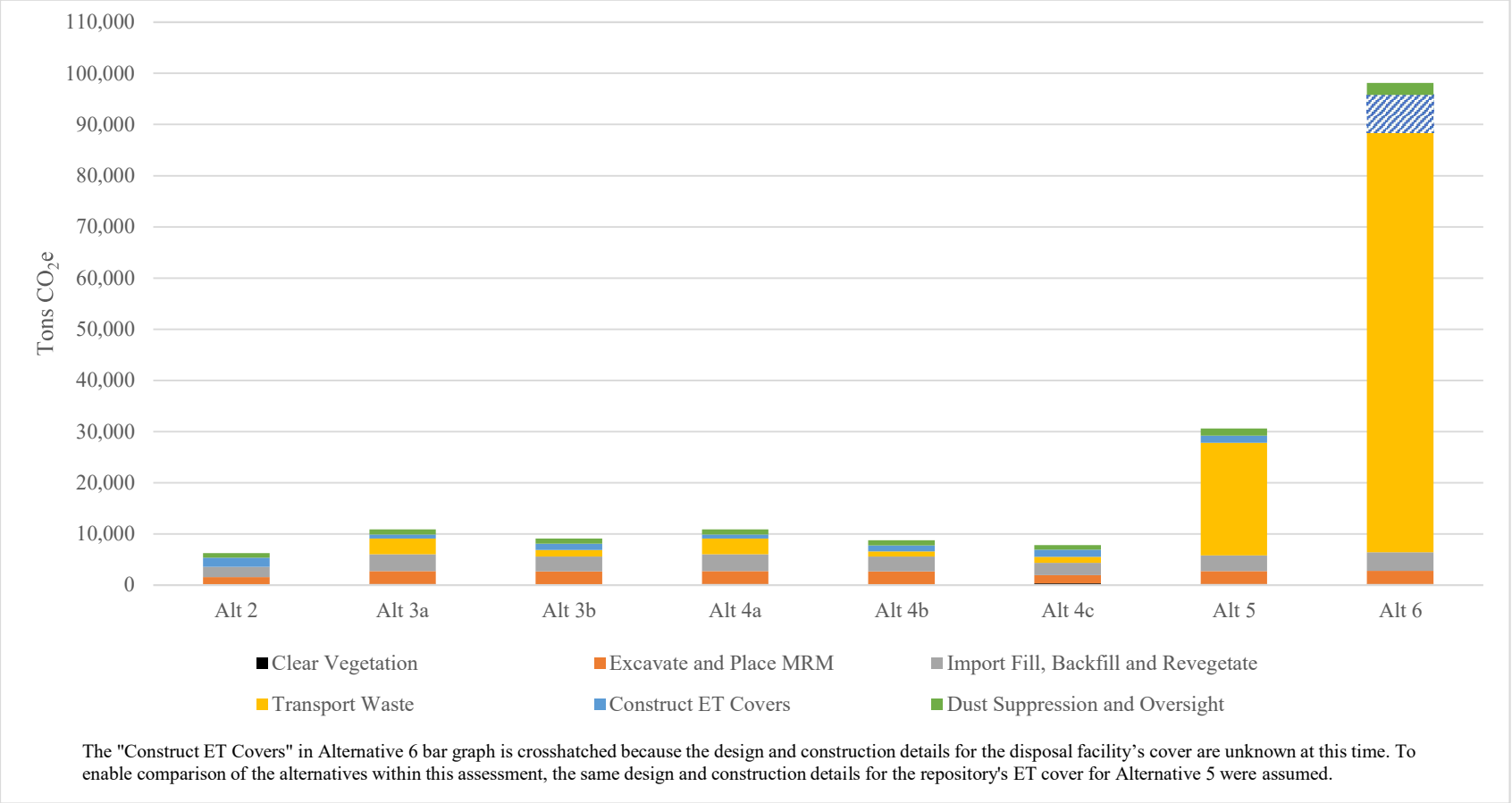


The "Construct ET Covers" in Alternative 6 bar graph is crosshatched because the design and construction details for the disposal facility's cover are unknown at this time. To enable comparison of the alternatives within this assessment, the same design and construction details for the repository's ET cover for Alternative 5 were assumed.

Figure A-1: Total Energy Used

ATTACHMENT B EMISSIONS

Figure B-1 presents total greenhouse gas emissions.



The "Construct ET Covers" in Alternative 6 bar graph is crosshatched because the design and construction details for the disposal facility's cover are unknown at this time. To enable comparison of the alternatives within this assessment, the same design and construction details for the repository's ET cover for Alternative 5 were assumed.

Figure B-1: Total Greenhouse Gas Emissions

ATTACHMENT C WATER USE

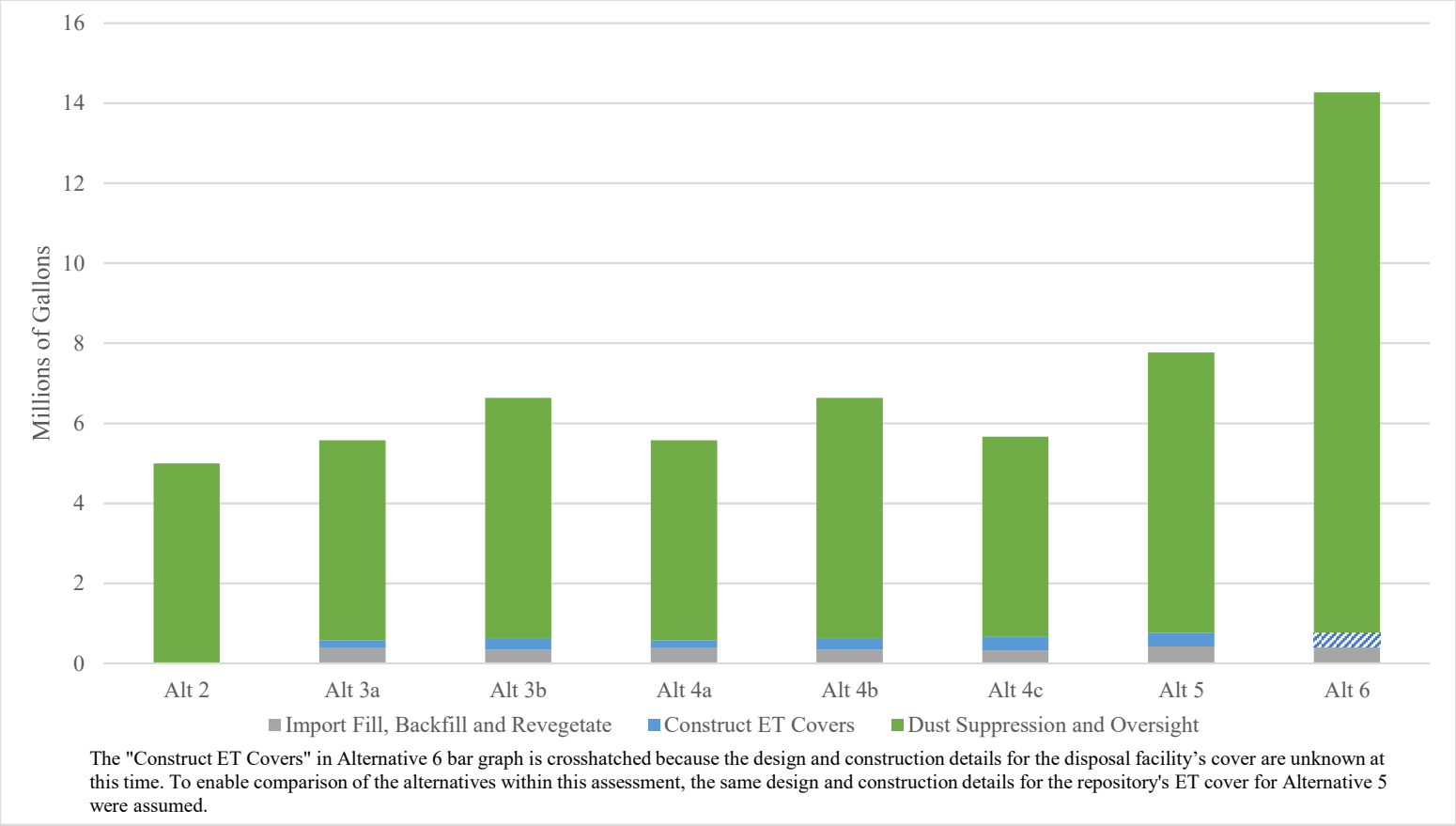
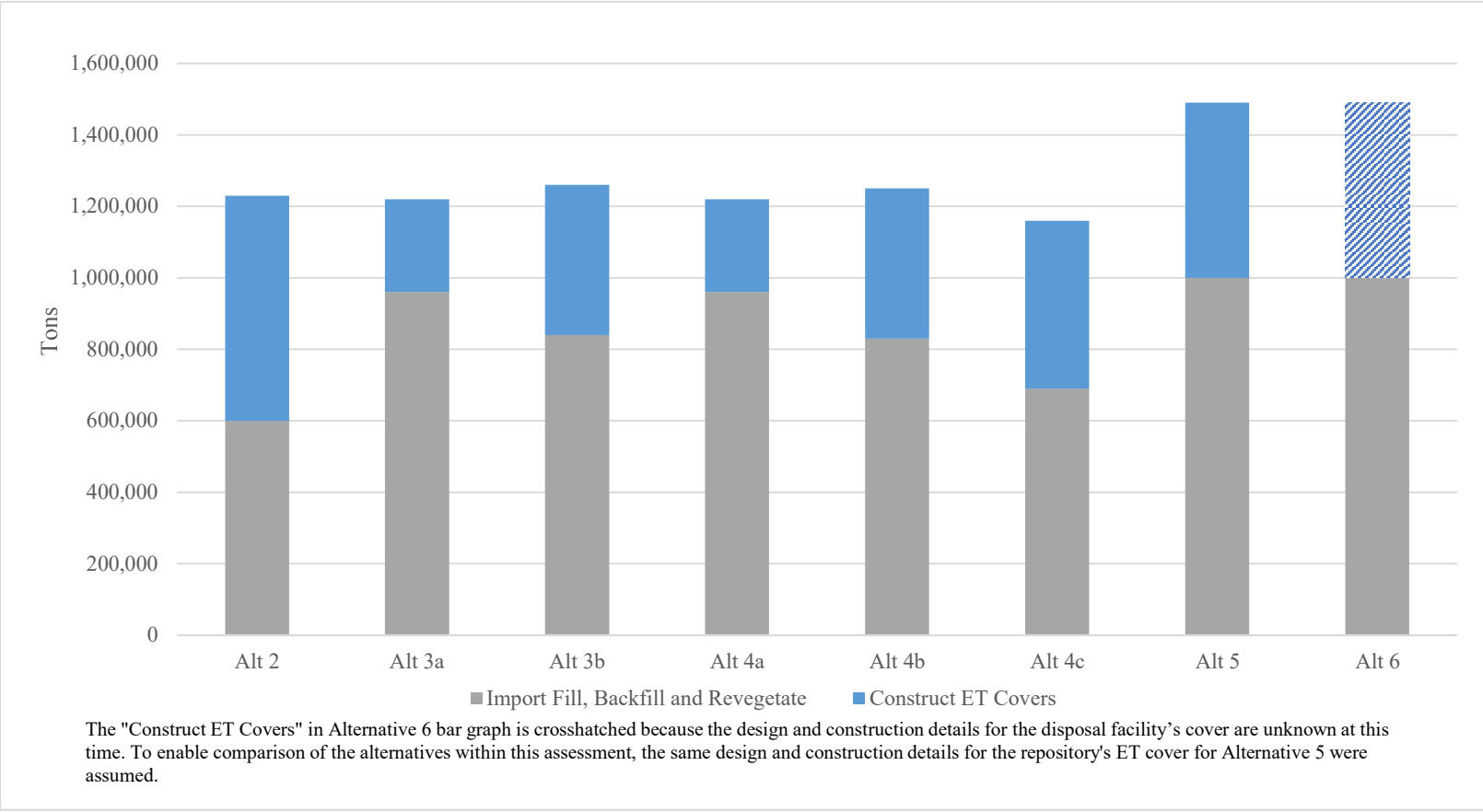


Figure C-1: Public Water Use

ATTACHMENT D MATERIALS & WASTE



The "Construct ET Covers" in Alternative 6 bar graph is crosshatched because the design and construction details for the disposal facility's cover are unknown at this time. To enable comparison of the alternatives within this assessment, the same design and construction details for the repository's ET cover for Alternative 5 were assumed.

Figure D-1: Unrefined Materials Used

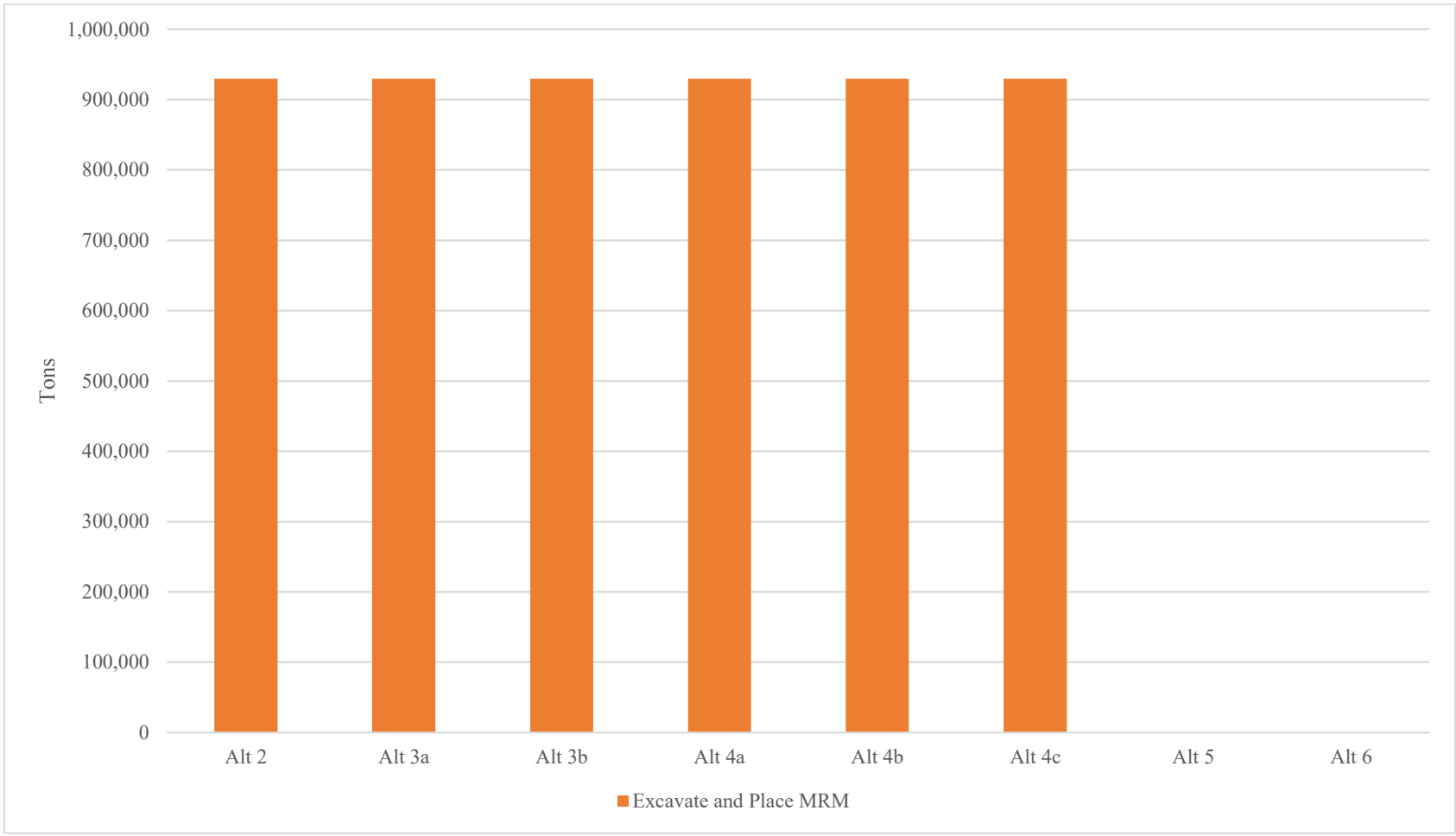


Figure D-2 Waste Remaining on Site

ATTACHMENT E RESTRICTED ON-SITE LAND USE

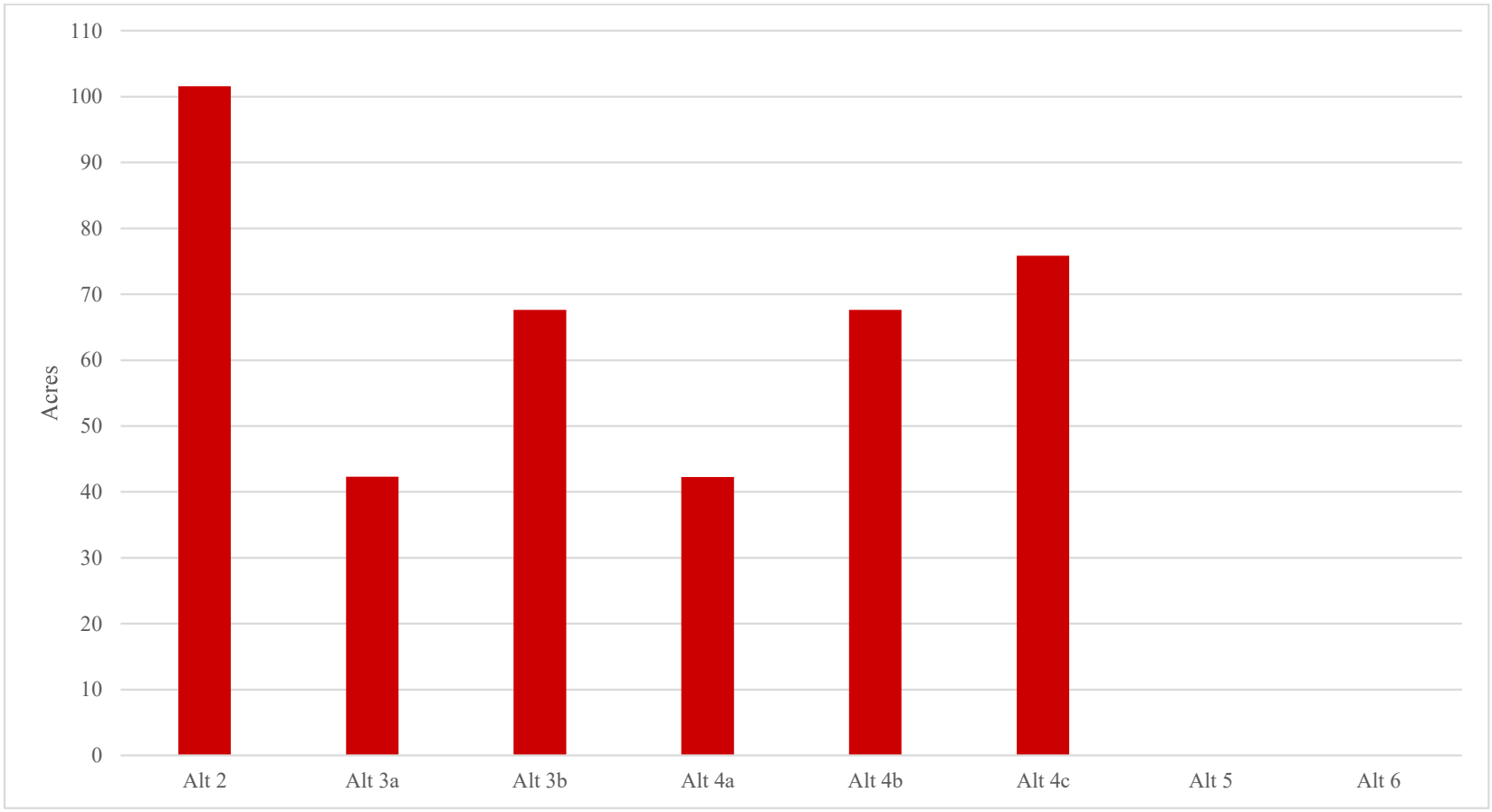


Figure E-1 Total Area of Repositories on Site