Quivira Mines

Coyote Canyon, Pinedale, and Standing Rock Chapters, Navajo Nation, New Mexico

Final

Engineering Evaluation/Cost Analysis



March 2024

TETRA TECH

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Engineering Evaluation/Cost Analysis

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Tetra Tech, Inc.

1999 Harrison Street, Suite 500

Oakland, CA 94612



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ACRONYMS AND ABBREVIATIONS

§	Section
°F	Degree Fahrenheit
ARAR	Applicable or relevant and appropriate requirement
AUM	Abandoned uranium mine
bgs	Below ground surface
BIA	Bureau of Indian Affairs
BSA	Background study area
BTV	Background threshold value
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CO_2e	Carbon dioxide equivalent
COC	Contaminant of concern
COEC	Contaminant of ecological concern
COPC	Contaminant of potential concern
COPEC	Contaminant of potential ecological concern
CR-1	Quivira Church Rock No. 1 Mine
CR-1E	Quivira Church Rock No. 1 East Mine
CR-2	Quivira Church Rock No. 2 Mine
CRA	Conestoga Rovers and Associates Ltd.
CSM	Conceptual site model
EE/CA	Engineering evaluation/cost analysis
EPC	Exposure point concentration
ERA	Ecological risk assessment
ERRG	Engineering/Remediation Resources Group, Inc.
ESA	Endangered Species Act
ET	Evapotranspiration
EU	Exposure unit
FOD	Frequency of detection
g/cm^3	Gram per cubic centimeter
gpm	Gallon per minute
HDPE	High-density polyethylene
HELP	Hydrologic Evaluation of Landfill Performance
HHRA	Human health risk assessment
HI	Hazard index
HQ	Hazard quotient
IC	Institutional control

ACRONYMS AND ABBREVIATIONS (CONTINUED)

Kerr-McGee	Kerr-McGee Corporation
LLRW	Low-level radioactive waste
MWH	Montgomery Watson Harza
NAMLRD	Navajo Nation Abandoned Mine Lands Reclamation Department
NAUM	Navajo abandoned uranium mine
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NECR	Northeast Church Rock
NESL	Navajo Endangered Species List
NNDFW	Navajo Nation Department of Fish and Wildlife
NNDWR	Navajo Nation Department of Water Resources
NNEPA	Navajo Nation Environmental Protection Agency
NNMD	Navajo Nation Minerals Department
NORM	Naturally occurring radioactive material
NRC	U.S. Nuclear Regulatory Commission
NTUA	Navajo Tribal Utility Authority
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
pCi/g	Picocurie per gram
PERG	Preliminary ecological removal goal
PRG	Preliminary removal goal
psf	Pound per square foot
Quivira Mines	Quivira Mines Site
Ra-226	Radium-226
RAG	Removal action goal
RAO	Removal action objective
RBSL	Risk-based screening level
RCRA	Resource Conservation and Recovery Act
RME	Reasonable maximum exposure
RSE	Removal site evaluation
SE	Secular equilibrium
SENES	SENES Consultants Limited
SLERA	Screening-level ecological risk assessment
SPLP	Synthetic precipitation leaching procedure

ACRONYMS AND ABBREVIATIONS (CONTINUED)

TBC	To be considered
TCLP	Toxicity characteristic leaching procedure
TCRA	Time-critical removal action
TENORM	Technologically enhanced naturally occurring radioactive material
Tetra Tech	Tetra Tech, Inc.
U-234	Uranium-234
U-238	Uranium-238
UNC	United Nuclear Corporation
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UTL95-95	95 percent upper tolerance limit with 95 percent coverage
WCS	Waste Control Specialists
Weston	Weston Solutions, Inc.
WRS	Wilcoxon rank sum

1.0 EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (USEPA) prepared this engineering evaluation/cost analysis (EE/CA) report regarding the Quivira Mines Site (Quivira Mines) near Gallup, New Mexico, in the Navajo Nation.

1.1 PURPOSE OF THE ENGINEERING EVALUATION/COST ALTERNATIVES ANALYSIS

The purpose of this EE/CA is to evaluate cleanup alternatives to address human and ecological health risks at the Quivira Mines. These cleanup alternatives are developed and evaluated in the context of the Navajo Nation Fundamental Laws and in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In this report, the Quivira Mines comprises the Quivira Church Rock No. 1 Mine (CR-1), Quivira Church Rock No. 1 East Mine (CR-1E), and Kerr-McGee Corporation (Kerr-McGee) Ponds (Figure 1).

1.2 SITE CHARACTERIZATION

CR-1 and CR-1E were leased for underground mining operations between approximately 1972 and 1986. A third leased location, the Quivira Church Rock No. 2 Mine (CR-2), is about 3 miles northwest of CR-1, but CR-2 was never developed and an investigation found no evidence of environmental impacts from mining at this location (Weston Solutions, Inc. [Weston] 2015). A fourth leased location, the Kerr-McGee Ponds, received sediment from settling ponds at CR-1 and CR-1E, where the sediment was dewatered; proto ore was also stored in a stockpile at this location. CR-1 and CR-1E are on Navajo Nation lands, and the Kerr-McGee Ponds are on private lands. The Quivira Mines are approximately 20 miles northeast of Gallup, New Mexico (Figure 1). Access to the area is via New Mexico State Road 566. The Coyote Canyon, Standing Rock, and Pinedale Chapters of the Navajo Nation intersect nearby. Active mining included sinking shafts and excavating underground workings at CR-1 and CR-1E and extracting ore from 1,500 to 1,850 feet below ground surface (bgs). CR-1 and CR-1E were reclaimed in 1985 to 1986 by backfilling 14-foot and 12 foot diameter shafts with proto ore and sealing with a steel and concrete plug, backfilling vent holes with waste rock and sealing with a steel and concrete plug, removing mine equipment and buildings, removing sediment from the settling ponds, and grading and covering the waste piles with 6 to 12 inches of material (Quivira Mining Company 1987). The Kerr-McGee Ponds were reclaimed in 1980 to 1982 by removing the pond berms and former proto ore stockpile (Weston 2019a).

Except for remnants of former mine operations and reclamation, the Quivira Mines are currently undeveloped although livestock grazing occasionally occurs where perimeter fencing is compromised. Land use on the Navajo Nation is mainly low-density, single-family residential and open grazing with some gathering of traditional plants and herbs. Several residences are within 700 feet of CR-1 and 800 feet of CR-1E. Other land use activities on the Navajo Nation may include hiking, wood gathering, and hunting. Land use at the Kerr-McGee Ponds is industrial and open space and is limited by private ownership by the United Nuclear Corporation (UNC). Continuation of current land uses is expected for the foreseeable future. Nearby residents, UNC outdoor workers, and open space users could be exposed to contaminants at the Quivira Mines via incidental ingestion of soil, external radiation from contaminants, and

inhalation of dust. Residents could also be exposed to contaminants through livestock or wildlife meat and plant consumption. The likely future land uses at the Quivira Mines are:

- **Kee'da'whíí tééh (full-time Navajo resident) –** Areas are easy to access and relatively flat except where waste rock piles are present.
- **Kǫǫ eí doo nahaazáh dah (difficult access open space user) –** Areas are difficult to get to because the land is steep. This land use also includes arroyos that are difficult to get to because of challenging features such as steep sidewalls.
- **UNC Outdoor Worker (non-Navajo lands) –** Privately-owned areas with former mine-related operations.

The nature and extent of contamination at the Quivira Mines were assessed with various technologies during the removal site evaluation (RSE) completed in September 2011 (SENES 2011). An assessment of the Kerr-McGee Ponds was conducted in 2017 (Weston 2019a). Data gap investigations were conducted in 2015 and 2022 (Tetra Tech 2023b). Most of the waste at the site is from excavated waste rock and occurs as reclaimed waste piles and settling and dewatering pond areas. Areas with contamination outside the waste rock piles and ponds are from mining-related activities.

As part of this EE/CA, risk assessments at the site were conducted to evaluate the potential risk posed to human and ecological health by mine-related contamination. The results of the human health risk assessment (HHRA) and ecological risk assessment (ERA) are used to help in removal action decisions at the Quivira Mines through the EE/CA process. The purpose of the risk assessment is to evaluate current and future human health risk under reasonable maximum exposure (RME) scenarios and ecological risk based on the known ecosystems for the region. **The results of the HHRA and ERA indicate that risks are present at the Quivira Mines for human and ecological receptors. At the site, radium-226 (Ra-226) and uranium are the human health risk contaminants of concern (COC); and Ra-226, uranium-234 (U-234), and uranium-238 (U-238) are contaminants of ecological concern (COEC).** A removal action is recommended for contamination associated with COCs and COECs at the Quivira Mines.

Human health and ecological removal action goals (RAG) were derived for COCs and COECs. The RAG is the lesser of the human health preliminary remediation goal (PRG) or preliminary ecological removal goal (PERG). When one or both PRGs or PERGs are less than the background threshold value (BTV), the BTV becomes the RAG. For purposes of the final EE/CA, the BTV is used to represent background for delineating contaminated areas.

Multiple lines of evidence were used to develop the removal action extent at the Quivira Mines, including the extent of Ra-226 in surface soil and sediment, extent of contamination of other COCs and COECs not co-located with Ra-226, surface and subsurface waste areas, transport pathways, potential disturbed mineralized areas, potential accessibility considerations, and risk management considerations. The removal action extent covers an estimated 63 acres at the Quivira Mines. **An estimated 1,005,500 bank cubic yards of mine waste and contaminated soil will be addressed by removal action.**

1.3 REMOVAL ACTION OBJECTIVES

The removal action objectives (RAO) of this soil removal action are to:

- Prevent exposure to soil with contaminants from mining activities that would pose an unacceptable risk to human health with the reasonably anticipated future land use and traditional Navajo lifeways
- Prevent exposure to soil with contaminants from mining activities that would pose an unacceptable risk to plants, animals, and other ecological receptors
- Prevent offsite migration of contaminants from mining activities that would pose an unacceptable risk to human or ecologic health by soil, surface water, groundwater, or air

Options to be analyzed include response actions that would allow for unrestricted residential and Diné Lifeways use, as well as response actions that would include land use restrictions limiting residential use and grazing on portions of the site on the Navajo Nation. Options to be analyzed on UNC property include response actions that would allow for unrestricted use by outdoor workers. The intent of the response action is to address the surface and subsurface contaminated soils and waste rock at the Quivira Mines. These RAOs have been developed to be considerate of Diné Lifeways.

1.4 IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

The following removal action alternatives were considered as part of this EE/CA. Each alternative was evaluated against the criteria of effectiveness, implementability, and cost.

- **Alternative 1: No Action (this must always be evaluated to provide a baseline for comparison**) – No treatment or removal action would occur at the site. In this case, all threats would remain unchanged. Mine waste and contaminated soils would continue to threaten human and ecological receptors. Gamma radiation and physical hazards would still be present.
- **Alternative 2: Consolidate and Cap All Waste On Site** – Addresses RAOs by excavating waste rock piles, residual waste rock, and contaminated soils; hauling the waste to a common onsite location; consolidating the waste in a repository; and capping the repository. An evapotranspiration (ET) cap would be used that is protective and would limit contaminant migration. The repository would be inspected and maintained in perpetuity. Land use restrictions would exist on the repository.
- **Alternative 3: Dispose of All Mine Waste Off Site at Red Rocks Disposal Facility** – Address RAOs by excavating waste rock piles, residual waste rock, and contaminated soils and hauling the waste to and disposing of the waste off site at the Red Rocks disposal facility near Thoreau, New Mexico. Off-Navajo Nation disposal is protective and would not require long-term onsite maintenance or land use restrictions.
- **Alternative 4: Dispose of All Mine Waste Off Site at a Resource Conservation and Recovery Act (RCRA) C or Low-Level Radioactive Waste (LLRW) Facility –** Addresses RAOs by excavating waste rock piles, residual waste rock, and contaminated soils and hauling and disposing of the waste at an offsite RCRA C and State of Colorado

radiological licensed facility, such as the Clean Harbors Deer Trail facility in Deer Trail, Colorado, or an LLRW facility licensed by the U.S. Nuclear Regulatory Commission (NRC), such as the Waste Control Specialists (WCS) in Andrews, Texas. Off-Navajo Nation disposal is protective and would not require long-term onsite maintenance or land use restrictions.

For the applicable removal action alternatives, plant life that matches the natural landscape will be planted on restored excavation areas and covers. All temporary roads built for construction will also be removed, and the site will be restored. The consolidation and capping of waste will address geomorphic recontouring and revegetation of land to match the natural landscape. For Alternative 3, an evaluation of rail and truck haul routes is provided in Section 4.1.2 and in Tetra Tech (2024).

1.5 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The removal action alternatives were evaluated individually and in relation to each other using three broad criteria: effectiveness, implementability, and cost. Exhibit 1 presents an overview of the comparative analysis results.

Exhibit 1. Summary of Alternative Ratings

Alternative		Attainment of Threshold Criteria[a]	Effectiveness	Implementability	Cost Rating (Million)[b]
1	No Action	Fail	Short-Term: Average Long-Term: Very Poor	Tech: Very Good Admin: Very Good	Very Good ($0)
2	Consolidate and Cap All Waste On Site	Pass	Short-Term: Average Long-Term: Good	Tech: Good Admin: Good	Good ($61.6)
3	Dispose of All Mine Waste Off Site at Red Rocks Disposal Facility	Pass	Short-Term: Average Long-Term: Very Good	Tech: Very Good Admin: Average	Poor ($182.5)
4	Dispose of All Mine Waste Off Site at a RCRA C or LLRW Facility	Pass	Short-Term: Very Poor Long-Term: Very Good	Tech: Very Good Admin: Good	Very Poor ($563)

Notes:
[a] Threshold criteria are (a) overall protection and (b) compliance with applicable or relevant and appropriate requirements.
[b] Estimated costs are net present value.
Admin Administrative feasibility
LLRW Low-level radioactive waste
RCRA Resource Conservation and Recovery Act
Tech Technical feasibility

The recommended alternative for the Quivira Mines is Alternative 3 (dispose of all mine waste off site at Red Rocks disposal facility). While the alternative is twice the price of Alternative 2 (consolidate and cap at the Quivira Mines), it removes the waste from the Red Water Pond Road and Pipeline Canyon Road communities and consolidates the waste at a dedicated facility capable of long-term management of the waste.

Though USEPA has identified a recommended alternative, USEPA will solicit input from Navajo Nation officials, regulators, chapter representatives, other stakeholders, and the community on the final EE/CA and recommended alternative during a public comment period. USEPA and the Navajo Nation Environmental Protection Agency (NNEPA) will hold a public meeting during the comment period to listen to input.

2.0 SITE CHARACTERIZATION

This section presents the site description and background; previous reclamation and removal actions; previous site investigations; source, nature, and extent of contamination; and risk assessment of the Quivira Mines.

2.1 SITE DESCRIPTION AND BACKGROUND

The Quivira Mines comprises the CR-1 mine, the CR-1E mine, and the Kerr-McGee Ponds. CR-1 and CR-1E contain waste rock piles, pond areas, and mining debris while the Kerr-McGee Ponds does not contain any mining residuals at the surface. CR-2, located about 3 miles northwest of CR-1, was never developed and does not require cleanup.

The following subsections describe the site location, type of mines and operational status, regulatory history, site features and landscape, geology and hydrology, land use and populations, sensitive ecosystems, and meteorology and climate. Appendix A contains site images that show the current condition of the Quivira Mines.

2.1.1 Site Location

The Quivira Mines is within the Eastern Abandoned Uranium Mine (AUM) Region of the Navajo Nation approximately 20 miles northeast of Gallup, New Mexico (Figure 1). The site is located within the Red Water Pond Road and Pipeline Canyon Road communities in the Coyote Canyon and Standing Rock Chapters of the Navajo Nation. The Church Rock Chapter is also located to the southwest of CR-1. Sections of land owned by Bureau of Land Management are located west of CR-1 within the Church Rock Chapter and south of CR-1 near the UNC Mill Facility. The UNC Mill Facility is on private property within the Pinedale Chapter (Figure 1). The site is accessed via State Road 566.

According to the "Red Water Pond Road and Pipeline Canyon Road Residents' Resolution" (Red Water Pond Road and Pipeline Canyon Residents 2006), more than 50 Navajo families live in the Red Water Pond Road area of the Coyote Canyon Chapter and the Pipeline Canyon Road area of the Standing Rock Chapter. Nearest residences are approximately 700 feet south of CR-1, 800 feet northeast of CR-1E, and 3,000 feet northwest of the Kerr-McGee Ponds. No public or commercial buildings are within 0.5 mile of the Quivira Mines. Current surrounding land use includes residential and agricultural grazing (for livestock such as sheep, cattle, and horses). Navajo families may collect pinyon nuts, herbs, and plants from the surrounding area for food, medicinal, and ceremonial purposes.

The geographic coordinates at the center of CR-1 are 35.665448° north latitude and 108.500970° west. CR-1 is located along Red Water Pond Road north of State Road 566 (Figure 2). The mine surface disturbance encompasses about 42 acres with 147 acres of underground workings extending toward CR-1E (Weston 2010).

The geographic coordinates at the center of CR-1E are 35.66597° north latitude, and 108.489614° west longitude (Figure 3). CR-1E is located east of and along Indian Route 7049

(Pipeline Canyon Road) approximately 0.5 mile east of CR-1. The mine surface disturbance encompasses about 10.5 acres with 97 acres of underground workings extending toward CR-1.

In early 2017, USEPA became aware that Kerr-McGee had operated sediment drying ponds and a proto ore storage area on UNC land previously leased from the State of New Mexico. This area, referred to as the Kerr-McGee Ponds, is approximately 2,000 feet south of CR-1E with geographic coordinates of 35.658767° north latitude, and 108.491410° west longitude (Figure 4). In addition, an office building and training facility had been located nearby to the south. Preliminary assessment work during summer 2017 indicated the presence of elevated gamma activity in surface soils at the Kerr-McGee Ponds (Weston 2019a).

Two additional sites are located near the Quivira Mines and are being addressed under separate actions by UNC (Figure 1):

- Northeast Church Rock (NECR) Mine approximately 0.5 mile southwest of CR-1
- UNC Mill Facility approximately 1 mile south of CR-1

USEPA also assessed five vent holes (VH-1 through VH-5) associated with the Quivira Mines (Weston 2016, 2019b) (Figure 1):

- VH-1 is located approximately 0.5 mile west-southwest of CR-1 with geographic coordinates of 35.662375° north latitude and 108.513108° west longitude for the center of the vent hole. A single-family residence is located approximately 620 feet northeast of the VH-1 vent hole.
- VH-2 is located approximately 5,000 feet west-southwest of CR-1 with geographic coordinates of 35.661423° north latitude and 108.520014° west longitude. A single-family residence is located approximately 750 feet from the VH-2 vent hole.
- VH-3 is located approximately 3,500 feet east of CR-1E with geographic coordinates of 35.664606° north latitude and 108.477477° west longitude. VH-3 is within an 8-acre, fenced-in area 0.35 mile west of an active sheep farm and residence comprising two houses and several smaller structures. Additionally, a residence is located 0.25 mile north of the VH3 fenced-in area.
- VH-4 is located approximately 1,500 feet east of CR-1 on a topographic ridge with geographic coordinates of 35.66559° north latitude and 108.4948° west longitude. The nearest residence is approximately 2,300 feet northeast of VH-4.
- VH-5 is located approximately 2,000 feet east of CR-1E with geographic coordinates of 35.6651° north latitude and 108.4822° west longitude. VH-5 is 0.3 mile west of the nearest residence.

2.1.2 Type of Mine and Operational Status

The surface estate of the Quivira Mines is owned by the United States in trust for the Navajo Nation and is part of the Navajo Nation Reservation (SENES Consultants Limited [SENES] 2010). An estimated 5,760 acres of land was leased for mining from the Bureau of Indian

Affairs (BIA) as owner of the mineral estate under the Navajo Tribal Uranium Leases 14-0-0603-9987 (CR-1) and 14-20-0603-9988 (CR-1E). Kerr-McGee conducted exploration of the CR-1 and CR-1E leases in the late 1960s (SENES 2010). Kerr-McGee and then its subsidiary, Kerr-McGee Nuclear, which later changed its name to the Quivira Mining Corporation, began development of the mines in 1974 and produced ore from 1974 until 1986 at CR-1 and from 1976 until 1985 at CR-1E. Kerr-McGee also operated sediment dewatering ponds and a proto ore storage area on land leased from the State of New Mexico approximately 2,000 feet south of CR-1E. The Quivira Mining Corporation surrendered the leased properties in February 1987, and the company was sold to the predecessor company of Rio Algom Mining LLC in 1988 (SENES 2011).

The Quivira Mines were large underground uranium mines in the Westwater Canyon Member of the Morrison Formation 1,500 to 1,850 feet below ground. The CR-1 shaft was 14 feet in diameter and 1,850 deep while the CR-1E shaft was 12 feet in diameter and 1,650 feet deep. The mines were wet and required ongoing dewatering during operations. Water pumped from the mine working was discharged to settling ponds before discharge to Unnamed Arroyo #2 and the Pipeline Canyon Arroyo. The CR-1 underground workings covered 147 acres while the CR-1E underground workings covered 97 acres (Weston 2010). The mines were ventilated via five ventholes at the surface. Uranium ore was hoisted 1,850 and 1,650 feet to the ground surface at CR-1 and CR-1E via shafts, respectively.

Atomic Energy Commission records indicate production of 3,139,784 pounds of uranium from ore mined at CR-1 and 1,447,463 pounds of uranium from ore mined at CR-1E (Weston 2010). Ore contained on average 0.266 percent (2,660 milligrams per kilogram) uranium. An estimated 1.3 million tons of ore from CR-1 and CR-1E was shipped to and processed at the Quivira Mining Corporation's Ambrosia Lake Mill, approximately 50 miles to the east and north of Grants, New Mexico.

Aboveground operations at CR-1 covered 42 acres and included a former industrial area, a waste rock area, and a former pond area (Figure 2). CR-1 is dominated by a single large waste rock pile with a 30- to 50-foot elevation difference between the top and toe of the slope (Photo 1). A number of surface structures existed during the operating years, including a shaft collar and head frame (Photo 2), ventilation raises, and ore stockpile area; office, hoist house, maintenance shops, and warehousing complex; mobile equipment repair shop; fuel and oil storage facilities; main electrical transformer and switch gear; explosive storage area; and internal roads and water drainage to divert water from the waste areas and rock storage areas (SENES 2010). The former pond area contained seven ponds (Photo 3 and Photo 4).

Aboveground operations at CR-1E covered 10.5 acres and included a waste rock area, a former pond area (Photo 5), and former industrial areas (Figure 3). Two small soil-covered waste rock stockpiles, with a 7- to 10-foot elevation difference between the top and toe of the slope, are located in the north-central portion of CR-1E. A number of surface structures existed during the operating years, including a shaft collar and head frame (Photo 6), ventilation raises, hoist house and maintenance shops, and fuel and oil storage facilities (SENES 2010).

Following cessation of operations at CR-1 and CR-1E in 1985 or 1986, the shafts were backfilled with proto ore and sealed with a steel and concrete plug, vent holes were backfilled with waste

rock and sealed with a steel and concrete plug, sediment ponds were scraped and filled, and wastes were consolidated at one location at each lease area. The wastes (mainly waste rock and low-grade ore with less than 0.10 percent uranium) were capped with 6 to 12 inches of fill material. Erosion and a general lack of maintenance have degraded the CR-1 cap. At CR-1, the wastes are in stockpiles as high as 50 feet above the original grade with steep slopes along the margins. Estimated volume of the CR-1 waste pile, industrial area, and former sediment ponds is 929,200 bank cubic yards. Wastes at CR-1E are below the surrounding land grade (rather than in an above grade pile), and erosion is not significant. Estimated volume of waste at CR-1E including the waste rock, former pond, and industrial and step-out areas is 49,300 bank cubic yards.

The Kerr-McGee Ponds covered an area of 9 acres and included four sediment dewatering ponds and a proto ore storage area (Photo 7) on UNC land previously leased from the State of New Mexico (Figure 4). Pond sediment and proto ore were received from CR-1 and CR-1E. The various work areas were reportedly closed and the proto ore and pond berms removed during reclamation and place at CR-1, when the State of New Mexico transferred the land at the mill to UNC. Preliminary assessment work during summer 2017 indicated the presence of elevated gamma activity in surface soils (Weston 2019a). Approximately 27,000 bank cubic yards of contaminated soil remains at the Kerr-McGee Ponds area.

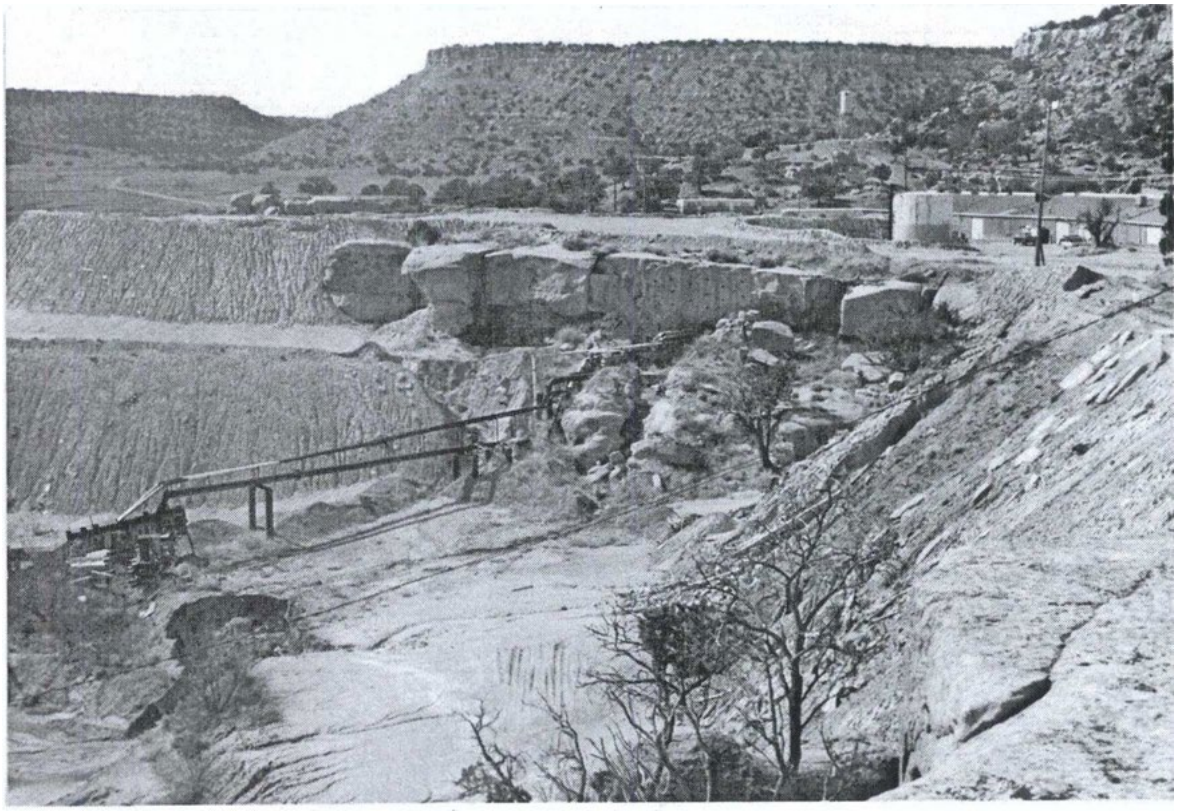


Photo 1. CR-1 Waste Rock Pile (Looking West)

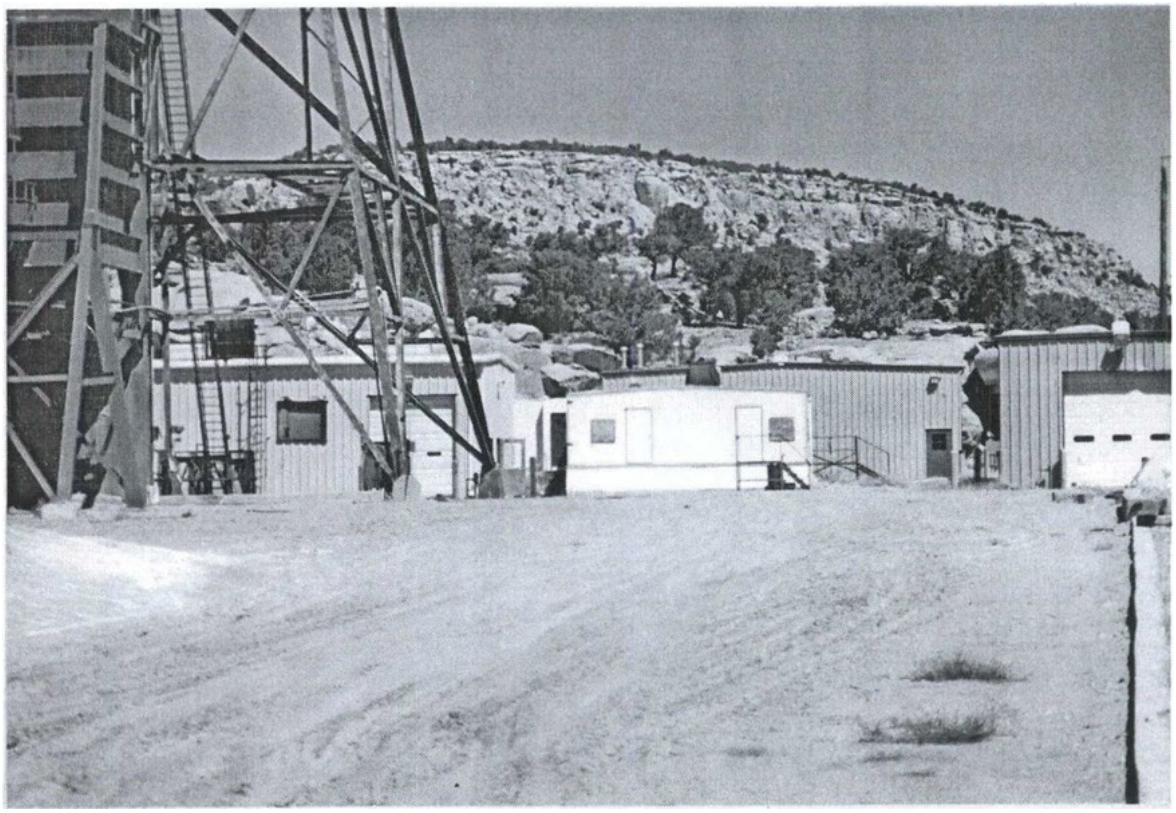


Photo 2. CR-1 Headframe and Industrial Buildings (Looking North)

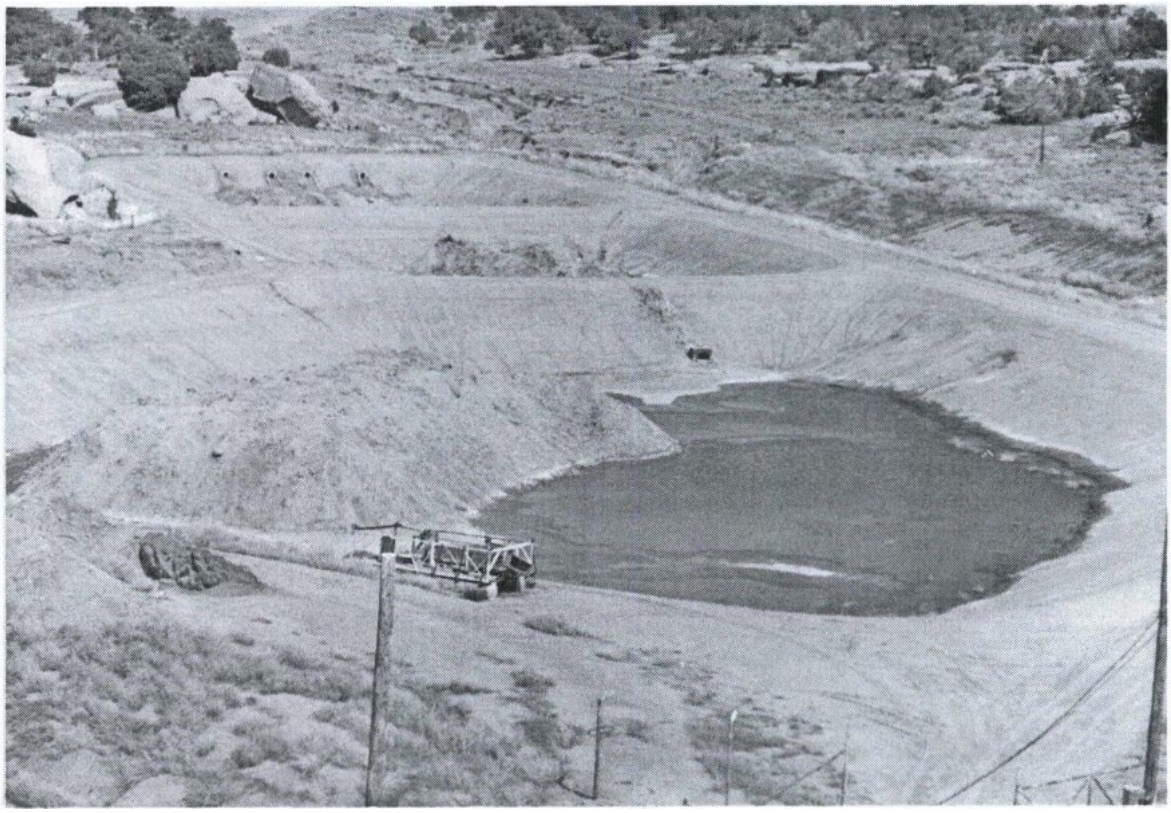


Photo 3. CR-1 Settling Ponds (Looking Northeast)



Photo 4. CR-1 Settling Ponds (Looking Southeast)

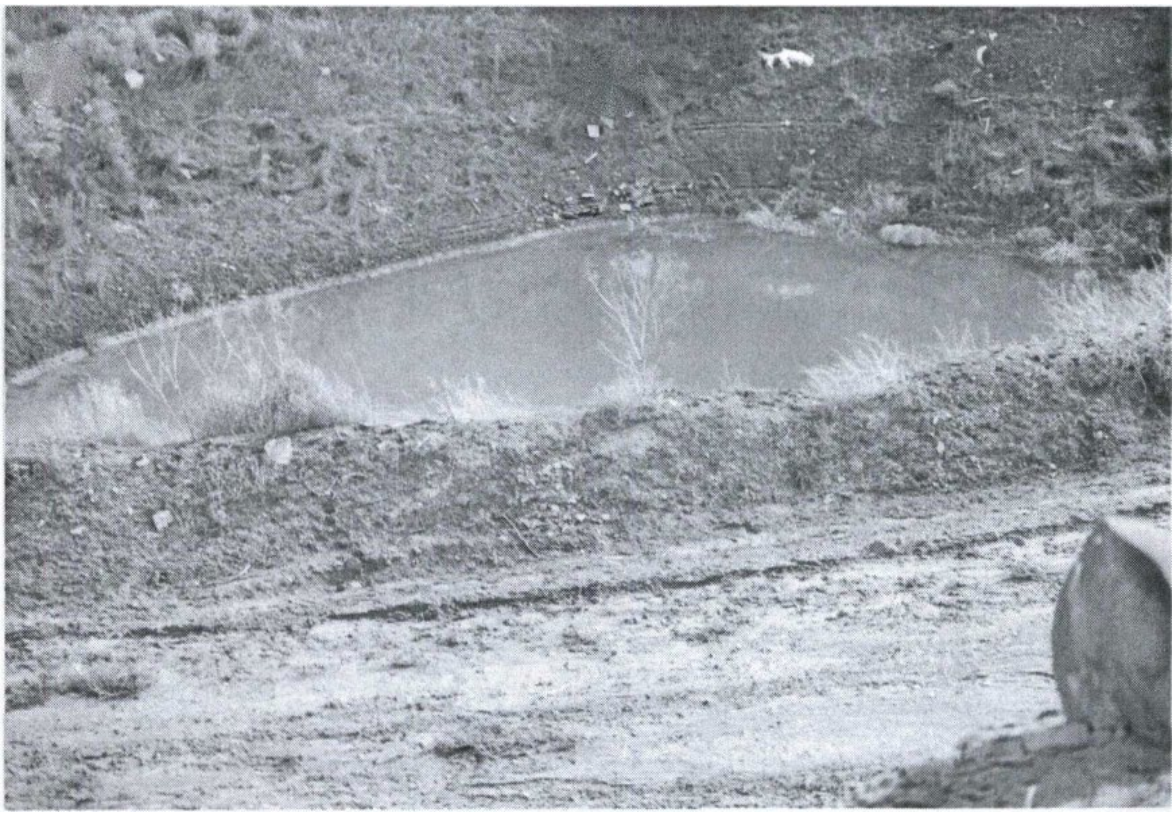


Photo 5. CR-1E Settling Pond

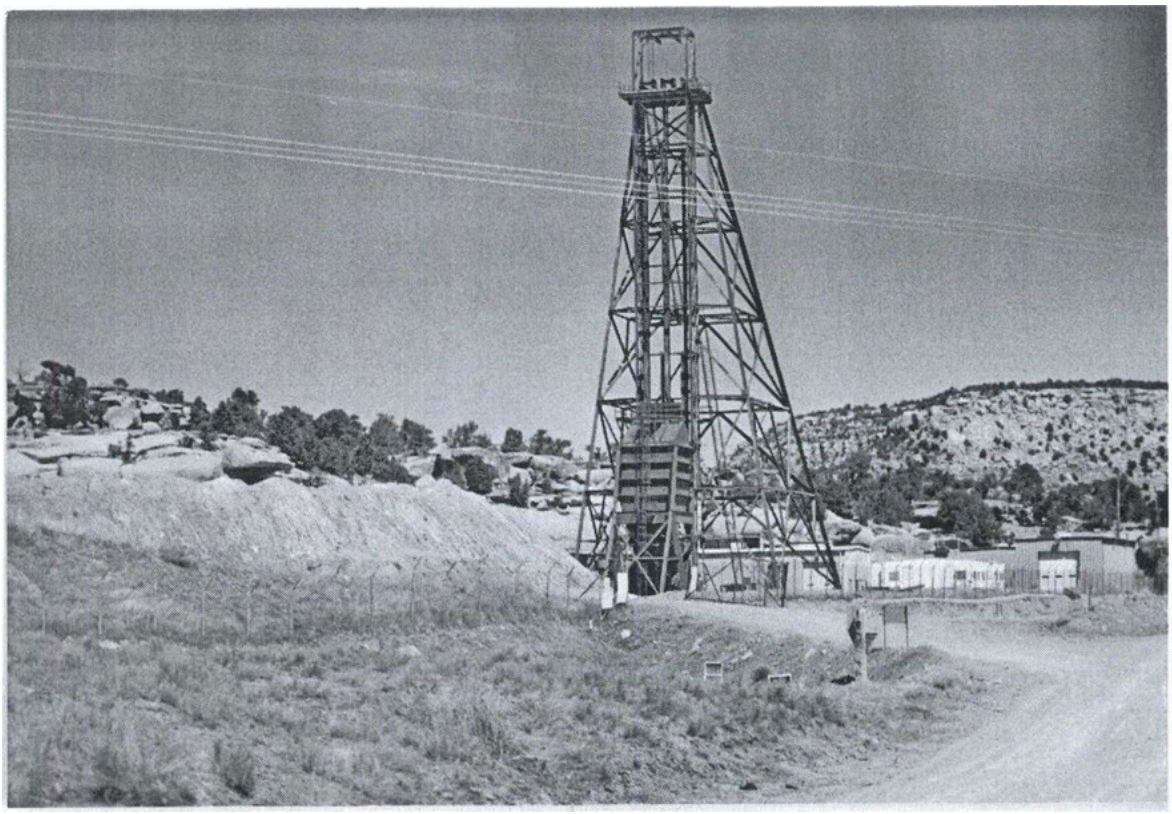


Photo 6. CR-1E Headframe and Industrial Buildings (Looking Northeast)



Photo 7. Proto Ore Stockpile at the Kerr-McGee Pond Area (Looking East)

The five vent holes (VH-1 through VH-5) associated with the Quivira Mines have elevated gamma activity in surface soils and elevated concentrations of Ra-226 in surface and shallow subsurface soil (Weston 2016). In 2015 and 2016, USEPA assessed the vent holes and found that all five vent holes had elevated gamma activity in surface soils and detections of Ra-226 in surface and shallow subsurface soil above the site-specific 2-picocuries-per-gram (pCi/g) action level for Ra-226. Based on the relatively uniform grain size, color, volume, and distribution, most vent hole wastes are likely drilling muds that were used to lubricate the drill string during vent hole installation operations.

In summer and fall 2017, USEPA conducted removal operations at five vent holes (Weston 2019b). Approximately 10,300 bank cubic yards of soil was excavated from the areas surrounding the vent holes and placed on top of the CR-1 waste rock pile. Residual contaminants remain immediately adjacent to the concrete vent shaft caps. Because of the interception of bedrock, not all contaminated material with Ra-226 concentrations above the action level was excavated from VH-2, VH-3, and VH-5.

2.1.3 Regulatory History

The Quivira Mines were operated by Kerr-McGee and then its subsidiary, Kerr-McGee Nuclear, which later changed its name to the Quivira Mining Corporation. Kerr-McGee began development of the Quivira Mines in 1974 and performed mining operations from approximately 1976 to 1985. Rio Algom Mining LLC purchased the mine lease in 1988. The Quivira Mine Corporation merged with Rio Algom Mining LLC in October 2001. Rio Algom Mining LLC is now an indirect subsidiary of the mining conglomerate BHP Billiton.

This Quivira Mines removal action is being completed under CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). In November 2014, the U.S. District Court for the Southern District of New York approved a settlement agreement to resolve fraudulent conveyance claims against Kerr-McGee and related subsidiaries of Anadarko Petroleum Corporation (*In re Tronox Inc.*, No. 09-10156 (Bankruptcy, Southern District of New York, Nov. 23, 2010)). Included in the Tronox settlement were $90 million in funds for the assessment and remediation of the Quivira Mines.

Multiple investigations of the Quivira Mines completed from 2008 through 2022 are summarized in Section 2.3. Reclamation activities at the Quivira Mines were completed between 1980 to 1986; and multiple removal actions were completed between 2010 and 2017 and are summarized in Section 2.2.

The nearby NECR Mine operated at approximately the same time as the Quivira Mines, and its ore was processed at the nearby UNC Mill Facility. USEPA Region 9 signed an action memorandum (USEPA 2011) selecting placement and capping of the approximately 1 million bank cubic yards of waste at the UNC Mill Facility.

The nearby UNC Mill Facility is a closed uranium mill with tailings ponds formerly operated by and currently owned by UNC, a subsidiary of the General Electric Company. The UNC Mill Facility is a National Priorities List or Superfund site, EPA ID #NMD030443303, with

two operable units—Ground Water Operable Unit 1 and Surface Soil Operable Unit 2 (USEPA 2015).

2.1.4 Site Features and Landscape

All mine workings at the Quivira Mines were established underground, and no mineralized rock is present at the surface. All mine features are aboveground and include shafts, adits, waste piles, mine debris, industrial areas, proto ore stockpile areas, access roads, and former ponds (Figure 2 through Figure 4). Reclamation of the shafts, adits, industrial areas, waste rock piles, and settling ponds occurred in 1986 and 1987 as specified in the abandonment and reclamation plan submitted by the Quivira Mining Company (1987).

CR-1 is located along Red Water Pond Road on the north side of an unnamed arroyo at the base of a mesa. CR-1 was reclaimed following the closeout of operations in 1986, and the mine lease area includes a former industrial area, waste rock area, former settling pond area, and reclaimed 14-foot-diameter shaft and adit (Figure 2). The former industrial area at CR-1 is defined as the area where industrial buildings and ancillary structures were formerly located. During operating years, surface structures included a shaft collar and head frame, ventilation raises, and ore stockpile area; an office building, a hoist house, maintenance shops, and a warehousing complex; mobile equipment repair shop; fuel and oil storage facilities; main electrical transformer and switch gear; explosive storage area; and internal roads and drainage channels to divert water from the waste and rock storage areas. The buildings were razed at the closeout of operations in 1986, and the area has been graded (SENES 2010). A waste rock pile is located on the western and southern portion of CR-1 adjacent to Unnamed Arroyo #2 to the south and Red Water Pond Road on the west (Figure 2). The waste rock pile has a 30- to 45-foot face, which is mostly sloped 3H:1V. Most waste rock material within the stockpile is a fine to medium sand with little to no coarse sand or gravel.

CR-1E is located on a terrace immediately northwest of Pipeline Canyon Road and Pipeline Canyon Arroyo adjacent to a mesa. CR-1E includes a former industrial area, a waste rock pile area, two adits, a 12-foot-diameter shaft, a former settling pond area, and surrounding areas with contaminated soil (Figure 3). The former industrial area at CR-1E is defined as the area where industrial buildings and ancillary structures were formerly located. The former structures at CR-1E were similar to those at CR-1 but smaller in scale. The buildings were razed at the closeout of operations, and most of the area appears to have been covered with soil and rock (SENES 2010). Two small soil-covered waste rock stockpiles slightly above grade in height are in the north-central portion of the lease area. Most of the waste rock material within the stockpile is a fine to medium sand with little to no coarse sand or gravel. The small former pond area has been defined according to depictions on historical aerial photographs of a settling pond constructed for and used in mining operations.

The Kerr-McGee Ponds are within a flat fenced area on an alluvial terrace in Pipeline Canyon 0.5 mile south of CR-1E and southeast of Pipeline Canyon Road and Pipeline Canyon Arroyo (Figure 4). This area contains former ponds used to dewater pond sediment from former mining operations at CR-1 and CR-1E. The former Quivira Mines uranium mining operations used three, and later four, overflow ponds at the Kerr-McGee Ponds. Dried sediment was then stored in a proto ore stockpile immediately east of the dewatering ponds.

2.1.5 Geology, Hydrogeology, and Hydrology

The following subsections describe the geology, hydrogeology, and hydrology of the Quivira Mines.

2.1.5.1 Geology

Surface geology (Figure 5) differs in each area of the Quivira Mines:

- CR-1 surface geology consists of the Dalton and Bartlett Barren Members of the Crevasse Canyon Formation on the northern hillslopes and Quaternary alluvium on the southern slopes.
- CR-1E surface geology consists of the Dalton Sandstone Member of the Crevasse Canyon Formation on the northern hillslopes and the Mulatto Tongue of Mancos Shale and Quaternary alluvium on the mine terrace.
- The Kerr-McGee Ponds is on fluvially deposited Quaternary alluvium that overlies the Mulatto Tongue of Mancos Shale, which is expressed on south-adjacent hillslopes.

No mineralization occurs in the surface geologies; however, areas of elevated activity are present north of CR-1. Soil types throughout the Quivira Mines are shown on Figure 6.

CR-1 and CR-1E lie in the Church Rock Mining District of the Grants Uranium Belt within the San Juan Geologic Basin. The primary ore-bearing unit in the Grants Uranium Belt and Church Rock Mining District is the Morrison Formation (Brister and Hoffman 2002). Three members of the Morrison Formation are listed below in stratigraphic order (oldest to youngest):

- Recapture Member consists of grayish-red siltstone and claystone.
- Westwater Canyon Member consists principally of medium- to coarse-grained arkosic sandstones interbedded with mudstone units of variable thicknesses.
- Brushy Basin Member consists of mudstone formed from volcanic ash falls.

At CR-1 and CR-1E, the uranium ore was mined primarily from the Westwater Canyon Member approximately 1,800 feet below grade. Uranium mineralization within the Westwater Canyon Member occurs as both tabular and roll-type deposits.

After deposition of the Morrison Formation during the late Jurassic period, no sediments were preserved in the San Juan Basin until the late Cretaceous period, including the Dakota Sandstone, Mancos Shale, and Gallup Sandstone. The Mancos Shale is a regional groundwater-confining unit. The Gallup Formation occurs as the Lower Gallup Sandstone and the Upper Gallup Sandstone and contains the first (uppermost) local bedrock groundwater. The Upper Cretaceous Crevasse Canyon Formation is within the Mesa Verde Group and overlies and interfingers with the Gallup Sandstone. The Upper Cretaceous Crevasse Canyon Formation (including Dalton Sandstone and Bartlett Barren Members) comprises silty shale, laminated siltstone, sandstone with a clay matrix, coal, shaly siltstone, and silty sandstone. All geologic units below the Quivira Mines dip to the northeast. Alluvium overlies the sedimentary bedrock. A stratigraphic profile of these units is shown on Figure 7.

2.1.5.2 Hydrogeology

The main water-bearing strata below the Quivira Mines, from shallowest to deepest, are the alluvial deposits, Upper Gallup Sandstone, Lower Gallup Sandstone, Dakota Sandstone, and Westwater Canyon Member (Figure 7). Because of the northeast dip of the rock units, each of these strata outcrops along the Pipeline Canyon Arroyo to the far southwest of the area. Aquifer recharge occurs along the arroyos primarily as rainfall infiltrates the shallow subsurface into the alluvial groundwater that moves southwesterly, following the same slope as the ground surface contours. Alluvial groundwater is transmitted to the underlying water-bearing strata at contacts between the strata and alluvium. Groundwater in the water-bearing strata generally flows northeast, following the regional dip of the bedrock strata. With the cessation of mining and deep aquifer dewatering, the local arroyos are no longer a major recharge source to the aquifers. A potentiometric surface map of the Upper Gallup Sandstone in the area shows a northeast flow direction following the regional dip (USEPA 2010a).

The main uranium-bearing rock unit (Morrison Formation) includes the water-bearing Westwater Canyon Member. Depth to groundwater in the Westwater Canyon Member is 1,500 to 1,850 feet bgs. No shaft construction records are available pertaining to the Quivira Mines other than shaft diameters and total depths; however, such records are available regarding the nearby NECR Mine. According to the drilling log for one nearby NECR Mine shaft constructed in 1968 and 1969, the first encounter with groundwater occurred at approximately 400 feet bgs in the lower portion of the Upper Gallup Sandstone (Montgomery Watson Harza [MWH] 2003). Inflow of water from this formation amounted to 30 to 50 gallons per minute (gpm). The mine shaft drilling logs indicate no encounter with groundwater again until the Dakota Sandstone at the base of the Mancos Shale. Groundwater inflows from the Dakota Sandstone were 800 gpm, and inflows from the Westwater Canyon Member were 1,500 to 2,000 gpm (MWH 2003). The Westwater Canyon Member was dewatered during mining operations, but water levels have been recovering since the cessation of mining. A regional cone of depression from mine dewatering will likely result in multiple decades of groundwater recovery. The local communities rely on municipal water provided by the Navajo Tribal Utility Authority (NTUA) with only limited local groundwater use for livestock watering.

2.1.5.3 Hydrology

Most precipitation at the Quivira Mines occurs from July to October as monsoon thunderstorms. The annual evaporation rate is nearly five times the precipitation rate; consequently, most streams in the area are ephemeral or have flowing water only during storms or rapid snowmelt. The dry conditions and high-intensity rains cause quick saturation of the surface soils, preventing precipitation from penetrating deeper. As a result, intense rainfall drives surface flow into canyon washes, generating short-term and fast-moving streams. These streams produce arroyos that cut through the sedimentary bedrock in the canyons and erode sediments that are transported downstream to be deposited as alluvium. The alluvium in the canyons and on valley floors consists of fine-grained sand with interbedded silty clay layers. The alluvium directly overlies sedimentary bedrock and aids in the transfer of surface water through the shallow groundwater zone in the alluvium to the deeper sedimentary bedrock aquifers (Figure 7).

A series of arroyos exist throughout the Quivira Mines and surrounding area. CR-1 is physically separated from the NECR Mine and the residences on Red Water Pond Road to the south by Unnamed Arroyo #2 that runs along the southern boundary of CR-1 (Figure 2). Unnamed Arroyo #2 drains approximately 4,700 acres upstream of the confluence with Pipeline Canyon Arroyo. The width of Unnamed Arroyo #2 typically ranges from 15 to 35 feet with sidewalls 10 to 15 feet high. Abutting the southern side of CR-1, the arroyo drains from west to east and flattens out to a floodplain near its junction with the Pipeline Canyon Arroyo, south of CR-1.

The Pipeline Canyon Arroyo is immediately southeast of CR-1E (Figure 3) and drains approximately 6,700 acres upstream of the confluence with Unnamed Arroyo #2. The width of the Pipeline Canyon Arroyo typically ranges from 15 to 25 feet with sidewalls 10 to 25 feet high. This arroyo drains from northeast to southwest and flattens out to a floodplain near its junction with Unnamed Arroyo #2, south of CR-1. A small tributary arroyo also drains an area north of the Kerr-McGee Ponds.

A large quantity of mine water (2,500 to 5,000 gpm) was extracted from the Westwater Canyon Member to allow access to ore during mining operations at the NECR Mine and Quivira Mines and to process ore at the UNC Mill Facility (Engineering/Remediation Resources Group, Inc. [ERRG] 2011). An estimated 93 billion gallons of water was pumped from the mine workings and for process water during mine and milling operations (ERRG 2011). Extracted groundwater was discharged via a series of ponds to surface water in Unnamed Arroyo #2 and the Pipeline Canyon Arroyo. Similar dewatering activities at the NECR Mine contributed a large flow to Unnamed Arroyo #2 during mining operations. The surface water, in turn, recharged the groundwater in alluvium and the Upper and Lower Gallup Formations along the Pipeline Canyon Arroyo near the UNC Mill Facility to the southwest of the Quivira Mines.

2.1.6 Land Use and Populations

More than 50 Navajo families live in the Red Water Pond Road area of the Coyote Canyon Chapter and the Pipeline Canyon Road area of the Standing Rock Chapter (Red Water Pond Road Community Association and Southwest Research and Information Center 2012). Figure 8 shows approximate locations of the Red Water Pond Road community area and the Pipeline Canyon Road community area. The nearest residences are approximately 700 feet south of CR-1 and 800 feet north of CR-1E. No public or commercial buildings are within 0.5 mile of the Quivira Mines.

The nearest urban populations are concentrated in Gallup and Church Rock. Gallup is approximately 20 miles from the Quivira Mines and had an estimated population of 21,899 in 2020 (U.S. Census Bureau 2021). Church Rock is approximately 12 miles from the Quivira Mines and had an estimated population of 1,100 in 2019 (U.S. Census Bureau 2019). Exhibit 2 shows the Navajo population and the non-Navajo population for Coyote Canyon, Pinedale, and Standing Rock chapters and other nearby chapters as determined by the 2019 U.S. census (Navajo Nation Division of Community Development 2019).

Exhibit 2. Chapter Populations in 2019

Chapter	Navajo Population	Non-Navajo Population	Total
Church Rock	2,596	87	2,683
Coyote Canyon	726	43	769
Pinedale	1,217	14	1,231
Standing Rock	522	1	523

Note:
Chapter populations are from the 2019 U.S. census (Navajo Nation 2019).

The Quivira Mines is a former industrial site that is currently used by wildlife and livestock where perimeter fencing is compromised. Current surrounding land uses include agricultural grazing (for livestock such as sheep, cattle, and horses), residential, and industrial (UNC property). Navajo families may collect pinyon nuts, herbs, and plants from the surrounding area for food, medicinal, and ceremonial purposes (USEPA 2009a). The following potential future land uses were identified at the Quivira Mines (Figure 8); these land uses are further described in Section 2.5.3 by pairing users of the land, otherwise known as receptors, with land areas as follows:

- **Kee'da'whíí téél (full-time Navajo resident) –** Areas that are easily accessible and relatively flat.
- **Kǫǫ eí doo nahaazáh dah (difficult access open space user) –** Areas that are difficult to access because of deeply incised arroyos.
- **UNC outdoor worker** – Areas of the former Kerr-McGee Ponds and arroyos on privately-owned land with industrial land use.

Additionally, a water line easement runs through the CR-1 pond area and crosses Unnamed Arroyo #2. The water line is scheduled to be rerouted. Marathon Petroleum has a 35-foot-wide easement for petroleum pipelines located along the southeast margin of CR-1E and adjacent to the Pipeline Canyon Road. The pipeline easement cannot be disturbed during removal activities without detailed consultation with Marathon Petroleum and other utilities using the easement.

2.1.7 Sensitive Ecosystems

SENES (2011) completed a vegetation survey in 2011 as part of the RSE report for the Quivira Mines. The survey identified good plant diversity with a mixture of native shrubs, grasses, and forbs although cover values varied based on grazing pressure. Tetra Tech (2022a, 2023a) performed rare plant surveys in 2022 and 2023 to assess the potential for investigation activities to affect Endangered Species Act (ESA)-listed species, critical habitats, and Navajo Nation Department of Fish and Wildlife (NNDFW)-listed sensitive species.

The habitat in the Quivira Mines area consists of upland communities of intermountain basins semi-desert grassland, intermountain basins greasewood flat, intermountain basins semi-desert shrub steppe, and Colorado Plateau pinyon-juniper woodlands and is bordered by Colorado plateau mixed bedrock canyon and tableland. The 2022 field survey identified the dominant species throughout the project footprint as sagebrush (*Artemisia tridentata ssp. tridentata*),

globemallow (*Sphaeralcea ambigua*), rabbitbrush (*Ericameria nauseosa*), filaree storksbill (*Erodium cicutarium*), cheatgrass (*Bromus tectorum*), Indian ricegrass (*Achnatherum hymenoides*), needle and thread grass (*Hesperostipa comata*), greasewood (*Sarcobatus vermiculatus*), two-needle pinyon (*Pinus edulis*), and Utah juniper (*Juniperus osteosperma*). No plant species of management interest or rare plant species were observed during the 2022 survey.

Dominant plant species identified during the 2023 field survey included all plant species identified during the 2022 field surveys, as well as Palmer's penstemon (*Penstemon palmeri*), Douglas' milk-vetch (*Astragalus douglassii*), yellow sweet clover (*Melilotus officinalis*), desert prince's plume (*Stanleya pinnata*), ground plum (*Astragalus crassicarpus*), fragrant evening primrose (*Oenothera cespitosa*), spiny star (*Escobaria vivipara*), whole leaf paintbrush (*Castilleja integra*), and hoary tansy aster (*Dieteria canescens*). Other plants species observed to a lesser extent included Gambel oak (*Quercus gambelii*), Russian olive (*Elaeagnus angustifolia*), alfalfa (*Medicago sativa*), Stansbury's cliffrose (*Purshia stansburyana*), alder leaf mountain mahogany (*Cercocarpus montanus*), rose heath (*Chaetopappa ericoides*), woolly locoweed (*Astragalus mollisssimus*), fineleaf woolly-white (*Hymenopappus filifolius*), and toad flax penstemon (*Penstemon linarioides*). Significant habitat for Naturita milk-vetch (*Astragalus naturitensis*) was found within the action area during the 2023 survey; Naturita milk-vetch is a Navajo Endangered Species List (NESL) sensitive species. Follow-up surveys are proposed in 2024 before construction activities to refine exclusion zones and mitigation measures.

Tetra Tech (2022a) performed a nesting bird survey in 2022 for the Quivira Mines area to assess the potential for investigation and construction activities to affect ESA-listed species, critical habitats, migratory birds protected by the Migratory Bird Treaty Act, and NNDFW-listed sensitive species. All suitable nesting areas were surveyed during the field survey, and no active raptor species nests were identified. However, one common raven *(Corvus corax)* nest was located between CR-1 and CR-1E. Avian and wildlife species observed at the Quivira Mines were the common raven, house finch (*Haemorphous mexicanus*), rock wren (*Salpinctes obsoletus*), Gunnison prairie dog (*Cynomys gunnisoni*), western fence lizard (*Sceloporus occidentalis*), and bullsnake (*Pituophis catenifer sayi*).

Tetra Tech (2023a) performed another nesting bird survey in 2023 for the Quivira Mines and Kerr-McGee Ponds. Burrowing owls (*Athene cunicularia*) and a great horned owl (*Bubo virginianus*) nest were identified within the survey area. All suitable nesting areas were surveyed, and no other nests or sensitive habitats were documented for sensitive species potentially affected by construction activities. Other avian and wildlife species observed included all species identified in 2022, as well as a red-tailed hawk (*Buteo jamaicensis*). Follow-up surveys for burrowing owls are proposed in 2024 before construction activities to refine exclusion zones and mitigation measures.

A biological assessment was conducted for the Quivira Mines that reviewed the most recent species lists for the area provided by the U.S. Fish and Wildlife Service and NNDFW (Tetra Tech 2022b). All potential species in the area that are federally threatened, endangered, candidates for listing, or are included on NESL were evaluated for potential to occur at the site. The biological assessment concluded that no federally listed species have the potential to occur in the Quivira Mines area and that no critical habitats for any ESA-listed species are within the area. The biological assessment concluded that investigation and construction activities will

have no effect on the ESA-listed Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), yellow-billed cuckoo (*Coccyzus americanus* ssp. *occidentalis*), Zuni bluehead sucker (*Catostomus discobolus yarrowi*), Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), or Zuni fleabane (*Erigeron rhizomatus*) and will have no effect on these species' designated critical habitats. A separate assessment may be required for construction activities that will occur over a longer time frame during any removal action.

The biological assessment identified three NESL species with the potential to occur in the Quivira Mines area: golden eagle (*Aquila chrysaetos*), mountain plover (*Charadrius montanus*), and Naturita milk-vetch; however, these species do not require an effects determination (Tetra Tech 2022b). The biological assessment identified conservation measures for NESL species to protect the continued existence of the above-listed species in the Quivira Mines area during the proposed action.

2.1.8 Meteorology and Climate

Climate at the Quivira Mines is semiarid with a high annual net pan evaporation rate of 54 inches per year, far exceeding the annual precipitation of 11.08 inches. Daily temperature and precipitation data from Western Regional Climate Center Station 293422 in Gallup, New Mexico, (about 20 miles southwest of the Quivira Mines) was examined for years 1976 to 2016 (Western Regional Climate Center 2018). Data from 2016 to the present from this station and other stations near the Quivira Mines were not available. The station data indicate the following weather trends:

- Annual average maximum temperature is 66.0 degrees Fahrenheit (°F), and annual average minimum temperature is 31.6 °F.
- Average maximum monthly temperatures peak in July at 87.7 °F, and average minimum monthly temperatures are lowest in December at 13.4 °F.
- Average annual precipitation is 11.08 inches.
- The most precipitation typically occurs in July and August, averaging 1.72 and 1.92 inches, respectively.
- The least amount of precipitation typically occurs in June, averaging 0.42 inch.
- The area receives approximately 30.6 inches of snow from October to May, primarily from November through April.

Figure 9 shows the City of Gallup monthly average temperature, precipitation, pan evaporation, and snowfall. Wind typically originates from the southwest (Figure 10).

Exhibit 3 provides precipitation frequency estimates over several average recurrence intervals for the City of Gallup from the National Oceanic and Atmospheric Administration (2006). For example, a 10-minute storm in this area that deposits 0.994 inch of rain is likely to occur once every 100 years. These estimates provide a better description of precipitation event intensities and how durations could affect the Quivira Mines and associated arroyos.

Exhibit 3. Precipitation Frequency Estimates

Duration	Average Recurrence Interval			
	1 Year	5 Years	100 Years	1,000 Years
5 Minutes	0.195	0.338	0.654	0.955
10 Minutes	0.296	0.515	0.994	1.45
30 Minutes	0.494	0.859	1.66	2.43
2 Hours	0.725	1.23	2.44	3.66

Note:
Precipitation frequency estimates in inches based on frequency analysis of partial duration series. Estimates have an upper bound confidence interval at 90 percent. Estimates are from the National Oceanic and Atmospheric Administration (2006).

2.2 PREVIOUS RECLAMATION AND REMOVAL ACTIONS

Previous mine reclamation and removal activities at the Quivira Mines are summarized chronologically below and shown on Figure 11 while reclaimed features are detailed in Table 1:

- 1980 to 1982: Reclamation of the former Kerr-McGee Ponds on UNC property included removal of the pond berms and former proto ore stockpile and grading to match the surrounding land (Weston 2019a). The reclaimed material was placed in Pond 1 at CR-1. The estimated remaining volume of contaminated soils at the Kerr-McGee Ponds is 34,000 bank cubic yards.
- 1985 or 1986: Reclamation of CR-1 and CR-1E included specified removals of mine dewatering pumps; mine equipment including hoists, compressors, headframes, and generators; buildings; and foundations. The sediment ponds were scraped and filled, and wastes were consolidated at one location at each mine. The wastes (mainly waste rock and low-grade ore with less than 0.10 percent uranium) were capped with 6 to 12 inches of fill material. Estimated volume of the CR-1 waste pile and former sediment ponds is 929,200 bank cubic yards. Wastes at CR-1E are in a low waste pile blended into the surrounding topography (rather than in an above-grade pile), and erosion is not significant. Estimated volume of waste at CR-1E including the waste rock, former pond, and industrial and step-out areas is 49,300 bank cubic yards. No record of execution of this work is available from the mine owners, but current visual conditions indicate that this work was completed as specified in the reclamation work plan (Quivira Mining Company 1987).
- 2010: Time-critical removal action (TCRA) to repair fences, grade and seed the western slopes of the CR-1 waste pile, install sediment control structures to CR-1, and repair mine access roads and the Red Water Pond Road (USEPA 2010c). USEPA repaired the bridge near the CR-1 waste pile.
- 2010: TCRA removal of approximately 110,000 bank cubic yards of soil from Step-Out Area #1 associated with the NECR Mine (Figure 11). Excavated soil was placed in a soil consolidation area within the NECR Mine (MWH 2010).
- 2012: TCRA to excavate 17,374 bank cubic yards of contaminated soil, place excavated materials onto the waste rock stockpile at CR-1, reconstruct the road and shoulder area

between State Road 566 and Unnamed Arroyo #2, and revegetate disturbed areas) (Conestoga Rovers and Associates Ltd. [CRA] and SENES 2013).

- 2012: TCRA removal of approximately 32,000 bank cubic yards of impacted soils from the East Drainage Area associated with the NECR Mine (Figure 11). Excavated soil was placed in a soil consolidation area within the NECR Mine (MWH 2013).
- 2017: Vent shaft removal activities at five ventilation shafts included excavating a combined estimated 10,293 bank cubic yards of impacted soil from VH-1, VH-2, VH-3, VH-4, VH-5, and bridge abutments. All excavated material was consolidated into the CR-1 waste pile. Residual contaminants remain immediately adjacent to the concrete vent shaft caps to avoid disturbance of the closures. Any remaining residual waste at these locations is 3 to 10 feet bgs and was capped with a minimum of 3 feet of clean fill material (Weston 2019b).
- 2023 and 2024: Erosion control efforts to limit further offsite migration of waste and improve nearby erosion and sedimentation conditions.

2.3 PREVIOUS SITE INVESTIGATIONS

The nature and extent of the contamination at CR-1, CR-1E, and the Kerr-McGee Ponds were delineated via gamma scans and soil sampling and analysis. Based on results of the scans and sample analysis, most of the waste is within the fenced areas at CR-1, CR-1E, and the Kerr-McGee Ponds.

Previous environmental investigations for the Quivira Mines include:

- Initial gamma screening investigations in 2008 and 2009 to conduct a surface screen for gamma radiation at CR-1, CR-1E, arroyos up and downstream of the site, Red Water Pond Road, and the cornfield of a local resident (Weston 2010).
- RSE field investigations in 2010 and 2011 including collection and analysis of surface and subsurface soil and static and scan gamma surveys at CR-1, CR-1E, Unnamed Arroyo #2, the Pipeline Canyon Arroyo, Red Water Pond Road, and Pipeline Canyon Road (SENES 2011).
- Supplemental soil sampling and static and scan surveys in 2011 by USEPA at two former cornfields, a former irrigation storage pond that stored water pumped from the mine, and portions of Unnamed Arroyo #2 upstream from CR-1 (Ecology and Environment, Inc. 2012).
- Vent hole assessment work between 2011 and 2017 to assess the gamma activity in the surface soil of the five vent holes associated with the Quivira Mines (Weston 2016, 2019b).
- Data gap collection of additional soil borings in 2015 to better delineate the lateral and vertical extents of contamination associated with CR-1 and CR-1E (data collected by Weston and not published). The data were used, together with data collected previously by SENES (2011), to estimate the total volume of waste rock at the two mines in this EE/CA.

- A Kerr-McGee Ponds assessment in 2017 including collection and analysis of surface and subsurface soil samples (Weston 2019a).
- Data gap investigation in summer 2022 including identification and sampling of three background study areas (BSA) for different geologies at the site, refining the lateral and vertical extent of contamination at the site, construction of wells in alluvium at CR-1, geotechnical test pits in waste piles and borrow soil, installation of soil moisture probes, and installation of a weather station (Tetra Tech 2023b).

Because of the significant depth to groundwater, arid climate, and interbedded, confining geology in the region, rainfall and surface water infiltration do not directly impact confined groundwater in the Westwater Canyon Member. Moreover, no drinking water wells are currently completed in the Westwater Canyon Member near the Quivira Mines. Groundwater impacts to shallow groundwater from the adjacent NECR Mine and UNC Mill Facility were evaluated by USEPA in 2023 (USEPA 2023). No direct pathway is available from the surface waste rock at the Quivira Mines to the Westwater Canyon Member. Potential impact of the Quivira Mines on shallow alluvium groundwater was evaluated during a 2022 data gaps investigation. Two wells were installed in alluvium and screened at the alluvium-bedrock interface at CR-1. An insufficient volume of water was present in the wells to sample. Water in the wells has been checked each quarter, but no water has been present. Therefore, the scope of this EE/CA focuses only on the nature and extent of contamination at the site in surface and near-surface soil.

2.4 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

The source, nature, and extent of waste materials at the Quivira Mines were characterized during the RSE investigation and follow-on investigations. The following subsections present the calculation of BTVs, results of the investigations, sources and nature of contamination, and extent of contamination.

2.4.1 Background Threshold Values

CR-1 is within 1 mile of the NECR Mine and was initially thought to be in the same geological setting. Thus, background levels developed for the NECR Mine (MWH 2006) were originally also applied to the Quivira Mines. However, after analysis, the data did not appear to fit the varied Quivira Mines site geologies. Therefore, background studies were conducted at the Quivira Mines in summer 2022 (Tetra Tech 2023b).

BSAs were sampled in three different geologies: Quaternary alluvium, Mulatto Tongue of Manco Shale, and Bartlett Barren Member of the Crevasse Canyon Formation (Figure 5). The Dalton Sandstone Member is a vertical cliff forming unit at the site and was not sampled because it has limited exposure. BSAs were selected to be up- or cross-wind to releases at the Quivira and NECR Mines and the UNC Mill Facility. Exposed geologic units at each lease area are described below.

- **CR-1 Exposed Units.** The Bartlett Barren Member is located at CR-1 upslope of the CR-1 waste pile and lower pond area. A cliff forming unit, the Dalton Sandstone Member, is located between the Bartlett Barren Member and Mulatto Tongue of Mancos Shale at CR-1. The Mulatto Tongue of the Mancos Shale is present at the base of the cliff

at CR-1. Similar to the area south of the Kerr-McGee Ponds, a unit of the Mulatto Tongue of the Mancos Shale may also be present locally above the Dalton Sandstone Member as evidenced by gamma activity in bedrock above. Quaternary alluvium is present at the toe of the CR-1 waste pile and lower pond area drainage and is derived from upslope geologic units.

- **CR-1E Exposed Units.** A cliff forming unit, the Dalton Sandstone Member, is located upslope of CR-1E. The Mulatto Tongue of the Mancos Shale underlies most of CR-1E. Quaternary alluvium is present at and downslope of CR-1E and is derived from upslope geologic units. The Quaternary alluvium overlies the Mulatto Tongue of the Mancos Shale bedrock locally.
- **Kerr-McGee Ponds Exposed Units.** The Mulatto Tongue of the Mancos Shale is present on the hillslopes surrounding the Kerr-McGee Ponds area. A cliff-forming unit, the Dalton Sandstone Member, is located between units of the Mulatto Tongue of the Mancos Shale. Quaternary alluvium is present at the Kerr-McGee Ponds area and is derived from upslope geologic units.

BTVs for each BSA were calculated (Exhibit 4) based on the 95 percent upper tolerance limit with 95 percent coverage (UTL95-95) (Tetra Tech 2023b). The limit represents a 95 percent probability (or confidence) that 95 percent of samples from background are below that value.

To identify the appropriate BTV for each lease area, the range of Ra-226 and metals concentrations in non-mining impacted alluvium at and around each lease area were compared to BTVs from each BSA. Ra-226 is discussed below as it is the primary risk driver at AUM lease areas.

- The BTV for Ra-226 in Quaternary alluvium (BSA-1), derived from the Bartlett Barren Member, Gibson Coal Member, and Point Lookout Member, is lower than the 1.5 to 2 pCi/g range of Ra-226 concentrations in non-mining impacted alluvium at and around CR-1, CR-1E, and the Kerr-McGee Ponds. This suggests that concentrations of Ra-226 in alluvium are influenced by upslope parent material such as the Mulatto Tongue of the Mancos Shale (BSA-5) at CR-1E and the Kerr-McGee Ponds and the Bartlett Barren Member (BSA-2) and Mulatto Tongue of the Mancos Shale (BSA-5) upslope of CR-1.
- The BTV for Ra-226 in alluvium derived from the Mulatto Tongue of the Mancos Shale (BSA-5), is about 2 pCi/g higher than Ra-226 concentrations in non-mining impacted alluvium at and around CR-1, CR-1E, and the Kerr-McGee Ponds. This suggests that concentrations of Ra-226 in alluvium are not influenced by upslope parent material such as the Mulatto Tongue of the Mancos Shale (BSA-5) at CR-1E and the Kerr-McGee Ponds.
- The BTV for Ra-226 in alluvium derived for the Bartlett Barren Member (BSA-2) was compared to the non-mining impacted alluvium at and around CR-1, CR-1E, and the Kerr-McGee Ponds and found to be within the 1.5 to 2 pCi/g range of observed values. Therefore, UTL95-95 values for the Bartlett Barren Member (BSA-2) were used to identify BTVs, COCs, and COECs at the Quivira Mines.

Exhibit 4. Background Threshold Values

Analyte [1]	Quaternary Alluvium (BSA-1)		Bartlett Barren Member of the Crevasse Canyon Formation (BSA-2)		Mulatto Tongue of Mancos Shale (BSA-5)	
	ProUCL Distribution	UTL95-95 from ProUCL	ProUCL Distribution	UTL95-95 from ProUCL	ProUCL Distribution	UTL95-95 from ProUCL
Aluminum	Nonparametric	4,800	Normal	6,004	Normal	6,731
Antimony	Normal	0.202	Normal	0.291	Normal	0.121
Arsenic	Normal	6.556	Nonparametric	8.9	Normal	6.476
Barium	Normal	88.5	Normal	110.9	Normal	170.8
Beryllium	Normal	0.55	Gamma	1.036	Normal	0.559
Cadmium	Normal	0.2	Nonparametric	0.42	Normal	0.11
Chromium	Nonparametric	4.8	Normal	6.263	Normal	7.704
Cobalt	Nonparametric	8.1	Normal	8.602	Normal	5.028
Copper	Normal	11.54	Nonparametric	27	Gamma	10.37
Iron	Nonparametric	12,000	Normal	19,094	Normal	15,805
Lead	Nonparametric	14	Normal	17.09	Nonparametric	11
Manganese	Nonparametric	240	Normal	360.5	Normal	287.4
Molybdenum	Nonparametric	0.43	Normal	0.406	Normal	0.471
Nickel	Nonparametric	11	Normal	10.11	Normal	9.492
Selenium	Normal	1.22	Nonparametric	2.5	Normal	1.475
Silver	Normal	0.06	Nonparametric	0.2	Gamma	0.122
Thallium	Nonparametric	0.5	Nonparametric	0.41	Lognormal	0.28
Uranium	Gamma	0.991	Nonparametric	2.4	Normal	0.907
Vanadium	Nonparametric	11	Normal	17.93	Normal	15.64
Zinc	Nonparametric	110	Nonparametric	100	Normal	42.75
Radium-226	Normal	1.321	Normal	1.954	Normal	3.975
Gamma Radiation	Nonparametric	12,600	Nonparametric	13,700	Nonparametric	13,100

Notes:
[1] Units for metals are milligram per kilogram; units for Radium-226 are picocurie per gram; and units for gamma are counts per minute.
BSA Background study area
UTL95-95 95 percent upper tolerance limit with 95 percent coverage

2.4.2 Source and Nature of Contamination

The main source of contamination at the Quivira Mines is waste rock[1] derived from the uranium-bearing Westwater Canyon Member from an estimate depth of 1,800 feet below grade that was brought to the surface at CR-1 and CR-1E along with uranium ore. Dewatering of the Westwater Canyon Member was required to conduct mining. Mine water was brought to the

[1] Waste rock or overburden consists of rock and target minerals in concentrations too low for economic recovery. It is removed from the earth along with the ore. Waste rock includes granular, broken rock that ranges from fine sand to large boulders, depending on the nature of the formation and mining methods employed.

surface and discharged to settling ponds at CR-1 and CR-1E. Fines settled in the ponds and were periodically removed for uranium recovery. Settled solids from these ponds along with drilling fluids were dewatered at the Kerr-McGee Ponds, and proto ore encountered during drilling, as well as dewatered solids, were also stockpiled for uranium recovery.

The areas of concern at the Quivira Mines for soil contamination are CR-1, CR-1E, and the Kerr-McGee Ponds, as well as step-out areas around CR-1 and CR-1E indicated by elevated Ra-226 soil sampling results and scan and static gamma survey results. Potential impacts to adjacent arroyos are also of concern.

Figure 12 presents the transport pathways at the Quivira Mines and a typical cross-section through the CR-1 waste pile. The primary contaminant transport pathways are slope failure and erosion of waste or contaminated soil by surface water, deposition in adjacent arroyos, and subsequent erosion and redeposition in the arroyos during storm events. Wind erosion of waste may also move contamination from the surface of the mine waste to adjacent areas; however, the waste rock piles at CR-1 and CR-1E were covered with soil during reclamation. Therefore, most wind deposition would have occurred during mining operations. Fluvial and aeolian waste deposits may be remobilized and transported off site. Radon gas emanation and the leaching and dissolution of metals and radionuclides from waste rock piles may also occur. The conceptual site model (CSM) wire diagram presented on Figure 13 shows the sources of contamination, release mechanisms, and exposure media, as well as potential human health and ecological receptors and exposure pathways (discussed in Section 2.5).

2.4.2.1 Waste Characteristics

The RSE included collection of two composite samples of waste rock from CR-1 for analysis for metals leachability via both the toxicity characteristic leaching procedure (TCLP) and the synthetic precipitation leaching procedure (SPLP). The RSE also included analyses of a composite sample of waste rock from CR-1E for metals leachability via both TCLP and SPLP. All TCLP results were below detection limits and below regulatory criteria, indicating that the waste does not exhibit a RCRA toxicity characteristic for hazardous waste if sent for disposal off site (SENES 2011). Reporting limits for SPLP data were above USEPA and Navajo surface water quality criteria and inconclusive.

A 2022 data gap investigation included collection of seven composite samples of waste rock for evaluation of leachability using TCLP and SPLP methodologies for metals and radionuclides (Tetra Tech 2023b). All TCLP results were below regulatory criteria, indicating that the waste does not exhibit a RCRA toxicity characteristic for hazardous waste if sent for disposal off site. SPLP metals and radionuclide results were compared to USEPA and Navajo surface water quality criteria. Ra-226, aluminum, barium, lead, selenium, and uranium in leachate from waste exceeded surface water quality criteria, indicating that leachate generated could impact surface water quality at the Quivira Mines. Groundwater is not present in waste rock or alluvium at CR-1 or CR-1E but is present at depth below the Kerr-McGee Ponds. A monitoring well network is present originating at the UNC Mill Facility tailings ponds and extending beyond the Kerr-McGee Ponds to track contaminant migration in the Upper Gallup Sandstone.

2.4.2.2 Geotechnical Characteristics

Geotechnical borings were advanced and test pits were excavated during summer 2022 at CR-1, CR-1E, the Kerr-McGee Ponds, and potential soil borrow areas. Geotechnical samples were analyzed for dry and wet bulk density, porosity, constant and falling head conductivity, particle size distribution, Atterberg limits, standard Proctor compaction, direct shear, and swell or collapse. The borrow soil samples were also analyzed for agronomic viability. The purpose of the geotechnical testing was to understand the physical characteristics of the waste and borrow soil to support radon and hydraulic modeling, suitability of the borrow soil for use as cover material, waste and borrow soil compaction requirements, plasticity of the waste and borrow soil, and loading limits before failure.

The mine waste has bulk densities ranging from 1.88 to 1.99 grams per cubic centimeter (g/cm^3) and porosities ranging from 31.4 to 37.5 percent. Saturated hydraulic conductivities ranged from 1.1×10^{-4} to 8×10^{-6}, which are indicative of fine sand to loams. Particle size distributions ranged from silty sands to a sandy lean clay. Clay slickens were observed in the CR-1 waste rock pile. Atterberg testing identified a liquid limit of 33, plastic limit of 16, and plasticity index of 17 for the sandy lean clay sample. Proctor compaction testing identified optimum moisture contents ranging from 11.4 to 15.8 percent with maximum dry bulk densities of 1.74 to 1.91 g/cm^3. Direct shear friction angles ranged from 30 degrees (243 pounds per square foot [psf] cohesion) to 35 degrees (114 psf cohesion) under loads ranging from 200 to 6,000 psf. In general, the mine waste is silty and clay sands and exhibits a moderate amount of cohesiveness. Swelling or collapse is not a concern.

The borrow material has bulk densities ranging from 1.83 to 1.94 g/cm^3 and porosities ranging from 34.4 to 39.6 percent. Saturated hydraulic conductivities ranged from 1×10^{-4} to 7.2×10^{-6}, which are indicative of fine sand to loams. Particle size distributions ranged from silty sands to a sandy lean clay. Atterberg testing identified a liquid limit of 33, plastic limit of 18, and plasticity index of 15 for the sandy lean clay sample. Proctor compaction testing identified optimum moisture contents ranging from 13.4 to 16.6 percent with maximum dry bulk densities of 1.68 to 1.83 g/cm^3. Direct shear friction angles ranged from 30 degrees (95 psf cohesion) to 41 degrees (36 psf cohesion) under loads ranging from 200 to 4,000 psf. In general, the borrow soil is silty sands and exhibits a low amount of cohesiveness. Swelling or collapse is not a concern.

2.4.3 Extent of Contamination

Data characterizing the extent of contamination collected through the measurement of radioactivity through gamma scan surveys and total and leachable metals and radionuclides concentrations during the RSE investigation (SENES 2011) and 2022 data gap investigation (Tetra Tech 2023b) are used to identify contamination migration pathways and support the risk assessment and removal decisions. The following subsections describe the results of the RSE investigation (SENES 2011), Kerr-McGee Ponds removal assessment (Weston 2019a), and 2022 data gap investigation (Tetra Tech 2023b).

2.4.3.1 Technologically Enhanced Naturally Occurring Radioactive Material and Naturally Occurring Radioactive Material

Uranium is a naturally occurring radioactive material (NORM), and the effects of mining can lead to technologically enhanced naturally occurring radioactive material (TENORM). Examples of TENORM at the Quivira Mines include waste rock piles, waste in former settling and dewatering ponds, contaminated former industrial areas, contaminated onsite access roads, and areas contaminated by eroding waste.

Areas undisturbed by mining activity are considered NORM and may include upslope land; bedrock outcrops outside the area of mining activity; alluvium derived from bedrock outcrops outside the area of mining activity; and inclusions of bedrock outcrops within an area at CR-1 and CR-1E otherwise disturbed by mining activity. At the Quivira Mines, bedrock outcrops along the cliff bands at CR-1 and CR-1E and upslope of the Kerr-McGee Ponds undisturbed by mining are considered NORM. Even though the outcrops are not mineralized, they do exhibit elevated gamma levels and may contribute to elevated Ra-226 and metals concentrations downslope of these outcrops. In addition, five of the nine former ponds (Ponds 4, 5, 6a, 6b, and 6c) in the lower pond area at CR-1 were reclaimed in 1985 and 1986, which involved excavation of pond sediments and backfilling with clean borrow material. The source of the borrow material was not documented but is thought to be the stockpiled material on the northernmost portion of the CR-1 upslope of the ponds. The borrow material should be considered NORM and does not require further action. Further, the backfilled borrow material concentrations of radionuclides and metals are similar to BTVs at BSA-2 (Bartlett Barren Member), which has been identified as the background for the Quivira Mines.

Figure 14 through Figure 16 present the elevated gamma radiation measurements for the Quivira Mines. The extent of TENORM at the Quivira Mines as evidenced by observations of mine waste, mining activity, elevated gamma radiation measurements, and extent of Ra-226 in soils is shown on Figure 17 through Figure 19. No outcrops of mineralized rock were observed within the TENORM boundaries; however, outcrops of NORM are present within and upslope of CR-1 and CR-1E. Contamination from the UNC Mill Facility is present to the south of the Kerr-McGee Ponds (Figure 16).

2.4.3.2 Gamma Radiation in Surface and Subsurface Soils

Results of gamma surveys at CR-1, CR-1E, and the Kerr-McGee Ponds, as well as in the Pipeline Canyon Arroyo and Unnamed Arroyo #2, are shown on Figure 14 through Figure 16. The figures show the extent of elevated gamma radiation at CR-1 and CR-1E, which includes the waste rock pile, ponds, and industrial areas, and at the Kerr-McGee Ponds, which includes the former dewatering ponds, proto ore stockpile, and laydown yard. The central area of CR-1, shown in black crosshatch, was previously surveyed using static gamma counts rather than a gamma walkover survey and shows lower gamma activity because of a reclamation cover. An additional gamma walkover survey across the remainder of CR-1 was conducted in 2022 and identified erosional migration downslope of the waste pile. Elevated gamma radiation upslope of the CR-1 waste pile and industrial area is related to NORM outcrops rather than windblown contamination. Gamma radiation at CR-1E correlates with known waste piles and the industrial area. Limited impacts were identified in the CR-1 and CR-1E adjacent arroyos, which is

expected given the high energy environment during monsoon rains. Gamma radiation at the Kerr-McGee Ponds was correlated with the former dewatering ponds, former proto ore stockpile, and laydown area; however, elevated gamma radiation was also identified upslope to the east, downgradient to the west (as expected), and to the far south. The elevated gamma upslope followed a dirt road to the west, but no evidence of mining activity was present. The elevated gamma to the far south is associated with another site on UNC lands.

2.4.3.3 Metals and Radionuclides in Surface and Subsurface Soils

Limited metals sampling was conducted in subsurface soils at CR-1 and CR-1E in 2011. A more robust metals evaluation was conducted at the Kerr-McGee Ponds in 2017. In 2022, additional metals data were collected from surface and subsurface borings at all three lease areas.

Modeled Ra-226 data were plotted to assess if the data correlated with areas of NORM and TENORM at each lease area to verify that only TENORM would be cleaned up. During this evaluation, the Quaternary alluvium BSA selected to establish BTVs based on local geology were lower than areas not impacted by mining at CR-1, CR-1E, and the Kerr-McGee Ponds, resulting in overestimation of areas requiring cleanup. Ra-226 concentrations in these unimpacted areas appear to be the result of eroded material from a combination of upslope parent geologies. Therefore, several model runs were evaluated for CR-1, CR-1E, and the Kerr-McGee Ponds using the Bartlett Barren Member BSA to better match the local geology, TENORM extent, and observed Ra-226 concentrations in areas not impacted by mining. Use of the Bartlett Barren Member BTV of 2 pCi/g was assessed to be the best fit for site conditions. Individual gamma survey data points converted to estimated Ra-226 were interpolated within the areas where gamma data are available to create a continuous surface of estimated Ra-226 concentrations at the site (Appendix B, Figure B-1).

Ra-226 surface and subsurface soil concentrations were compared to a cleanup goal of 2 pCi/g for the portion of the Quivira Mines on Navajo lands and 5.4 pCi/g (PRG) for the portion of the Kerr-McGee Ponds on UNC property. Figure 17, Figure 18, and Figure 19 show the model results for Ra-226 at CR-1, CR-1E, and the Kerr-McGee Ponds, respectively. An area of elevated Ra-226 concentrations south of the site is associated with contaminant migration from another UNC site to the south and will be addressed separately by UNC. Correlated Ra-226 results are shown on the left panel of each figure, and the best fit comparison between model results above 2 pCi/g or 5.4 pCi/g at Kerr-McGee Ponds and measured Ra-226 data are shown on the right panel. Correlated Ra-226 results were in agreement with the gamma radiation results described in Section 2.4.3.2.

CR-1 Results. The lateral extent and vertical extent of measured Ra-226 contamination at CR-1 and the adjacent arroyo are shown on Figure 20 and Figure 21, respectively. Measured surface results are in good agreement with gamma-correlated Ra-226 results. Ra-226 was observed in migrating mine waste along the toe of the CR-1 waste pile slopes. As expected with a reclamation cover, Ra-226 in subsurface samples in the CR-1 waste pile are elevated. Contamination extended to the bottom of the waste (up to 59 feet below grade) and did not appear to have migrated vertically into underlying native soil. Elevated Ra-226 was also observed in unreclaimed Ponds 1, 1a, 2, and 3, extending up to 19 feet below grade. Elevated Ra-226 was also observed at 6 to 7 feet below grade, which is greater than the reclaimed depths

at Ponds 5, 6b, and 6c. The mean Ra-226 concentration at CR-1 was 14.6 pCi/g in surface soils and 12.6 pCi/g in subsurface soils (0 to 72 inches bgs). The maximum Ra-226 concentration was 468 pCi/g in subsurface soils. The distribution of Ra-226 at CR-1 is shown in Appendix B, Figure B-1. The distribution of candidate metals of concern at CR-1 (arsenic, barium, chromium, selenium, uranium, and vanadium) with sufficient data available for plotting are shown in Appendix B, Figure B-2 through Figure B-7. The presence of metals of concern correlated with the location of mine waste.

CR-1E Results. The lateral extent and vertical extent of measured Ra-226 contamination at CR-1E and the adjacent arroyo are shown on Figure 22 and Figure 23, respectively. Measured surface results are in good agreement with gamma-correlated Ra-226 results. Ra-226 was observed in migrating mine waste around the perimeter of the CR-1E waste piles and on the ramp road onto the mine near the pond. As expected with a reclamation cover, Ra-226 in subsurface samples in the CR-1E waste piles are elevated. Contamination extended to the bottom of the waste (up to 16 feet below grade) and did not appear to have migrated vertically into underlying native soil. Elevated Ra-226 was also observed up to 5 feet below grade in the northern industrial area and 12 feet below grade in the pond. The mean Ra-226 concentration at CR-1E was 6 pCi/g in surface soils and 30.9 pCi/g in subsurface soils (0 to 72 inches bgs). The maximum Ra-226 concentration was 429 pCi/g in subsurface soils. The distribution of Ra-226 at CR-1E is shown in Appendix B, Figure B-1. The distribution of candidate metals of concern at CR-1E (arsenic, barium, chromium, selenium, uranium, and vanadium) with sufficient data available for plotting are shown in Appendix B, Figure B-2 through Figure B-7. The presence of metals of concern correlated with the location of mine waste.

Kerr-McGee Ponds Results. The lateral extent and vertical extent of measured Ra-226 contamination at the Kerr-McGee Ponds on Navajo Nation and UNC property are shown on Figure 24 and Figure 25, respectively. The vertical extent of Ra-226 at the Kerr-McGee Ponds is shown on Figure 26. Measured surface results are in good agreement with gamma-correlated Ra-226 results. Contamination extends to a depth of 2 feet on the Navajo Nation side of the fence line. The mean Ra-226 concentration on Navajo Nation land north of the Kerr-McGee Ponds was 5.3 pCi/g in surface soils and 4.3 pCi/g in subsurface soils (0 to 72 inches bgs). The maximum Ra-226 concentration was 9.3 pCi/g in subsurface soils. Contamination generally did not extend below a depth of 1 foot on UNC property except where dewatering ponds were located where contamination extended up to 6 feet below grade. The mean Ra-226 concentration on UNC property at the Kerr-McGee Ponds was 9.5 pCi/g in surface soils and 8.2 pCi/g in subsurface soils (0 to 72 inches bgs). The maximum Ra-226 concentration was 143 pCi/g in subsurface soils. Ra-226 was observed migrating to the west. Elevated Ra-226 to the far south is associated with another UNC site. Elevated Ra-226 to the east and upgradient of the area is likely associated with the migration of NORM from surrounding hillslopes; however, two small soil piles had elevated Ra-226. The distribution of Ra-226 at Kerr-McGee Ponds is shown in Appendix B, Figure B-1. The distribution of candidate metals of concern at the Kerr-McGee Ponds (arsenic, barium, chromium, selenium, uranium, and vanadium) with sufficient data available for plotting are shown in Appendix B, Figure B-2 through Figure B-7. The presence of metals of concern generally correlated with the location of mine waste.

2.4.3.4 Mine Water

Historically, groundwater was pumped out of the Westwater Canyon Member during mining activities at the NECR Mine and Quivira Mines and discharged to the Unnamed Arroyo adjacent to the mines. Mine water from the Unnamed Arroyo discharged to the Pipeline Canyon Arroyo. Two alluvium monitoring wells were constructed to bedrock below the CR-1 waste rock pile and the CR-1 lower pond area. No wells were installed at CR-1E because of the shallow depth to bedrock. Insufficient groundwater to collect samples has been observed at the two CR-1 alluvium wells.

However, previous groundwater investigations have occurred in alluvium which follows the erosional surface of the Upper Gallup Sandstone down valley to the south and then west and two aquifers which dip to the northeast beneath the NECR Mine and UNC Mill Facility (USEPA 2023). The UNC Mill Facility used conventional acid leach and solvent extraction methods to extract uranium. The acid-waste tailings mixture was pumped to tailings disposal ponds located adjacent to the Pipeline Canyon Arroyo.

During operations at the Quivira Mines, NECR Mine, and UNC Mill Facility, the following releases introduced dissolved uranium, Ra-226, gross alpha, and other contaminants into area groundwater (USEPA 2023):

- Mine water discharges to the Unnamed Arroyo from groundwater extracted from the Westwater Canyon Member during mining activities at the NECR Mine and Quivira Mines. Mine water in the arroyo infiltrated into the underlying alluvium and, eventually, into the Upper Gallup Sandstone, which either created a new source of groundwater or mixed with existing groundwater.
- Acidic wastewater seepage from UNC Mill Facility tailings disposal ponds into the underlying alluvium and Upper Gallup Sandstone formations beneath the UNC Mill Facility and Pipeline Canyon Arroyo.
- A 1979 UNC Mill Facility tailings dam breach release to the lower Pipeline Canyon area at the UNC Mill Facility and further downstream into the Puerco River.

Based on these historical releases and the hydrogeology of the area, three water-bearing zones were identified as possibly impacted: alluvium, the Upper Gallup Sandstone aquifer, and the Westwater Canyon aquifer (USEPA 2023). The alluvium along the Unnamed Arroyo and further north along Pipeline Canyon are no longer water bearing and have drained to the south and west down valley. The alluvium is wetted and geochemistry impacted along Pipeline Canyon Arroyo near the UNC Mill Facility. The geochemistry of the Upper Gallup Sandstone aquifer is impacted by UNC mill tailings pond releases and a Ra-226 plume is oriented to the northeast beneath Pipeline Canyon. These three water-bearing zones are extensively monitored by UNC. The geochemistry of the Westwater Canyon Aquifer was modified by dewatering, oxygen introduction, and rewatering after cessation of mining in both mines.

2.5 RISK ASSESSMENT

Appendix C presents the complete risk assessment. The risk assessment uses laboratory sampling data from the Quivira Mines to identify the candidate COCs and COECs, provide an estimate of how and to what extent human and ecological receptors might be exposed to these contaminants, and describe whether the exposures pose unacceptable risk to the receptors. Appendix C, Table C-1, provides a summary of the sample results available for the Quivira Mines, and Appendix C, Attachment C-1, provides the full dataset used in the risk assessment. Appendix C, Figure C-2, presents the locations of the soil samples used in the risk assessment. The following subsections present the purpose of the risk assessment, describe the exposure units (EU), and summarize the risk assessment methodology and results.

2.5.1 Purpose

The purpose of the risk assessment is to estimate current and future human health risk under appropriate RME scenarios and ecological risk focused on the known ecosystems for the region. This risk assessment was performed using procedures in USEPA (2001) guidance on risk assessment and focuses on the completed exposure pathways, primary risk drivers, and source material as indicated in the "Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA" (USEPA 1993). The results of the risk assessment are used to assist in removal action decisions for a site. The HHRA identifies the risk posed to human health by contaminants at the site and human health candidate COCs at each EU. The ERA identifies the risks posed to ecological receptors by contaminants at the site and candidate COECs at each EU. The methodology for the HHRA and ERA is presented in detail in the Navajo Abandoned Uranium Mines (NAUM) program risk assessment methodology (USEPA 2024a).

2.5.2 Exposure Units

An EU is a geographic area with a particular land use within which an exposed receptor (a person, animal, or plant) may reasonably be assumed to reside or move at random and where contact across the EU is equally likely over the course of an exposure duration. The Quivira Mines EUs were developed by identifying areas of contiguous TENORM contamination and anticipated future land use. The risk assessment boundary (the entirety of all areas evaluated within EUs) was established via soil sampling and augmented through examination of gamma survey data. Areas of NORM, such as natural mineralized outcrops and nonimpacted areas in the northwestern portion of the site, although not included in the TENORM boundary, were also included within the risk assessment boundary and as part of the EU because a receptor would also be exposed to the NORM area when at the site. Appendix C, Table C-2 and Figure C-3 through Figure C-9, present the EUs identified at the site and provide the area and samples available for each EU; land uses are described in Section 2.1.6. Based on the site evaluation, the following six EUs were identified at the Quivira Mines. The ERA is conducted on a site-wide basis; all HHRA EUs were combined to create the site-wide EU.

- **CR-1** – The former CR-1 mine is 53 acres and on the Navajo Nation. Several residences are nearby with the nearest residence approximately 700 feet from the former mine. Therefore, the Kee'da'whíí téél (full-time Navajo resident) was selected as the RME receptor for the CR-1 EU.

- **CR-1E** – The former CR-1E mine is 14 acres and on the Navajo Nation. Several residences are nearby with the nearest residence approximately 800 feet from the former mine . Therefore, the Kee'da'whíí téél (full-time Navajo resident) was selected as the RME receptor for the CR-1E EU.
- **Kerr-McGee Ponds on the Navajo Nation** – A 2-acre portion of the former Kerr-McGee Ponds is on the Navajo Nation. Several residences are nearby with the nearest residence approximately 3,000 feet from the Kerr-McGee Ponds. Therefore, the Kee'da'whíí téél (full-time Navajo resident) was selected as the RME receptor for the Kerr-McGee Ponds on the Navajo Nation EU.
- **Kerr-McGee Ponds on UNC Property** – A 19-acre portion of the former Kerr-McGee Ponds is on privately-owned land and fenced property. Therefore, the UNC outdoor worker was selected as the RME receptor for the Kerr-McGee Ponds on UNC Property EU.
- **Arroyos on the Navajo Nation** – A 16-acre portion of the impacted arroyos is on the Navajo Nation. The impacted arroyos are deep with steep sides and, thus, difficult to access. Therefore, the Kǫǫ eí doo nahaazáh dah (difficult access open space user) was selected as the RME receptor for the Arroyos on the Navajo Nation EU.
- **Arroyos on UNC Property** – A 3-acre portion of the impacted arroyos is on privately-owned land and fenced property. Therefore, the UNC outdoor worker was selected as the RME receptor for the Arroyos on UNC Property EU.
- **Site-Wide** – A 137-acre area encompasses all the human health exposures units for evaluation of the ecological receptors at the Quivira Mines.

2.5.3 Human Health Risk Assessment

This subsection describes the key elements of the HHRA methodology. An HHRA is the process for evaluating how people are impacted as a result of exposure to one or more environmental stressors, such as metals or radiation. Exposure is how a contaminant can enter a body (for example, by eating produce that absorbed contaminants, breathing contaminated dust, touching contaminated materials, or radiation emanating from soil). This risk assessment uses Navajo-specific exposure scenarios, as explained below, to determine how a person can be exposed to contamination at AUMs on the Navajo Nation. For areas on UNC property, a site-specific outdoor worker was used in the risk assessment. This HHRA focuses on soil contamination only. The HHRA does not include ingestion of surface water or groundwater by people or animals. Safe drinking water is supplied to residents in the Quivira Mines area. Wells used for livestock have been tested and are upgradient of the known groundwater contamination in the area. The arroyos are mostly dry, and the ponds are dry since mine operations have stopped.

The HHRA evaluates whether site-related contaminants of potential concern (COPC) detected in soil pose unacceptable risks to potential current and future people at a site under conditions at the time of the EE/CA (unremediated conditions) (USEPA 1989, 1993). The HHRA includes the following components: data evaluation and selection of COPCs, exposure assessment, toxicity assessment, and risk characterization.

Any contaminant with a maximum detected value exceeding its COPC screening level is retained as a COPC for the HHRA risk calculations. The COPC screening levels are based on a $1x10^{-6}$ cancer risk and a hazard index of 0.1 for a Navajo resident. Appendix C, Table C-1, provides the COPC screening. Based on the screening, the following contaminants were identified as COPCs and are included in the risk estimates in the HHRA: Ra-226 in secular equilibrium, aluminum, arsenic, barium, cadmium, cobalt, copper, iron, manganese, molybdenum, selenium, thallium, uranium, and vanadium.

The exposure assessment is the process of measuring or estimating intensity, frequency, and duration of human exposure to a contaminant in the environment. The CSM describes the exposure setting and identifies potentially complete exposure pathways by which receptors (both people and ecological) could contact site-related contaminants. The CSM is provided on Figure 13.

Exhibit 5 presents a brief description of each receptor along with the associated geographic distribution. The specific exposure pathways and inputs for these receptors evaluated in the HHRA are provided in Appendix C, Table C-3. Figure 27 presents a graphic depiction of Navajo residential exposure pathways, including the Diné Lifeways.

Exhibit 5. Quivira Mines Receptors

Exposure Units	Receptor Name	Receptor Description
CR-1, CR-1E, and Kerr-McGee Ponds on the Navajo Nation	Kee'da'whíí téél (Full-Time Navajo Resident)	Members of the Navajo Nation that live full time at a site. Includes 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, and eggs) and hunted animals (meat), as well as plant exposures (ingestion, dermal, and inhalation) from Diné Lifeways practices including medicinal and ceremonial exposures.
Arroyos on the Navajo Nation	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space User)	A member of the Navajo Nation that enters the arroyo 1 hour per day for 30 days a year to collect plants, herd animals, or hunt. Includes 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 and milk) and hunted animals (meat), as well as plant exposures (ingestion, dermal, and inhalation) from Diné Lifeways practices including medicinal and ceremonial exposures
Kerr-McGee Ponds and Arroyos on UNC Property	UNC Outdoor Worker	A worker that is assumed present on site 8 hours per day, 2 days per week, 50 weeks per year. Exposure pathways evaluated include external exposure to radiation, incidental ingestion of soil, dermal exposure to soil (metals only), and inhalation of soil (or dust).

Notes:
CR-1 Quivira Church Rock No. 1 Mine
CR-1E Quivira Church Rock No. 1 East Mine
Kerr-McGee Kerr-McGee Corporation
UNC United Nuclear Corporation

The toxicity assessment identifies the toxicity parameters needed for the risk assessment. The toxicity values used in the streamlined HHRA are all standard values provided by USEPA. Risk characterization proceeds by combining the results of the exposure and toxicity assessments. For the NAUM program HHRAs, the risk characterization process described in Appendix C was used.

The intake factors for all exposure pathways used in the HHRA were calculated using the NAUM Risk Calculator (USEPA 2024b). The cumulative cancer risk for the age-adjusted adult and child and noncancer hazard for the child receptor (or adult receptor in the case of the outdoor worker) for each EU and soil interval are provided in Appendix C, Table C-7, and summarized in Exhibit 6.

Exhibit 6. Cancer Risks and Noncancer Hazards

Exposure Unit	Soil Interval	Cancer Risk	Adult Noncancer Hazard	Child Noncancer Hazard
CR-1	Surface Soil	**$1x10^{-2}$**	**8**	**10**
	Subsurface Soil	**$3x10^{-2}$**	**8**	**10**
CR-1E	Surface Soil	**$2x10^{-2}$**	**8**	**10**
	Subsurface Soil	**$8x10^{-2}$**	**10**	**20**
Kerr-McGee Ponds on the Navajo Nation	Surface Soil	**$2x10^{-2}$**	**9**	**10**
	Subsurface Soil	**$2x10^{-2}$**	**9**	**10**
Kerr-McGee Ponds on UNC Property	Surface Soil	**$2x10^{-4}$**	0.05	--
	Subsurface Soil	**$2x10^{-4}$**	0.08	--
Arroyos on the Navajo Nation	Surface Soil	**$6x10^{-4}$**	**5**	0.5
	Subsurface Soil	**$6x10^{-4}$**	**8**	0.7
Arroyos on UNC Property	Surface Soil	$2x10^{-5}$	0.03	--
	Subsurface Soil	$2x10^{-5}$	0.03	--

Notes:
Bolded values exceed the target cancer risk or target hazard quotient.
-- Not applicable
CR-1 Quivira Church Rock No. 1 Mine
CR-1E Quivira Church Rock No. 1 East Mine
Kerr-McGee Kerr-McGee Corporation
UNC United Nuclear Corporation

Candidate COCs are identified based on the cancer risk exceeding the target cancer risk of $1x10^{-4}$ or a noncancer hazard of 1 for the RME receptor at the EU. Exhibit 7 presents the candidate COCs for each EU and soil interval as identified in Appendix C, Table C-7.

Exhibit 7. Candidate COCs Identified Based on Cancer Risks and Noncancer Hazards

Exposure Unit	Soil Interval	Cancer Risk	Noncancer Hazard
CR-1	Surface and Surface	Radium-226 in SE Arsenic Chromium[1]	Cobalt Iron Manganese Thallium Uranium

Exhibit 7. Candidate COCs Identified Based on Cancer Risks and Noncancer Hazards (Continued)

Exposure Unit	Soil Interval	Cancer Risk	Noncancer Hazard
CR-1E	Surface and Surface	Radium-226 in SE Arsenic Chromium[1]	Arsenic Cobalt Iron Manganese Thallium Uranium
Kerr-McGee Ponds on the Navajo Nation	Surface and Surface	Radium-226 in SE Arsenic Chromium[1]	Cobalt Iron Manganese Thallium Uranium
Kerr-McGee Ponds on UNC Property	Surface and Surface	Radium-226 in SE	--
Arroyos on the Navajo Nation	Surface and Surface	Radium-226 in SE Arsenic	Manganese
Arroyos on UNC Property	Surface and Surface	--	--

Notes:

[1] No speciation data are available for chromium; therefore, chromium is assumed to be 100 percent hexavalent chromium.

-- No COC identified based on a cancer target risk of $1x10^{-4}$ or noncancer target hazard of 1.

COC Contaminant of concern

CR-1 Quivira Church Rock No. 1 Mine

CR-1E Quivira Church Rock No. 1 East Mine

Kerr-McGee Kerr-McGee Corporation

SE Secular equilibrium

UNC United Nuclear Corporation

2.5.4 Ecological Risk Assessment

An ERA is the process for evaluating how likely the environment will be impacted as a result of exposure to one or more environmental stressors, such as radionuclides or metals. The objective of the ERA is to evaluate whether ecological receptors may be adversely affected by exposure to contaminants. The ERA is intended to provide input for risk management decision-making at each lease area while maintaining a conservative approach protective of ecological populations and communities. This ERA follows the guidelines in the NAUM risk assessment methodology (USEPA 2024a).

As described in USEPA (1993a) EE/CA guidance, a risk assessment is used to help justify a removal action, identify what current or potential exposures should be prevented, and focus on the specific problem that the removal action is intended to address. NAUM ERAs include a screening-level ecological risk assessment (SLERA) and SLERA refinement. The SLERA includes Steps 1 and 2 of USEPA's eight-step ERA process (USEPA 1997) and is intended to provide a conservative estimate, using maximum concentrations, of potential ecological risks and compensate for uncertainty in a precautionary manner by incorporating conservative assumptions. The SLERA refinement includes a refinement of Steps 1 and 2 and is intended to provide additional information for risk managers. Candidate COECs are identified based on the results of the SLERA refinement for soil.

The ERA evaluated the Quivira Mines as a single site-wide EU. The SLERA COPECs for soil at the Quivira Mines are presented in Appendix C, Table C-8. Contaminants in soil for which the hazard quotient was greater than or equal to 1.0 were U-238, U-234, Ra-226, arsenic, barium, chromium, lead, manganese, nickel, selenium, thallium, uranium, vanadium, and zinc.

Candidate COECs and the calculated hazard quotient risk estimates are listed in Appendix C, Table C-10 for plants and invertebrates, Table C-11 for birds, and Table C-12 for mammals. The site-wide candidate COECs are summarized in Exhibit 8.

Exhibit 8. Site-Wide Candidate COECs

Receptor	Soil Interval	Candidate Contaminant of Ecological Concern												
		Uranium-238	Uranium-234	Radium-226 in SE	Arsenic	Barium	Chromium	Lead	Manganese	Selenium	Thallium	Uranium	Vanadium	Zinc
Plants	Surface Soil	--	--	X	--	X	X	X	X	X	X	X	--	--
	Subsurface Soil	X	X	X	--	X	X	--	X	X	X	X	--	--
Invertebrates	Surface Soil	--	--	--	X	X	X	--	--	X	--	--	--	--
Birds	Surface Soil	--	--	--	--	--	--	X	--	X	--	--	X	X
Mammals	Surface Soil	--	--	--	--	--	--	--	--	X	--	--	--	--
	Subsurface Soil	--	--	X	--	--	--	--	--	X	--	--	--	--

Notes:
-- Not a candidate COEC
X Candidate COEC
SE Secular equilibrium

2.5.5 Risk Assessment Results Summary

Candidate COCs and COECs were identified based on available laboratory data. The HHRA and ERA results indicate that risk is above a level of concern for the contaminants listed in Exhibit 9.

Exhibit 9. Candidate COCs and Candidate COECs Recommended for Further Evaluation

Exposure Unit	Media	Candidate COC or COEC														
		Uranium-238	Uranium-234	Radium-226 in SE	Arsenic	Barium	Chromium[1]	Cobalt	Iron	Lead	Manganese	Selenium	Thallium	Uranium	Vanadium	Zinc
CR-1	Surface/ Subsurface Soil	--	--	X	X	--	X	X	X	--	X	--	X	X	--	--

Exhibit 9. Candidate COCs and Candidate COECs Recommended for Further Evaluation (Continued)

Exposure Unit	Media	Candidate COC or COEC														
		Uranium-238	Uranium-234	Radium-226 in SE	Arsenic	Barium	Chromium[1]	Cobalt	Iron	Lead	Manganese	Selenium	Thallium	Uranium	Vanadium	Zinc
CR-1E	Surface/ Subsurface Soil	--	--	X	X	--	X	X	X	--	X	--	X	X	--	--
Kerr-McGee Ponds on the Navajo Nation	Surface/ Subsurface Soil	--	--	X	X	--	X	X	X	--	X	--	X	X	--	--
Kerr-McGee Ponds on UNC Property	Surface/ Subsurface Soil	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--
Arroyos on the Navajo Nation	Surface/ Subsurface Soil	--	--	X	X	--	--	--	--	--	X	--	--	--	--	--
Arroyos on UNC Property	Surface/ Subsurface Soil	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Site-Wide (Ecological Risk)	Surface Soil	--	--	X	X	X	X	--	--	X	X	X	X	X	X	X
	Subsurface Soil	X[2]	X[2]	X	--	X	X	--	--	--	X	X	X	X	--	--

Notes:

[1] No speciation data are available for chromium; therefore, chromium is assumed to be 100 percent hexavalent chromium.

[2] Uranium-234 and uranium-238 concentrations exceed the ecological no observed effect concentration for plants in a single subsurface sample (location KMP-SB28 from 60 to 66 inches below ground surface) in Kerr-McGee Ponds on UNC Property. This area is considered a hot spot and any recommendations for uranium-234 and uranium-238 apply only to the hot spot.

-- Not a candidate COC or COEC. Not recommended for further evaluation in this EE/CA.
X Candidate COC and/or COEC. Recommended for further evaluation in this EE/CA.
COC Contaminant of concern
COEC Contaminant of ecological concern
CR-1 Quivira Church Rock No. 1 Mine
CR-1E Quivira Church Rock No. 1 East Mine
EE/CA Engineering evaluation/cost analysis
Kerr-McGee Kerr-McGee Corporation
SE Secular equilibrium
UNC United Nuclear Corporation

2.6 RISK MANAGEMENT ANALYSIS

Risk management is a different process from risk assessment. The risk assessment establishes whether a risk is present and defines the magnitude of the risk. In risk management, the results of the risk assessment are integrated with other considerations to make and justify risk management decisions. Risk managers must understand the risk assessment, including its uncertainties and assumptions. By understanding the potential adverse effects posed by candidate COCs and

COECs and the removal actions themselves, risk managers can balance the costs and benefits of the available removal alternatives. Understanding the uncertainties associated with risk assessment is critical to evaluating the overall protection of any remedy (USEPA 1997a).

U-238 and its decay products is the primary COC at the Quivira Mines. U-238, U-234, Th-230, and Ra-226 in secular equilibrium were evaluated in the risk assessment to include toxicity from all radionuclides in the U-238 decay chain. For risk management, site data for Ra-226 were used to represent the soil concentration of U-238; however, the human health PRGs for the Navajo resident and the UNC outdoor worker and the NAUM PERG use toxicity values that include toxicity from the entire U-238 decay chain. Use of Ra-226 for risk management reduces the number of radionuclides evaluated when establishing the extent of radiological contamination.

The risk assessment for the Quivira Mines identified numerous candidate COCs and COECs. Radiological contamination is the predominant risk driver at the Quivira Mines; thus, the extent of Ra-226 above the selected RAG will primarily be used to establish the extent of the removal action. No candidate COCs were identified in the Arroyos on UNC Property EU; therefore, this EU is not discussed further in the risk management section. In addition to Ra-226, candidate COCs at the site are arsenic, chromium, cobalt, iron, manganese, thallium, and uranium, and candidate COECs are arsenic, barium, chromium, lead, manganese, selenium, thallium, uranium, vanadium, and zinc. U-234 and U-238 are also candidate COECs at a single location (KMP-SB28) in subsurface soil at the Kerr-McGee Ponds on UNC Property EU.

The NAUM risk management process involves assessment of various lines of evidence for candidate COCs and COECs. Lines of evidence considered in the risk management process include:

- Refinement of candidate COCs and COECs:
    - Comparison of site concentrations to background concentrations (Table 2). Candidate COCs and COECs below background are removed from further analysis.
    - Consideration of natural forms of chromium
    - Assessment of co-location via a comparison of the metals distribution to the Ra-226 preliminary removal action extent. Metal COCs and COECs with concentrations above human health PRGs and NAUM PERGs that are fully co-located with the Ra-226 preliminary removal action extent are removed from further analysis.
- Refinement of candidate COECs only:
    - Potential impacts of site risks for candidate COECs based on a comparison of site concentrations to NAUM PERGs (USEPA 2024c)
    - Analysis of contaminant distribution
    - Assessment of other uncertainties

Refinement of the exposures, inputs, and uncertainties for candidate COCs is not warranted because the HHRA was developed using Navajo-specific exposure scenarios and a site-specific

scenario for private property. Refinement of the exposures, inputs, and uncertainties for the ERA is warranted because the ERA was completed using literature-based assumptions and inputs.

Section 2.6.1 presents the background comparison, Section 2.6.2 discusses the natural forms of chromium, Section 2.6.3 presents and describes the human health PRGs and NAUM PERGs, Section 2.6.4 presents the co-location analysis, Section 2.6.5 presents the refinement of candidate COECs, and Section 2.6.6 presents a summary of risk management conclusions and decisions.

Table 3 presents the results of the risk management analysis and identifies the final analytes recommended for removal action, as well as the rationale for refinement of each candidate COC or COEC that is not considered for removal action.

2.6.1 Comparison of Site Concentrations of Candidate Contaminants of Concern and Contaminants of Ecological Concern to Background Concentrations

The candidate COCs and COECs were compared to background concentrations to identify any contaminants present at background levels. For the Quivira Mines, the background comparison used the Bartlett Barren Member of the Crevasse Canyon Formation (BSA-2) results per the discussion in Section 2.4.1. Two-population statistical tests were performed to compare concentrations in soil at the site for candidate COCs and COECs. All methods followed USEPA (2002a, 2010, 2022) statistical guidance for evaluating background concentrations of chemicals in soil. The background comparison results are presented in Table 2 for each human health and ecological risk EU.

A tiered approach employing one or more statistical methods was used to conduct two-population tests. The first tier in this approach compares the median concentrations between the site and background populations using the Wilcoxon-Mann-Whitney test for datasets having all detected data. For datasets with nondetect results, Gehan's modification to the Wilcoxon rank-sum (WRS) test (Gehan test) and the Tarone-Ware test were used. These two-population tests are available in ProUCL (USEPA 2022).

If the first-tier tests indicated that the site concentrations are greater than background concentrations, no further testing was conducted. If the first-tier tests indicated that the site concentrations are less than or equivalent to background concentrations, a second-tier test was used to compare the right-hand tails or upper quantiles of the site and background populations using the Quantile test (USEPA 1994, 2002c, 2010). Two-sided statistical tests are used in all cases and employ a Type I error rate of 0.05 (5 percent).

The following null and alternative hypotheses were tested:

- **Null hypothesis:** The median metal concentration for the site is less than or equal to the median concentration in the background population.
- **Alternative hypothesis:** The median metal concentration for the site is greater than the median concentration in the background population.

The Quantile test (Johnson, Verrill, and Moore II 1987; USEPA 1994, 2000b, 2002b, 2010) was conducted for all metals where the Gehan, Tarone-Ware, and Wilcoxon-Mann-Whitney tests did

not reject the null hypothesis (that is, when the median site and background concentrations were concluded not to be significantly different).

The Quantile test is a nonparametric two-population test developed for comparing the right-hand tails or upper quantiles of two distributions. The Quantile test can be used when some proportion of high-value measurements (rather than the entire distribution) of one population has shifted relative to a second population. The Quantile test is not as powerful as the WRS test when the distribution of site concentrations is shifted in its entirety to the right of the background distribution. However, the Quantile test is more powerful than the WRS test for detecting cases where only a small number of high-value measurements are present in the upper quantile of the site distribution. For this reason, USEPA (1994, 2002c, 2010) guidance recommends the Quantile test be used in conjunction with the WRS test. When applied together, these tests have more power to detect true differences between two population distributions.

Exhibit 10 presents the background comparison results for the Quivira Mines EUs. In addition to Ra-226, uranium was found at concentrations greater than background in all human health EUs where the analyte was identified as a candidate COC, except for the Arroyos on the Navajo Nation EU, and is recommended for further evaluation in the EE/CA at those EUs. In addition to Ra-226, arsenic, barium, chromium, selenium, uranium, and vanadium were found at concentrations greater than background in the ecological site-wide EU, and are recommended for further evaluation in the EE/CA.

Exhibit 10. Background Comparison Results Summary

Exposure Unit	Candidate COC or COEC Background Comparison Result														
	Uranium-238	Uranium-234	Radium-226 in SE	Arsenic	Barium	Chromium	Cobalt	Iron	Lead	Manganese	Selenium	Thallium	Uranium	Vanadium	Zinc
CR-1	--	--	**>BG**	<BG	--	<BG	<BG	<BG	--	<BG	--	<BG	**>BG**	--	--
CR-1E	--	--	**>BG**	<BG	--	**>BG**	<BG	<BG	--	<BG	--	<BG	**>BG**	--	--
Kerr-McGee Ponds on the Navajo Nation	--	--	**>BG**	<BG	--	**>BG**	<BG	<BG	--	<BG	--	<BG	**>BG**	--	--
Kerr-McGee Ponds on UNC Property	--	--	**>BG**	--	--	--	--	--	--	--	--	--	--	--	--
Arroyos on the Navajo Nation	--	--	<BG	<BG	--	--	--	--	--	<BG	--	--	--	--	--
Site-Wide	**>BG**	**>BG**	**>BG**	**>BG**	**>BG**	**>BG**	--	--	<BG	<BG	**>BG**	<BG	**>BG**	**>BG**	<BG

Notes:
The background comparison was conducted using site and background surface soil data only. The background comparisons for surface soil are assumed valid for subsurface soil. For analytes calculated to be less than background, site subsurface results were compared to site surface results to confirm that no subsurface areas with concentrations above surface concentrations warrant further evaluation.

Exhibit 10. Background Comparison Results Summary (Continued)

Notes (Continued):

--	Not a candidate COC or COEC for exposure unit/receptor combination. Background comparison was not conducted for this analyte and exposure unit.
<BG	Site concentrations are less than background concentrations. Candidate COC or COEC is not recommended for further evaluation in the EE/CA.
>BG	Site concentrations are greater than background concentrations. Candidate COC or COEC is recommended for further evaluation in the EE/CA.
COC	Contaminant of concern
COEC	Contaminant of ecological concern
CR-1	Quivira Church Rock No. 1 Mine
CR-1E	Quivira Church Rock No. 1 East Mine
EE/CA	Engineering evaluation/cost analysis
Kerr-McGee	Kerr-McGee Corporation
SE	Secular equilibrium
UNC	United Nuclear Corporation

2.6.2 Consideration of Natural Forms of Chromium

The assumption used in the HHRA and ERA was that the measured chromium at the site is entirely hexavalent chromium. Trivalent chromium (CrIII) is the most common oxidation state and an essential dietary element that aids normal glucose, protein, and fat metabolisms (Agency for Toxic Substances and Disease Registry 2012). Hexavalent chromium (CrVI) is the most toxic chromium ion and is a known human carcinogen.

Hexavalent chromium is almost exclusively produced from industrial processes and only expected from natural sources at NAUM sites at much lower concentrations. Sources of compounds containing hexavalent chromium in the environment are discharged dye and paint pigments, wood preservatives, and chrome-plating liquid wastes. Prominent uses of hexavalent chromium are in processes for production of metal alloys such as stainless steel, protective coatings on metal, magnetic tapes, pigments for paints, cement, paper, rubber, and composition floor covering (Agency for Toxic Substances and Disease Registry 2012). These industrial processes or commercial products are not associated with NAUM sites. Hexavalent chromium is not expected to be elevated above naturally occurring levels at NAUM sites without an industrial process that created hexavalent chromium. Hexavalent chromium is a known human carcinogen when inhaled and has been shown to cause tumors in mice and rats when ingested in drinking water, but little evidence indicates that ingesting trivalent chromium, a dietary supplement, poses any toxic or carcinogenic risk to humans (USEPA 1998b).

In rare instances in nature, hexavalent chromium may form minerals with uranium; however, these minerals are not present at NAUM sites. Oxidation of natural sources of trivalent chromium to hexavalent chromium in soil at NAUM sites is unlikely given typical site conditions; that is, the sites do not contain ultramafic rock and serpentine soils, which are the most likely natural source of hexavalent chromium. Furthermore, weather conditions of the Navajo Nation are arid, and ionic compounds containing chromium typically are not detected in the desert sandy-loam soils present in the area. Trivalent chromium in soil is typically found in higher pH (more basic), in aerobic conditions, in low amounts of organic matter, and with manganese and iron oxides. Trivalent chromium is cationic and adsorbs onto clay particles, organic matter, metal oxyhydroxides, and other negatively charged particles in contrast to hexavalent chromium, which does not interact significantly with clay or organic matter. Finally,

desert sandy-loam soils typically contain low amounts of organic matter. Soils from Quivira Mines have measured pH between 7.8 and 8.5.

The lines of evidence presented above suggest that chromium at the Quivira Mines is likely present in the less toxic trivalent form and, therefore, should be evaluated as trivalent chromium. From a risk management perspective for uranium mines, the presence of hexavalent chromium is expected to be minimal and the assumption that the chromium measured at the site is trivalent chromium is reasonable and supported by site conditions.

The maximum detected result for chromium is 24 milligrams per kilogram, which is below both the COPC screening level for trivalent chromium in the HHRA (79 mg/kg) and the lowest trivalent chromium NOEC in the ERA (34 mg/kg) (based on the mammalian ground insectivore). Thus, trivalent chromium would not be identified as either a COPC or COPEC and would not be included in the human health risk calculations or the SLERA refinement. Therefore, chromium is not recommended for removal action at Quivira Mines.

2.6.3 Preliminary Removal Goals for Human Health and Ecological Health

Human health PRGs and NAUM PERGs were developed for use in risk management decision-making and determination of RAGs.

Human health PRGs are land-use specific and calculated using the NAUM Risk Calculator (USEPA 2024b) with the same target cancer and noncancer risk level used to identify candidate COCs. PRGs for carcinogenic metals and radionuclides are based on a target cancer risk of $1x10^{-4}$, and PRGs for noncarcinogenic metals are based on a target noncancer hazard quotient of 1.0.

PERGs for radionuclides and metals were developed for NAUM sites by USEPA (2024c). USEPA (1999) guidance recommends designing remedial actions to protect local populations and communities of biota rather than protect organisms on an individual basis except for threatened and endangered species. NAUM PERGs establish analyte-specific thresholds that correspond to minimal disruption on wildlife communities and populations. Reducing or maintaining site concentrations to levels below the PERG will support the recovery and maintenance of healthy local populations and communities of biota.

NAUM PERGs for radionuclides were based on dose assessments using the ERICA Tool (Brown and others 2008) for terrestrial animals and plants (USEPA 2024a, 2024c). NAUM PERGs for radionuclides were identified based on the radionuclide concentration corresponding to a dose rate where individuals have a higher probability to be adversely affected but the population is still protected (USEPA 2024c). NAUM PERGs for metals were developed using average exposure parameters for food ingestion rates, toxicity reference values, soil intake factors, and body weights (USEPA 2024c).

Exhibit 11 presents the human health PRGs and NAUM PERGs for soil for candidate COCs and COCs greater than background.

Exhibit 11. Human Health Preliminary Removal Goals and NAUM Preliminary Ecological Removal Goals for Candidate COC and COECs in Soil Above Background

Candidate COC/COEC	Unit	Human Health PRG Navajo Resident[1]	Human Health PRG UNC Outdoor Worker[1]	NAUM PERG[2]
Uranium-234[3,4]	pCi/g	--	--	430
Uranium-238[3,4]	pCi/g	--	--	480
Radium-226[5]	pCi/g	0.050	5.4	40
Arsenic	mg/kg	--	--	68
Barium	mg/kg	--	--	1,400
Chromium	mg/kg	--	--	250
Selenium	mg/kg	--	--	3.4
Uranium	mg/kg	3.2	--	250
Vanadium	mg/kg	--	--	80

Notes:

[1] Human health PRGs are from the NAUM Risk Calculator (USEPA 2024b). PRGs for carcinogenic contaminants are based on a target cancer risk of $1x10^{-4}$, and PRGs for noncarcinogenic contaminants are based on a target noncancer hazard quotient of 1.0.

[2] NAUM PERGs are based on the most sensitive ecological receptor (USEPA 2024c). The NAUM PERG is applicable site-wide except for uranium-234 and uranium-238 (see note 4).

[3] The NAUM PERG is the minimum PERG for the individual radionuclide.

[4] Uranium-234 and uranium-238 concentrations exceed the ecological no observed effect concentration for plants in a single subsurface sample (location KMP-SB28 from 60 to 66 inches below ground surface) in the Kerr-McGee Ponds on UNC Property exposure unit. This area is considered a hot spot, and any recommendations for uranium-234 and uranium-238 apply only to the hot spot.

[5] Site data for radium-226 are used to evaluate the extent of radionuclides above human health PRGs and NAUM PERGs. The human health PRG for radium-226 is the PRG for uranium-238 in SE. The radium-226 NAUM PERG is the minimum PERG for uranium-238 in SE for all feeding guilds (USEPA 2024c) and is based on the individual radium-226 PERG adjusted to include doses from all progeny of uranium-238 in SE as described in Appendix F of USEPA (2024a).

-- Not a candidate COC
COC Contaminant of concern
COEC Contaminant of ecological concern
Kerr-McGee Kerr-McGee Corporation
mg/kg Milligram per kilogram
NAUM Navajo abandoned uranium mine
pCi/g Picocurie per gram
PERG Preliminary ecological removal goal
PRG Preliminary removal goal
SE Secular equilibrium
UNC United Nuclear Corporation
USEPA U.S. Environmental Protection Agency

2.6.4 Co-Location Assessment

The Ra-226 removal action extent encompasses a large portion of the TENORM area at the Quivira Mines (Appendix B, Figure B-1). The source of the contamination is from historical uranium mining activities, and the mining waste. Areas where estimated Ra-226 levels exceed BTVs is a strong indicator of areas with mine waste, and concentrations of other elevated metals are expected to be co-located in those areas. Section 2.6.4.1 defines the Ra-226 removal action extent, and Section 2.6.4.2 assesses whether metals candidate COCs and COECs exceeding background concentrations are co-located with Ra-226 via a comparison of the metals distribution to the Ra-226 preliminary removal action extent.

2.6.4.1 Development of Radium-226 Removal Action Extent

The Ra-226 RAG for all EUs is the lesser of the human health PRG and the NAUM PERG unless either of the preliminary goals is less than the BTV. On the Navajo Nation, the RAG is based on the BTV because the human health PRGs for all receptors are lower than each of the geology-specific BTVs. On UNC property, the RAG is based on the human health PRG for the UNC outdoor worker. No cleanup is recommended in the site-wide EU to address risk to ecological receptors per the evaluation presented in Section 2.6.5.1. The Ra-226 EPC in the site-wide EU is 5.9 pCi/g, which does not exceed the NAUM PERG of 40 pCi/g; therefore, Ra-226 is not a COEC. Exhibit 12 presents the comparison of the human health PRGs, NAUM PERGs, and geology-specific BTVs for Ra-226 that were considered to establish the RAG.

Exhibit 12. Radium-226 Removal Action Goal Development

Exposure Unit	HH PRG[1]			NAUM PERG[2]	BTV[3]	Radium-226 RAG	Basis for RAG
	Navajo Resident	DAOS	UNC Outdoor Worker				
CR-1	0.050	--	--	40	2.0	2.0	BTV
CR-1E	0.050	--	--	40	2.0	2.0	BTV
Kerr-McGee Ponds on the Navajo Nation	0.050	--	--	40	2.0	2.0	BTV
Kerr-McGee Ponds on UNC Property	--	--	5.4	40	2.0	5.4	HH PRG
Arroyos on the Navajo Nation	--	0.33	--	40	2.0	2.0	BTV

Notes:
Units are in picocuries per gram.

[1] HH PRGs are the PRGs for uranium-238 in SE from the NAUM Risk Calculator (USEPA 2024b) and are based on a target cancer risk of $1x10^{-4}$. Site data for radium-226 are used to evaluate the extent of radionuclides above PRGs.

[2] The NAUM PERG is applicable site-wide. The NAUM PERG presented is the minimum PERG for uranium-238 in SE for all feeding guilds (USEPA 2024c). The NAUM PERG for uranium-238 in SE is based on the individual radium-226 NAUM PERG that is adjusted to include doses from all progeny of uranium-238 in SE as described in Appendix F of USEPA (2024a). Site data for radium-226 are used to evaluate the extent of radionuclides above the NAUM PERG.

[3] The BTV is the UTL95-95 for nonduplicate analytical data. If outliers are removed, the BTV is the UTL95-95 for the dataset with extreme outliers removed (Tetra Tech, Inc. 2023a).

-- Not applicable
BTV Background threshold value
CR-1 Quivira Church Rock No. 1 Mine
CR-1E Quivira Church Rock No. 1 East Mine
DAOS Difficult access open space
HH Human health
Kerr-McGee Kerr-McGee Corporation
NAUM Navajo abandoned uranium mine
PERG Preliminary ecological removal goal
PRG Preliminary removal goal
RAG Removal action goal
SE Secular equilibrium
UNC United Nuclear Corporation
USEPA U.S. Environmental Protection Agency
UTL95-95 95 percent upper tolerance limit with 95 percent coverage

The estimated Ra-226 interpolated surface was generated using gamma survey data from the Quivira Mines as discussed in Section 2.4.3.3. Gamma survey results were converted from counts per minute to estimated Ra-226 concentrations in pCi/g. For each EU, the Ra-226 preliminary removal action extent for the site was developed using geospatial tools based on the area estimated to exceed the RAG within the TENORM boundary.

2.6.4.2 Assessment of Metals Co-Location with the Radium-226 Preliminary Removal Action Extent

The distribution of candidate metal COCs and COECs was compared with the Ra-226 preliminary removal action extent to identify whether concentrations of candidate COCs and COECs at concentrations above background are co-located with the Ra-226 preliminary removal action extent. Appendix B, Figure B-2 through Figure B-7, presents the soil sample results for each candidate metal COC and COEC above background overlain with the Ra-226 preliminary removal action extent with results screened against relevant BTVs, human health PRGs, and NAUM PERGs. For candidate COCs and COECs for which RAGs are developed in Section 2.7.1, the results are also screened against the RAG.

At the Quivira Mines, the extent of barium, chromium, and vanadium (Appendix B, Figure B-3, Figure B-4, and Figure B-7) above the NAUM PERG and BTVs is entirely co-located within the preliminary Ra-226 removal action extent or the waste rock stockpile that is planned for removal. Further assessment of the extent of barium, chromium, and vanadium will not result in a change in the removal action extent and, therefore, barium, chromium, and vanadium will not be considered for further evaluation and are not identified as COECs recommended for removal action.

2.6.5 Refinement of the Ecological Risk Assessment Candidate Contaminants of Ecological Concern

Per USEPA (1999), ecological risk management decisions should be based on sound science and clear rationale. As described in USEPA (1999) guidance, establishing preliminary removal goals for ecological receptors is difficult because of the following:

- Lack of broadly applicable and quantifiable toxicological data
- Number and variety of species potentially present at an EU
- Differences in susceptibility of different species at different life stages to COECs
- Recuperative potential of different species following exposure
- Variation in environmental bioavailability of the candidate COECs

The selected remedies should be protective of ecological receptors in both the short and long term. Because ecological receptors at an EU are within a larger ecosystem, remedies selected for protection of these receptors should also assume protection of the ecosystem components upon which they depend or support. Removal actions should not be designed to protect organisms on an individual basis but, instead, should be designed to protect local populations and communities

of biota. Evaluation of these factors was incorporated in the EE/CA in the evaluation of the effectiveness of the removal action alternatives in Section 4.3.

Risk managers should consider the following principles when making ecological management decisions.

- **The potential impact of site risks.** When evaluating ecological risks and the potential for response alternatives to achieve acceptable levels of protection, managers should consider the following:
    - Magnitude or degree of the predicted responses of receptors to the range of COEC levels
    - Severity of the impact (for example, how many species will be affected)
    - Areal extent and duration over which effects may occur
    - Potential for recovery of the affected receptors
- **Actions that will reduce ecological risks to levels that will result in the recovery and maintenance of healthy local populations and communities of biota.** Managers should consider the actions that will result in an ability for the site to sustain an ecological structure and function of the local populations, communities, and habitats. The benefit of risk reduction should be weighed against the ecological cost of habitat destruction. Excavation destroys plant cover and removes valuable topsoil, which leads to the degradation of biologically rich areas (Whicker and others 2004). This consideration is particularly important in vegetated areas because those areas may be used by ecological receptors and revegetation may be difficult to establish and slow to mature once established.
- **Input from the public and stakeholders.** Through the EE/CA Superfund public comment process and NNEPA review, managers should consider the input or issues voiced from stakeholders, such as community groups, on any perceived negative short- or long-term impact of the removal action.

To support managers in understanding the site risks and to provide managers with a balanced recommendation so that the ecological structure and function can recover and be sustainable for the long-term risk, risk management should include:

- Development of NAUM PERGs using average exposure assumptions instead of conversative assumptions and comparison with representative site concentrations (for example, UCL95)
- Evaluation of analytical data uncertainties, such as frequency of detection (FOD)
- Inclusion of other lines of evidence, including bioavailability, area use factors, and seasonality of exposures (Appendix C contains more information on these uncertainties)

2.6.5.1 Comparison of Metals Site Concentrations with Preliminary Ecological Removal Goals for Candidate Contaminants of Ecological Concern

To refine site risks associated with metal candidate COECs for soil above background that are not entirely co-located within the Ra-226 preliminary removal action extent (arsenic, selenium, and uranium), estimates of the site-wide EPC (using UCL95 concentrations) at the Quivira Mines were compared with NAUM PERGs. Exhibit 13 presents the results of the comparison of the site-wide EPCs to the NAUM PERGs.

As shown in Exhibit 13, the site-wide EPCs for U-234, U-238, Ra-226, arsenic, selenium, and uranium are less than the NAUM PERGs; therefore, these candidate COECS are not recommended for removal action.

Exhibit 13. Comparison of Site-Wide EPCs to NAUM PERGs for Soil

Candidate COEC	Unit	Site-Wide EPC[1] – Surface Soil	Site-Wide EPC[1] – Subsurface Soil	NAUM PERG[2]	Candidate COEC EPC > PERG
Uranium-234	pCi/g	--	12	430	No
Uranium-238	pCi/g	--	12	480	No
Radium-226	pCi/g	5.9	16	40	No
Arsenic	mg/kg	5.7	--	68	No
Selenium	mg/kg	3.0	3.1	3.4	No
Uranium	mg/kg	6.2	16	250	No

Notes:
[1] EPC as indicated in Appendix C, Table C-9.
[2] NAUM PERGs are based on the most sensitive ecological receptor
-- Not a candidate COEC for the depth interval
COEC Contaminant of ecological concern
EPC Exposure point concentration
mg/kg Milligram per kilogram
NAUM Navajo abandoned uranium mine
pCi/g Picocurie per gram
PERG Preliminary ecological removal goal

2.6.5.2 Assessment of Contaminant Distribution

An analyte could be identified as a candidate COC or COEC and be only detected infrequently in an EU (for example, less than 5 percent with at least 20 samples). Because of low FOD, the exposure and resulting risk could be unreasonably elevated and overly conservative. COCs and COECs should not be removed simply based on the FOD of less than 5 percent, but each case should be reviewed for analytical certainty and if low FOD potentially indicates a unique hot spot for risk management consideration. At the Quivira Mines, FOD is greater than 5 percent for all candidate COCs and COECs.

Risk managers should also consider the assessment of nonmobile ecological receptors (for example, plant and soil invertebrate communities). Plants and soil invertebrates represent the basis of the ecological food chain and site concentrations were evaluated in the ERA against the NOEC or ESL on a point-by-point basis (see Appendix C, Table C-10). Although the use of literature-based soil toxicity values protective of soil invertebrates and plants is conservative,

risk managers should compare the areas under consideration for removal action with those locations that have concentrations that exceed a risk-based soil concentration. Appendix B presents the distribution of all candidate COECs within the TENORM boundary compared to the NAUM PERGs and geology-specific BTVs. At the Quivira Mines, candidate COECs greater than background concentrations based on exceedance of a plant or invertebrate NOEC are U-238, U-234, Ra-226, barium, chromium, selenium, and uranium.

2.6.6 Risk Management Summary and Conclusions

Based on the HHRA and ERA for the Quivira Mines, candidate COCs for soil are Ra-226, arsenic, chromium, cobalt, iron, manganese, thallium, and uranium, and candidate COECs for soil are U-234, U-238, Ra-226, arsenic, barium, chromium, lead, manganese, selenium, thallium, uranium, vanadium, and zinc. Following the lines of evidence considered in the risk management analysis in the prior subsections, removal action is recommended as follows:

- To address excess human health risk from Ra-226 contamination at the CR-1, CR-1E, Kerr-McGee Ponds on UNC Property, and Arroyos on the Navajo Nation EUs, removal of Ra-226 above the applicable RAG for each human health EU is recommended.
- To address excess human health risk at the CR-1, CR-1E, and Kerr-McGee Ponds on the Navajo Nation EUs from uranium, removal of uranium above the applicable RAG for each human health EU is recommended.

The conclusions for candidate COCs are based on the results of the risk assessment, background comparison, and co-location analysis. Conclusions for candidate COECs also include consideration of the results of a comparison of the site-wide EPCs with the NAUM PERGs, and are supported by the assessment of uncertainties that are likely to overestimate risk estimates in the ERA. Exhibit 14 provides the COCs recommended for removal at each human health EU. No COECs were identified at the site-wide EU, and no removal action is recommended to address ecological risk at the Quivira Mines. Table 3 presents the results of the risk management analysis and identifies the final COCs recommended for removal action, as well as the rationale for refinement of each candidate COC or COEC, which are not considered for removal action.

Exhibit 14. COCs Recommended for Removal Action

Exposure Unit	Receptor	Surface Soil COCs	Subsurface Soil COCs
CR-1	Kee'da'whíí tééh (Navajo Resident)	Radium-226 Uranium	Radium-226 Uranium
CR-1E	Kee'da'whíí tééh (Navajo Resident)	Radium-226 Uranium	Radium-226 Uranium
Kerr-McGee Ponds on the Navajo Nation	Kee'da'whíí tééh (Navajo Resident)	Radium-226 Uranium	Radium-226 Uranium
Kerr-McGee Ponds on UNC Property	UNC Outdoor Worker	Radium-226	Radium-226

Exhibit 14. COCs Recommended for Removal Action (Continued)

Exposure Unit	Receptor	Surface Soil COCs	Subsurface Soil COCs
Arroyos on the Navajo Nation	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space User)	--	--
Arroyos on UNC Property	Kee'da'whíí tééh (UNC Outdoor Worker)	--	--
Site-Wide	Plants, Invertebrates, Birds, Mammals	--	--

Notes:
-- No COCs or COECs were identified
COC Contaminant of concern
COEC Contaminant of ecological concern
CR-1 Quivira Church Rock No. 1 Mine
CR-1E Quivira Church Rock No. 1 East Mine
Kerr-McGee Kerr-McGee Corporation
UNC United Nuclear Corporation

2.7 REMOVAL ACTION EXTENT

Multiple lines of evidence were used to develop the removal action extent at the Quivira Mines, including the extent of Ra-226 in surface soil, extent of contamination of other COCs and COECs outside the Ra-226 extent, risk management considerations, surface and subsurface waste areas, transport pathways, and disturbed mineralized areas.

2.7.1 Numerical Removal Action Goals

Following the risk management assessment, removal action is recommended for soil for Ra-226 and uranium at the Quivira Mines and for uranium-238 and uranium-234 in the hot spot in the Kerr-McGee Ponds on UNC Property EU. RAGs were derived for each applicable receptor, EU, and COC or COEC recommended for removal action. COCs and COECs were identified based on available laboratory data, comparison to background levels, and other lines of evidence as summarized in Section 2.6.4.

Table 4 presents the comparison of inputs used to develop the final RAGs for each COC in soil. No COECs were identified at the site-wide EU, and no removal action is recommended to address ecological risk at the Quivira Mines. The final RAG is the lesser of the human health PRG and the NAUM PERG, when applicable, unless either the PRG or PERG is less than the BTV. If the BTV is greater than the human health PRG or NAUM PERG, the final RAG is to address material that is distinguishable from background. For purposes of this EE/CA, the BTV calculated for the Bartlett Barren Member of the Crevasse Canyon Formation (BSA-2) is used to represent background for delineating contaminated areas. However, the BTVs may not be representative of the blending of geologic materials from upslope areas and additional lines of evidence may be considered to identify the cleanup extent. Exhibit 15 provides the selected numerical RAG for each COC recommended for removal at each EU.

Exhibit 15. Selected RAG for Each COC

COC	Unit	Exposure Unit	RAG	RAG Basis
Radium-226	pCi/g	CR-1, CR-1E, and Kerr-McGee Ponds on the Navajo Nation	2.0	BTV[1]
		Kerr-McGee Ponds on UNC Property	5.4	HH PRG UNC Outdoor Worker
Uranium	mg/kg	CR-1, CR-1E, and Kerr-McGee Ponds on the Navajo Nation	3.2	HH PRG Navajo Resident

Notes:
No COECs were identified.
[1] The BTV is used to represent background for delineating contaminated areas.
BTV Background threshold value
COC Contaminant of concern
COEC Contaminant of ecological concern
CR-1 Quivira Church Rock No. 1 Mine
CR-1E Quivira Church Rock No. 1 East Mine
HH Human health
Kerr-McGee Kerr-McGee Corporation
mg/kg Milligram per kilogram
pCi/g Picocurie per gram
RAG Removal action goal
PRG Preliminary removal goal
UNC United Nuclear Corporation

2.7.2 Other Removal Action Extent Considerations

The preliminary removal action extent was modified based on the evaluation of additional lines of evidence as follows:

- **Surface and subsurface waste areas:** Waste rock piles and unreclaimed ponds were included in the removal action area. Reclaimed ponds and those backfilled portions of reclaimed ponds no longer containing TENORM were excluded.
- **Transport pathways:** No additional mine features and areas (such as waste rock piles and ponds) with potential for future transport of waste material downgradient were identified.
- **Disturbed mineralized areas:** No mineralized areas are located at the surface at the Quivira Mines. All mining was conducted at depth. However, an upslope area at CR-1, above the cliff band bounding the north side of the mine, was excluded because the area contains only NORM bedrock outcrops of the Bartlett Barren Member and potentially Mulatto Tongue of the Mancos Shale that are slightly higher than the Ra-226 RAG. No mine waste was observed in this upslope area or in the swales draining the area.
- **Accessibility and risk management considerations:** No inaccessible areas are present at the Quivira Mines. However, the arroyos adjacent to the mines are deeply incised and difficult to access. Ra-226 was identified above the RAG in the Unnamed and Pipeline Canyon Arroyos adjacent to CR-1 and CR-1E; however, EPCs for the two arroyos were below the RAG. Arroyo soils data collected in 2010–2011 do not reflect more recent conditions from soil mobility during monsoon events. Recent gamma scanning did not

identify correlated Ra-226 values above the RAG. Therefore, no actionable risk was identified in the two arroyos.

Figure 28, Figure 29, and Figure 30 present the proposed removal action extent at CR-1, CR-1E, and the Kerr-McGee Ponds, respectively. The total calculated surface area is 62.9 acres, and the total estimated volume is 1,005,500 bank cubic yards within the proposed removal action area. The removal action extent by component is as follows:

- CR-1 Waste Pile, Industrial Area, Lower Ponds, and Step-Out Areas: 38.8 acres; estimated 929,200 bank cubic yards
- CR-1E Waste Pile, Pond, Industrial Areas, and Step-Out Areas: 11.5 acres; estimated 49,300 bank cubic yards
- Kerr-McGee Ponds Areas: 12.7 acres; estimated 27,000 bank cubic yards

3.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

This section presents the RAOs, statutory limits on removal actions, removal scope, and removal schedule.

3.1 REMOVAL ACTION OBJECTIVES

An early step in developing removal action alternatives is to establish RAOs. RAOs are a general description of what the removal action will accomplish. RAGs are separate numerical cleanup goal concentrations. CERCLA does not allow removal action alternatives to require remediation of NORM or to remediate soil to concentrations below background levels. Taking current and potential future land use and Navajo cultural considerations into account, the RAOs are to:

- Prevent exposure to soil with contaminants from mining activities that would pose an unacceptable risk to human health with the reasonably anticipated future land use and traditional Navajo lifeways
- Prevent exposure to soil with contaminants from mining activities that would pose an unacceptable risk to plants, animals, and other ecological receptors
- Prevent offsite migration of contaminants from mining activities that would pose an unacceptable risk to human or ecologic health by soil, surface water, groundwater, or air

The reasonably anticipated reuse is generally residential although areas with steep terrain, difficult access, or other similar use constraints are identified in the risk assessment and addressed with reduced exposure parameters. These types of land use include seasonal sheep camps, difficult access open space, easy access open space, and drainages and ravines. Other land uses on the Navajo Nation also include livestock grazing, gardening, and wood and plant gathering. The anticipated reuse is industrial for outdoor workers for the Kerr-McGee Ponds on privately-owned UNC land.

The COCs, COECs, and numeric RAGs are listed in Section 2.7.

USEPA identified general response actions, screened potential technologies, and developed alternatives in Section 4.1 that will satisfy the RAOs listed above. Section 4.2 describes the retained removal action alternatives for the Quivira Mines, and Section 4.3 presents a detailed analysis of the removal action alternatives with respect to NCP effectiveness, implementability, and cost criteria. Section 5.0 presents a comparative analysis of the removal action alternatives.

3.2 STATUTORY LIMITS ON REMOVAL ACTIONS

Pursuant to CERCLA Section (§) 104(c)(1), the normal statutory limits for CERCLA removal actions of $2 million and 12 months do not apply because the selected action will be funded by a responsible party and not by Superfund.

3.3 REMOVAL SCOPE

The scope of the removal action will be to address all solid media contamination at the Quivira Mines under the assumption that this will be the final action regarding solid media at the site. The removal action will also protect against potential future impacts on groundwater and surface water. Post-removal action site controls will be included under an alternative that does not specify complete removal of contaminants to an offsite location.

3.4 REMOVAL SCHEDULE

NCP requires a minimum public comment period of 30 days following release of the proposed final EE/CA by USEPA. USEPA and NNEPA will work together to respond to comments received during the public comment period and publish an action memorandum following the response to comments. USEPA will provide public notification of the removal action schedule upon issuance of the action memorandum.

During implementation of the selected removal action alternative(s), several factors may affect the removal action schedule, including removal action planning and design, cultural and biological clearances and mitigation, seasonal weather-related restrictions, and access for construction equipment. Depending on the removal action alternative selected in the final EE/CA, design and implementation of the construction activities will likely require between 4 and 18 years, depending on alternative selected. Annual post-removal site controls (termed maintenance within this EE/CA for brevity) include annual inspections and maintenance of graded and revegetated site surfaces will be necessary at restored areas for at least the first 30 years after restoration because of the long time frame required to reestablish native vegetation. Annual inspections and maintenance of a repository cap, if selected, will occur as specified in a site-specific, long-term surveillance plan (prepared in accordance with 10 *Code of Federal Regulations* [CFR] § 40.28) with inspection frequencies adjusted based on cover or cap stability and inspection findings. A 100-year maintenance period is used for onsite capping alternative cost estimating and comparison purposes.

4.0 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section identifies and analyzes the removal action alternatives for the Quivira Mines. Section 4.1 summarizes the process of screening potential technologies and identifies the removal action alternatives that may be effective and implementable at the site, Section 4.2 describes in detail the retained removal action alternatives, and Section 4.3 provides a detailed analysis of the removal action alternatives based on NCP evaluation criteria of effectiveness, implementability, and cost.

4.1 DEVELOPMENT AND SCREENING OF ALTERNATIVES

This subsection identifies general response actions, identifies and screens technologies, develops and describes potential removal action alternatives, and identifies the applicable or relevant and appropriate requirements (ARAR).

4.1.1 Summary of Technology Identification and Screening

The removal action alternative development process involves identifying general response actions, technology types, and process options that may satisfy RAOs. Table 5 presents the general response actions that were considered for the AUMs and includes institutional controls (IC), engineering controls, disposal, and ex situ and in situ treatment. The initial screening below eliminates infeasible technologies and process options and retains potentially feasible technologies and process options.

A technology or process option can be eliminated from further consideration if it does not meet the effectiveness threshold criteria (protection and compliance with ARARs) or substantive implementability criteria (technical, administrative, availability, and local acceptance), which are detailed in Section 4.3. In addition, a technology or process option can be eliminated if its cost is substantially higher than other technologies or process options and at least one other technology or process option is retained that is protective.

Institutional Controls. ICs include the implementation of access restrictions to control current and future land use, including traditional Diné Lifeways. ICs would not reduce waste migration from the site but could be used to protect human health by administratively restricting access to affected areas. In addition, these restrictions may be used in conjunction with other technologies to protect an implemented action. While the ICs are not effective as stand-alone remedies, they are retained as components of alternatives that include capping waste on Navajo lands. Potentially applicable ICs consist of land use and access restrictions that are described below.

- **Chapter land use plans** – Land use plans are used on Navajo lands similar to zoning on private lands to control current and future land uses.
- **Deed restrictions** – Deed restrictions do not exist on Navajo lands.
- **Navajo Land Department homesite lease approvals –** Building a home on Navajo lands requires a homesite lease from the Navajo Land Department. The Navajo Land

Department may restrict homesite leases on or near areas with hazardous conditions from mining activities.

- **Environmental control easements** – Environmental control easements are intended for use at sites that contain or may contain hazardous wastes or substances that may threaten public health, safety, or welfare or the environment if certain land uses are permitted or if certain activities are performed on these sites. Environmental control easements are primarily used to address residual contamination.

Engineering Controls. Engineering controls are used primarily to reduce exposure to contaminants. These goals are accomplished by creating a barrier that prevents direct exposure to or transport of waste from the contaminated sources to the surrounding lands. Engineering controls include surface controls; physical barriers; soil sorting; onsite containment and consolidation; backfilling of cuts, benches, and pits; and backfilling of underground voids.

- **Surface controls** – Surface control measures are used primarily to reduce contaminant transport, direct exposure, and the overall exposure area. Surface controls could be appropriate in more remote areas where direct human contact is not a primary concern or as a component of a containment alternative. Surface control process options include consolidation, grading, revegetation, and erosion controls. These measures are retained at the Quivira Mines for use in conjunction with other technologies.
- **Physical barriers** – Physical barriers may include portal closure or site access controls such as fencing and signage. Physical constraints of the location of AUM waste at many of the sites may be restrictive to traditional heavy earthwork equipment because of steep grades and limited working area. These process options are usually integrated with other technologies to various degrees based on site characteristics and are not effective as a stand-alone technology. Portal closures will be retained for infilled adits at the Quivira Mines. The vertical shafts were closed during reclamation but will be closed again if disturbed during remedy implementation.
- **Sorting** – Soil and waste sorting is a standard process applied as an intermediate step between soil or waste excavation and onsite or off-Navajo Nation treatment or disposal methods. The process goal is to segregate highly contaminated material from less contaminated material, allowing for different treatment or disposal options. Sorting reduces the waste volume requiring treatment or disposal, increases the volume of material that can remain on site with limited or no treatment or containment, and allows classification of waste to reduce the volume requiring more costly treatment or disposal options. A full-scale study is planned as part of a TCRA at the Cove Chapter. The goal of the study is to segregate material at or below cleanup goals from waste requiring offsite disposal. Sorting is retained and may be considered in conjunction with onsite consolidation and containment at the Quivira Mines to remove higher concentration waste for offsite disposal.
- **Onsite consolidation and containment** – Mine waste can be consolidated and capped to prevent exposure. Waste from all areas of the site is gathered together, or consolidated, and then capped. Typically, the cap is an ET cap designed to minimize water infiltration and leaching of contaminants, control erosion, control radon emissions, and limit exposure to contaminants. The containment may be directly on site; or waste from

multiple mines can be consolidated and capped at one mine site as a combined action under CERCLA § 104(d)(4). Combined actions are considered "on site" and, thus, retain the CERCLA permit exemption for onsite actions. Consolidation and containment is retained at the Quivira Mines.

- **Backfilling of cuts, benches, and pits** – Backfilling of aboveground mine workings with mine waste occurs when mine waste is excavated and consolidated in cuts, benches, and pits in isolated areas. The mine waste can be either treated to stabilize or solidify as needed. Placement of mine waste would need to consider surrounding slope steepness and minimize slope with engineered rock walls to reduce potential for slope failure. Placing a soil cover over the waste (containment) would be required to reduce erosion and promote vegetative growth. These mine features do not exist at the Quivira Mines; therefore, backfilling is not retained.
- **Backfilling of underground voids** – Backfilling of underground mine workings with mine waste occurs when mine waste is pushed or pumped down vertical mine workings (shafts, stopes, and vents) or injection wells, or transported or pumped into and placed within horizontal workings (adits, drifts, and stopes) and underground vertical workings (shafts, chutes, raises, winzes, and declines). Mine waste can be placed dry or wet, depending on access to and whether the mine workings are flooded. Dry placement requires reopening and rehabilitating adits and shafts for entry and providing a means for material movement (conveyor). Dry placement at the Quivira Mines is not retained given that the mine workings are 1,500 to 1,800 feet below grade and wet.

  Wet placement requires creating a slurry that can flow or be pumped into the underground mine workings. Approximately 4,000 gallons of water per cubic yard of waste is typically required to create a 5 percent solids slurry. Forming a paste mixture with less water (about 670 gallons of water per cubic yard of waste) is possible, but directional placement would be required. Locating mine voids and drilling of multiple large diameter boreholes would also be required to inject slurry. Once injected, the slurry could partially separate back into solid and water, and this contaminated water could migrate to surface water or groundwater. Cement or another solidifying agent could be added to the slurry to reduce separation but would increase the volume of imported materials and decrease the amount of waste that could be disposed of in the workings. Wet placement is retained at the Quivira Mines; however, the mine shafts are already backfilled, requiring drilling of multiple deep injection wells to reach flooded workings.

Disposal. Mine waste can be excavated and disposed of on or off site as a potential remedy. Onsite disposal may be applicable at mines where waste is consolidated or for locations where a separate onsite repository would be constructed. Offsite disposal may be applicable if the disposal site is accessible to a large volume of truck traffic and the waste can be hauled to an on- or off-Navajo Nation regional repository or a RCRA C or LLRW facility licensed to receive radiological waste. Pretreatment of waste using solidification or stabilization to address potential leachability may be considered where repository design does not address the potential for leachate generation. On- or offsite disposal and on- or off-Navajo Nation disposal are retained for the Quivira Mines.

Treatment. CERCLA and NCP express a preference for the treatment of waste that significantly and permanently reduces the volume, toxicity, or mobility of contaminants in selecting remedial actions, where such treatment is practicable. CERCLA § 121(b), 40 CFR § 300.430(a)(1)(iii), and USEPA (1991a) guidance on principal threat and low-level threat waste describe how to identify wastes that may be appropriate for treatment. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur.

USEPA has fully considered whether the site contained any principal threat waste, whether that 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 individual samples at the site contained higher levels of contaminants that might be considered principal threat waste, the waste at the site is extremely variable and heterogeneous and USEPA found no distinct areas of waste rock that were clearly distinguishable as meeting the definitions of principal threat waste in USEPA (1991a) 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 below.

Ex Situ Treatment. Excavation and treatment involve the removal of waste from a source area and subsequent treatment using processes that chemically, physically, or thermally reduce contaminant toxicity, mobility, or volume. Treatment processes have the primary objective of either (1) concentrating chemicals for additional treatment, disposal, or recovery of valuable constituents or (2) reducing the mobility of the chemicals. A short screening summary of different ex situ treatment classes is described below.

- **Physical and chemical treatments** – Physical treatment processes use physical separation and the characteristics of materials to concentrate constituents into a relatively smaller volume for disposal or further treatment. Chemical treatment processes act by adding a chemical reagent that either removes contaminants from the material or fixates contaminants within the material matrix. The net result of chemical treatment processes is a reduction of toxicity and mobility of contaminants in the solid media. Different types of physical and chemical treatments screened include soil washing, acid extraction, ablation, milling, solidification, and stabilization.

    - **Soil washing** is a treatment process that involves washing the contaminated waste (with water) in a heap, vat, or agitated vessel to dissolve water-soluble contaminants. The most common forms of uranium oxides attached to sand particles in waste rock at the site have low solubility in water, rendering soil washing ineffective for removal to below cleanup goals. Dewatered precipitates and sludge must be disposed of at a mill or RCRA C or LLRW facility licensed to receive radiological waste because of the concentrating of radionuclides. Because of the low concentrations of uranium in the waste rock, varying solubilities at different pH ranges for radionuclides and metals, and limited demonstrated application for AUM wastes, soil washing likely would not meet cleanup goals and was not retained.
    - **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. 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 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 not retained.

- **Ablation** 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 and impacts opposing slurry streams, causing collisions between the sandstone particles and fragments and removing the uranium minerals coating the sand grains. Uranium mass then shifts from coarse-grain to fine-grain fraction, resulting in a much smaller volume of waste requiring disposal. Pilot-scale studies at three sites on the Navajo Nation, including the Quivira Mines, has shown that up to 95 percent removal of uranium mass from the coarse sand fraction can be achieved, that the treated materials are not RCRA hazardous, and do not generate leachable metals or radionuclides above EPA and Navajo Nation water quality standards. Concentrates are disposed of off site at a RCRA C or LLRW facility licensed to receive radiological waste. However, ablation has not been able to achieve low cleanup goals for unrestricted use, such as those established for the Quivira Mines and Section 32 and 33 Mines. Instead, ablation can be used to reduce uranium mass for waste consolidated on site and to reduce migration potential. Ablation was not retained as a standalone or pretreatment treatment technology because it would increase costs without significantly reducing risk.
- **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 site are low, so any processing would, therefore, yield only a minimal amount of uranium. Additionally, milling does not remove Ra-226 and the resulting mill waste is neither less toxic nor less mobile than the source material. Thus, milling was not retained for treatment of uranium mine waste. Milling may be considered as a pretreatment step for recovering uranium before disposal in a tailings disposal facility; however, an operational mill that is in compliance with the CERCLA Off-Site Rule is not located within the region and milling alone as a pretreatment step was also not retained.
- **Solidification and stabilization** are processes that either physically encapsulates or chemically alters mine waste to reduce contaminant leachability, mobility, or toxicity. Neither process addresses radiation concerns. Solidification involves mixing waste with a binder material such as cement, fly ash, clay, or geopolymers. Stabilization involves mixing waste with a neutralizing material such as lime/fly ash and pozzolan/cement. The binder or neutralizing material would have to be hauled to the site, and a batch plant would need to be set up to mix the material with waste. 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 off site. Once the material is solidified or stabilized, it may be placed into a repository or in aboveground mine workings as stackable blocks or gravel admixture; however, the

volume of waste requiring disposal greatly increases because of the addition of binding and neutralizing agents. Furthermore, unless placed in a disposal cell or repository, the solidified or stabilized material may break apart when exposed to freeze-thaw and precipitation, potentially increasing leachability. On- or offsite disposal options are protective and use fewer resources. As a result, solidification and stabilization were not retained.

- **Thermal treatment** – Thermal treatment technologies apply very high levels of heat to the excavated soil in a reactor to volatilize and oxidize contaminants and render them amenable to additional processing. Thermal treatment is typically used for organic contaminants and is not effective on radionuclides and metals in soils.

In Situ Treatment. In situ treatment involves treating the contaminated medium where it is currently located. In situ technologies reduce the mobility and toxicity of the contaminated medium and may reduce exposure to the contaminated materials; however, they allow a lesser degree of control, in general, in comparison to ex situ treatment options. A short screening summary of different in situ treatment classes is described below.

- **Physical and chemical treatments** – Potentially applicable in situ physical and chemical treatment technologies include soil stabilization and solidification. In situ stabilization and solidification are similar to conventional ex situ stabilization in that a solidifying agent (or combination of agents) induces a chemical or physical change in the mobility or toxicity of the contaminants. The in situ process uses deep-mixing techniques to allow maximum contact of the solidifying agents with the contaminated medium. The technologies were not retained because the waste pile depth and the hillslope orientation of the waste pile would make the in situ approach problematic. In addition, exposure to external irradiation by treated materials would remain unless covered with a calculated depth of soil.
- **Thermal treatment** – In situ vitrification is a process used to melt contaminated solid media in situ to immobilize radionuclides and metals into a glass-like, inert, non-leachable solid matrix. Vitrification requires significant energy to generate sufficient current to force the solid medium to act as a continuous electrical conductor. In situ vitrification has been demonstrated only at the pilot scale, and treatment costs are extremely high compared with other treatment technologies. The technology does not address exposure from external irradiation from treated materials and is not considered a feasible option because the infrastructure necessary to deliver high-voltage electricity to a site is unavailable and portable generators cannot provide sufficient voltage, which makes the startup and treatment cost prohibitive. Therefore, in situ vitrification was not retained.
- **Vegetative treatment** – Vegetation treatment (also known as phytoremediation) is an innovative process that uses plants to remove, transfer, stabilize, or destroy contaminants in soil or sediment. Phytoremediation methods applicable to AUM waste are limited to phytoextraction and phytostabilization. Much of the contamination at the site is located in 30- to 60-foot-deep piles, and not all of the waste 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 waste and prevention of human or animal consumption of the plants would be necessary. Because of

the depth of waste, limited depth of root penetration, and harvested material handling requirements, phytoremediation was not retained.

If the treatments discussed above or any other treatment methods are shown to be effective and practicable before selection of a remedy, USEPA will amend this analysis and consider such treatments.

4.1.2 Summary of Alternative Development

After an initial screening of general response actions and technologies, containment, consolidation, and capping along with various disposal process options were the only technologies identified as being protective, effective, and implementable for the Quivira Mines. ICs, surface controls, and access controls are feasible but not as stand-alone responses and may be combined with containment and disposal options. A list of analyzed but excluded disposal process options for the site is included below and is followed by a list of retained alternatives comprising excavation and other disposal process options.

The following site-specific disposal alternatives were removed from consideration as infeasible during development of this EE/CA for the Quivira Mines:

- **Excavation, Onsite Ablation, Onsite Capping of Treated Material, and Offsite Disposal of Concentrates.** Ablation may not be able to attain background levels for all waste, therefore, this potential future disposal alternative would utilize ablation as pretreatment step to reduce Ra-226 and uranium concentrations posing a risk to people and ecological receptors and volume before treated material is consolidated and covered onsite. The pretreatment step offers more contaminant removal than simple onsite consolidation and capping as contaminant mass remaining on site is reduced by up to 95 percent. Ablation pretreatment could be retained after additional scalability testing and where a viable offsite disposal alternative at a similar cost is not available and the community would like contaminant mass and volume reduction before onsite consolidation and capping.
- **Excavation and Disposal at Uranium Mill Tailings Radiation Control Act Sites.** Several Uranium Mill Tailings Radiation Control Act sites, including the UNC Mill Facility, assessed for disposal of the Quivira Mines waste were considered infeasible because those sites were closed, had insufficient capacity to receive the waste, or had groundwater contamination issues that could prohibit disposal under the CERCLA Off-Site Rule.
- **Excavation and Disposal at Unlicensed Disposal Facilities.** Use of two currently unlicensed locations for new disposal facilities at abandoned coal mines near Grants and Fort Wingate was considered infeasible because of limitations under 10 *United States Code* 2692. Factors included the long time required to license new disposal facilities, whether the coal mines could meet licensing requirements, and contamination issues at both sites that could prohibit disposal under the CERCLA Off-Site Rule.
- **Excavation and Disposal at White Mesa Mill.** The White Mesa Mill facility was considered for extraction of uranium from waste rock and subsequent disposal in the adjacent tailings facility. However, disposal at the tailings facility was determined to be

infeasible at this time because of potential contamination issues that would prohibit disposal under the CERCLA Off-Site Rule. This may be an option in the future if compliance with the CERCLA Off-Site Rule can be documented and concurrence obtained from USEPA.

- **Excavation and Disposal at the UNC Mill Facility Tailings Area.** The UNC Mill Facility tailings area was selected as the preferred alternative for disposal of contaminated soil from the NECR Mine. However, disposal of waste from the site at the UNC Mill Facility tailings area is considered administratively infeasible for the following reasons:

  - The property owner (UNC) is unwilling to accept the waste at this time.
  - The process to design placement of the NECR Mine waste at the UNC Mill Facility tailings area was completed in 2018 (MWH 2018). The design indicates little likelihood that extra capacity to accept waste from the Quivira Mines would exist after the NECR Mine removal action. Moreover, evaluating the required changes to the remedial design would delay the remedial process for the NECR Mine.
  - The UNC Mill Facility tailings area is under an NRC license that must be amended by NRC before placement of any waste. NRC estimates that it will make a decision on the license amendment request in 2022. Adding waste from the site to that license termination process would result in further delays.
  - The U.S. Department of Energy Legacy Management Program assumes land ownership and long-term maintenance responsibility for mill sites after termination of NRC licenses. Adding waste from the site to the design would necessitate additional delays.
  - Both USEPA and the community are committed to implementing both the Quivira Mines and NECR Mine actions within the smallest possible time frame to minimize impacts on the community. However, transport and placement of waste from both the NECR Mine and the Quivira Mines to the UNC Mill Facility tailings area concurrently would increase potential for construction and transportation bottlenecks and delays.

  Excavation and disposal at the UNC Mill Facility tailings area was eliminated as an option from this EE/CA because too many legal, administrative, and implementation hurdles would have to be addressed that would likely add years to both the Quivira Mines and NECR Mine removal actions.

- **Use of Both Upper and Lower Synthetic Liners for Repositories.** Onsite disposal was evaluated as a removal alternative. Each onsite disposal alternative involves two cover options: (1) using a store-and-release (also known as ET) cover, and (2) using an upper synthetic liner with a store-and-release cover. Use of both an upper and lower liner has been screened out as an option because this would add significant additional cost without adding additional protection. A Hydrologic Evaluation of Landfill Performance (HELP) model was used to evaluate the difference in percolation through 3- and 4-feet deep ET cap systems. The models showed annual percolation through the cover at amounts less than the accuracy of the model (0.002453 inch for the ET cap of 3 feet and

0.001598 inch for the ET cap of 4 feet). Because precipitation measurement inputs into the model are only accurate to 0.1 or 0.01 inch, the modeled percolation value is zero. This modeling indicates that no liners are necessary to prevent infiltration into the wastes with an ET cap ranging from 3 to 4 feet in depth.

- **Evaluation of Rail Transport of Waste to Disposal Facilities.** Two off-Navajo Nation disposal facilities are set up to receive railcars containing waste rock: a RCRA C landfill in Deer Trail, Colorado, and a LLRW facility in Andrews, Texas. Rail transport was evaluated considering three options: (1) extending a rail line from Gallup to the Old Church Rock Mine about 5 miles from the Quivira Mines, (2) trucking waste 30 miles to an existing rail spur near High Country Transportation, and (3) trucking waste 14 miles to a new loading facility along the main rail lines on the Interstate 40 corridor. Because of costs to purchase land along a right-of-way, costs to construct bridges across arroyos, long permitting lead times, and a cost of construction of $3 to $4 million per mile, the option to extend a rail line to the Quivira Mines was assessed to not be viable. Trucking mileage to an existing rail spur near High Country Transportation is approximately the same mileage as to the Red Rocks disposal facility, passing through Gallup twice, and scheduling of loaded and return railcars would require scheduling and holds from the railroad. Consequently, the option was assessed to not be viable for transport to the Red Rocks disposal facility. Construction of a loading facility adjacent to the main rail lines on the Interstate 40 corridor was initially deemed not viable because the BNSF Railway representatives informed USEPA that no loading facilities could be placed along the main transit lines in that area. Further, even if allowed, property would have to be purchased or leased, the loading facility would need to be designed and constructed, and a spur off the main transit lines would need to be reviewed, approved, and constructed (Tetra Tech 2024).

  USEPA also visited potential rail spur and loading/unloading sites in the Gallup area (14 miles) and in the Thoreau area (48 miles) from the Quivira Mines and determined that transloading facilities would need to be constructed and operated to receive the waste from trucks and transfer into railcars and would create another area requiring cleanup at the end of the project. USEPA determined that trucking the waste through the communities would be no different than hauling waste to the Red Rocks disposal facility. Waste transfer and scheduling would also add additional years to cleanup of the Quivira Mines. Therefore, USEPA determined that rail transport would have limited benefit to the local community and was assessed to not be viable (Tetra Tech 2024).

- **Evaluation of Truck Transport of Waste to Disposal Facilities.** Two main haul routes were considered for trucking waste from the Quivira Mines to the Red Rocks disposal facility: (1) south on State Highway 566 to Interstate 40, exiting Interstate 40 at Thoreau, and then north on State Highway 371 to the facility; and (2) south on State Highway 566 to Pinedale Road/State Highway 11-49 and then south on State Highway 371 to the facility. These routes are the most direct or safest routes and were both assessed as viable. Option 1 using the Interstate 40 corridor is the recommended route because of road safety and capacity, less additive traffic impact from other mines on the Option 2 route, and fewer communities impacted (Tetra Tech 2024). Exiting Interstate 40 at Thoreau provides an overpass to the high-traffic railroad lines that parallel Interstate 40. At-grade crossing of these main rail transit lines with thousands of haul trucks, as envisioned by

screened-out options, is a risk to the truck drivers, trains on the main transit lines, and nearby communities (Tetra Tech 2024).

Retained Removal Action Alternatives. The following alternatives were retained for further evaluation in this EE/CA and have been tailored to address site-specific conditions and other local requirements.

- **Alternative 1: No Action** – No new treatment, containment, or response action would occur at the site. Maintenance of the existing soil cover and site controls would continue. The No Action alternative has been included as a requirement of NCP and to provide a basis for comparison of the remaining alternatives. Exposure to COCs by human and ecological receptors would not be reduced.
- **Alternative 2: Consolidate and Cap All Waste On Site** – All waste rock and contaminated soils from the Quivira Mines with concentrations above the action levels would be consolidated and capped on site. A store-and-release cover (ET cap) will be used. The cover would be designed to meet performance criteria to achieve specified radon flux attenuation goals.
- **Alternative 3: Dispose of All Mine Waste Off Site at Red Rocks Disposal Facility** – Waste rock and contaminated soils with concentrations above the action levels would be excavated and disposed of at a State of New Mexico permitted offsite disposal facility located adjacent to but managed separately from the Red Rocks Municipal landfill near Thoreau, New Mexico. Waste would be transported south on State Highway 566 to Interstate 40, exiting Interstate 40 at Thoreau, and north on State Highway 371 to the Red Rocks disposal facility.
- **Alternative 4: Dispose of All Mine Waste Off Site at a RCRA C or LLRW Facility** – Waste rock and contaminated soils with concentrations above the action levels would be excavated and disposed of at a RCRA C and State of Colorado radiological licensed facility, such as the Clean Harbors RCRA C facility in Deer Trail, Colorado, or an NRC licensed LLRW facility, such as the WCS facility in Andrews, Texas. Waste would be transported south on State Highway 566 to Interstate 40, east to Interstate 25, north on Interstate 25, northeast on State Highway 24, and north on State Highway 71 to Deer Trail.

Retained removal action alternatives listed above are fully described in Section 4.2.2 and are carried through a detailed analysis in Section 4.3.

4.1.3 Applicable or Relevant and Appropriate Requirements

Pursuant to NCP at 40 CFR § 300.415(j), USEPA has promulgated a requirement that removal actions attain federal and state ARARs to the extent practicable considering the exigencies of the situation. The ARARs evaluation completed for the Quivira Mines was comprehensive, and no ARARs were rejected based on the exigencies of the situation. The Quivira Mines is located on Navajo Nation and UNC lands. Pursuant to NCP at 40 CFR § 300.5, the term “state” includes American Indian tribes. Therefore, for the purposes of evaluating potential ARARs, Navajo requirements will be treated the same as state requirements. The identification of ARARs is an

iterative process; therefore, ARARs are referred to as potential until the final determination is made by USEPA in the action memorandum.

NCP at 40 CFR § 300.5 identifies ARARs and other "To Be Considered" (TBC) criteria as follows:

- **Applicable requirements** are defined as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA site."
- **Relevant and appropriate requirements** are defined as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitation promulgated under federal or state environmental facility siting laws that, while not 'applicable' address problems or situations sufficiently similar to those encountered at the CERCLA site and that is well suited to the particular site."
- **TBC criteria** consist of advisories, criteria, or guidance that were developed by USEPA, other federal agencies, or states that may be useful in developing CERCLA remedies and include non-promulgated guidance or advisories that are not legally binding and that do not have the status of potential ARARs. TBCs generally fall within three categories: health effects information with a high degree of credibility, technical information on how to perform or evaluate site investigations or response actions, and policy.

ARARs apply to onsite actions completed as part of a removal action. The onsite actions evaluated in this EE/CA will occur on Navajo Nation and UNC lands. Navajo Nation statutory and regulatory requirements were evaluated as potential ARARs for Navajo Nation lands (USEPA 1991b). State of New Mexico has regulatory jurisdiction on UNC lands but not on Navajo Nation lands. Compliance with ARARs requires compliance only with the substantive requirements contained within the statute or regulation and, pursuant to CERCLA § 121(e)(1), does not require compliance with procedural requirements, such as permitting or recordkeeping. ARARs do not apply to offsite response actions. Instead, offsite response actions must comply with independently applicable requirements (not relevant and appropriate) and must comply with both substantive and procedural components of the requirements.

USEPA, as the lead agency, is responsible for identifying potential federal ARARs and evaluating potential State of New Mexico ARARs and Navajo Nation ARARs. For a State of New Mexico or Navajo Nation requirement to be identified as a potential ARAR, the requirement must be more stringent than the corresponding federal ARARs.

USEPA has divided ARARs into three categories: chemical specific, location specific, and action specific. The three categories are described below:

- **Chemical-Specific ARARs** are usually health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

- **Location-Specific ARARs** apply to the geographical or physical location of a site. These requirements limit where and how the response action can be implemented.
- **Action-Specific ARARs** include performance, design, or other controls on the specific activities to be performed as part of the response action for a site.

The potential ARARs for this response action are presented and analyzed in Table 6 by ARAR category and address requirements specific to the alternatives for the Quivira Mines.

4.2 DESCRIPTION OF ALTERNATIVES

Section 4.2.1 provides a summary of common site construction and restoration elements applicable to all alternatives. A detailed description of removal action alternatives and associated costs, which focuses on the different waste disposal options, is presented in Section 4.2.2.

4.2.1 Common Elements

To reduce repetitive discussion in the detailed alternative analyses, common removal action elements for Alternatives 2 through 4 are provided in the following subsections.

4.2.1.1 Common Elements for Construction and Restoration

Common removal action elements at the Quivira Mines for construction and restoration for Alternatives 2 through 4 are described below.

Site Preparation. A laydown area would be established after biological and cultural resource clearances near the Quivira Mines (Figure 31). Laydown areas include port-a-potties, wash water, refuse pickup, decontamination station, temporary offices, radiation scanning equipment, personal protective equipment, first aid supplies, temporary Wi-Fi and radio, and potentially a construction water well and tank stand. The laydown areas would also include security personnel and temporary security fencing and signage for access controls. Laydown areas would remain until completion of the removal action.

A sufficient water supply is not available for construction near the Quivira Mines. Construction of a new construction supply well near the onsite repository would be needed to provide water for the project. Utility water could be obtained approximately 20 miles from the City of Gallup depending on existing infrastructure and the volume of water available. Well depths would likely range from 500 to 700 feet for the Upper Gallup aquifer and 850 to 1,000 feet for the Lower Gallup aquifer if Gallup water is not available. Generators for site power would be used to run the well pump. Therefore, power for the project would be provided by diesel generators for the temporary work site (laydown) and well site location (if constructed). The diesel generators would require bulk fuel storage at the laydown area, as well as daily storage on the project site. A secondary containment area would be constructed around generators, storage tanks, and fueling area. The generators would provide power for various types of construction equipment, lighting systems, and pumps. A water storage tank for the water trucks would also be required. If a well is constructed, it could be left after completion of the removal action for use by the Navajo community for irrigation or livestock.

Cultural and Biological Exclusion and Timing. Cultural resource surveys were conducted in 2010 for CR-1 and CR-1E (SENES 2011) and in 2022 for the preliminary removal action area by Dinétahdóó Cultural Resources Management. The results of these surveys would be reviewed and used where possible for planning and removal design. Additional surveys would be performed after design by a Navajo Nation-approved archeologist, and compliance requirements for cultural resources would be specified by USEPA with concurrence by the Navajo Nation Heritage and Historic Preservation Department. For the purposes of this EE/CA and consistent with other CERCLA actions taken in this area, cultural resources can assume to be avoided or protected during site work activities and that no special status plant or animal species would be identified that would limit site work activities.

Natural resource surveys (for example, biological and botanical) for special status species would be required to verify the current land use for each area, mapped habitat and vegetation cover types, and recorded locations of potential special status species resources. NNDFW and previous surveys would be consulted where possible, and new surveys would be conducted if necessary. Furthermore, if new action areas are identified as part of the selected removal action, these areas would need to be surveyed before earthmoving activities. If any natural resources are found, then ARARs would be identified.

The removal actions would involve construction of access and haul roads and a laydown area. Therefore, additional field surveys and reports of both natural and cultural resources in the proposed work areas would be required in consultation with the Navajo Nation. The surveys must conclude that the proposed removal action project area would not affect natural and cultural resources before design and construction can proceed.

An environmental protection plan would be developed for monitoring protocols during the work activities and include a review and evaluation of potential impacts to historic properties and locations. Natural resource (for example, biological and botanical) inspections would be conducted at the site, and information from these inspections would be included in the environmental protection plan. Environmental protection would include a review and evaluation of potential impacts on government-protected species and critical habitats.

Site Access. During the response and restoration activities, site access would be restricted by the existing fence and temporary fencing that would be constructed where the existing fence may need to be removed to perform work. Security would be maintained during all non-working hours while site work is occurring. The site foreperson and the health and safety officer would be responsible for personnel while they are on the site. To restrict access, the site would remain completely fenced throughout the duration of construction activities. Temporary fencing would be used whenever the perimeter fence must be removed for construction access. Alternate entrances that may be required for portions of the work would be secured when not in use. If work is occurring at CR-1, CR-1E, and the Kerr-McGee Ponds simultaneously, security would be provided at all lease areas. USEPA and its authorized representatives, including its contractors, and representatives of NNEPA would have access to the site at all times. A site access and security plan would describe the activities used to monitor and control access to the site during implementation of the response actions and the period of work performance.

The alternatives being considered require an extensive amount of soil and water hauling over several years. An access road would be constructed from Pipeline Canyon Road to the east side of CR-1 to minimize disturbance of nearby residence along Red Water Pond Road (Figure 31). CR-1E access to the Kerr-McGee Ponds would use existing access roads and Pipeline Canyon Road. Existing access roads and Pipeline Canyon Road are graded dirt roads and would not support 22-cubic-yard (33-ton) off-road articulated haul truck or 16.5-cubic-yard (25-ton) on-highway haul truck and construction equipment movement. Existing access roads and Pipeline Canyon Road would require widening and surfacing with gravel or pavement to reduce dust generation, including water conveyances along and passing under the roads for year-round operations. During transport on site (between CR-1, CR-1E, and the Kerr-McGee Ponds) and off site (State Road 566), traffic controls would be necessary. A traffic control plan would be developed and followed throughout operations. Even with precautions, nearby paved roads would require maintenance to protect the roadway and road users. To maintain road load limits, scales would be used to weigh the trucks that navigate Navajo Nation roadways. Observing road and bridge load limits would help reduce roadway wear and maintain the local roadways in a safe operating condition. Equipment and materials would be available to restore Red Water Pond Road and Pipeline Canyon Road as needed.

Air Monitoring. A sampling and analysis plan would be prepared that describes the methods and procedures for collecting, analyzing, and evaluating air samples within and at the perimeter of work zones and within the community. Air monitoring stations would be positioned and operated to monitor dust and airborne contaminant concentrations during grubbing, excavating, stockpiling, loading of bulk carriers, managing the stockpile, and restoring the site. Air monitoring results and dust suppression measures would be used to document that offsite migration of contaminants at unacceptable activity concentrations does not occur, maintain compliant air quality conditions and a safe working environment, and protect the health of nearby residents, workers, the general public, and the environment. Frequent water spraying would be used during soil moving activities at all work zones and for dust suppression. Water would be sourced from an offsite source or a permanent well installed near CR-1.

Dust Control. Off-road haul routes and site excavation and restoration areas would be wetted so that dust generation is minimized. Frequent water spraying would be used during soil moving activities for dust suppression. Further, rock fields and grating would be used to reduce track out of dirt onto paved surfaces. To maintain the haul routes as laid out, signs and barriers would be provided, as necessary, to contain traffic along the designated route. Water used for dust control and cleaning of paved surfaces would be imported or pumped from a new construction well as described earlier. Alternate methods of dust control, such as chemical polymers, gravel cover, recycle asphalt, and paving of access and haul roads, will be considered to reduce the water required. Dust control would be used to maintain compliant air quality conditions and a safe working environment and protect the health of nearby residents, workers, the general public, and the environment.

Stormwater Control. Excavated areas would be graded to pre-mining contours when possible and oriented to reduce scouring with low-energy flow rates and patterns. The drainage system would be integrated with the topography and existing drainage patterns to the extent possible. Activities at the Quivira Mines must be evaluated for potential impacts on federally listed species and critical habitat and for certification to meet the substantive requirements of the National

Pollutant Discharge Elimination System Multi-Sector General Permit. Once the site has been stabilized, monitoring of construction stormwater runoff would cease and post-removal action site controls would be initiated. The cost estimates include provisions for ongoing cover maintenance and erosion control and fence inspection and repair.

Excavation Approach. Waste rock piles and contaminated soils containing metals and radionuclides above RAGs are the removal areas of concern (Figure 28 through Figure 30). The estimated 1,005,500 bank cubic yards of waste is easily accessible. Waste excavation methods considered for the Quivira Mines include standard- to large-size excavators and loaders. Waste rock piles would be removed to native soil interface after which excavation would proceed in lifts using field screening techniques such as gamma scanning and X-ray fluorescence measurements until RAGs are attained. In some areas, excavation may extend to bedrock, at which point excavation would stop. Confirmation sampling and final status survey sampling would be conducted to verify attainment of RAGs and RAOs. Waste rock and contaminated soils would be temporarily stockpiled for load out. Borrow material would first be obtained from on site; additional imported borrow material may be needed.

Waste Handling and Transfer. For cost estimating purposes, 22-cubic-yard (33-ton) articulated haul trucks were assumed for onsite transport and 16.5-cubic-yard (25-ton) on-highway haul trucks were assumed for offsite transport. Waste would be transferred on site using existing and temporary access roads and Pipeline Canyon Road (Figure 31). Waste transferred off site would use Pipeline Canyon Road to State Road 566 to avoid the Red Water Pond Road residential community. No transfer station would be required because the site can be accessed with multiple types of trucks. Dry brushing of all truck beds and wheels would occur before each truck leaves the site. During muddy conditions, scraping and spraying of truck tires will also be conducted. Traffic control planning and implementation would be required for Pipeline Canyon Road and at the entrance to State Road 566.

Site Restoration Activities. USEPA has developed a matrix to identify the different features and areas of the Quivira Mines requiring restoration and the typical restoration approaches for each feature and area. Site restoration approaches for each mine feature and area are described below:

- **Waste excavation areas** – Excavated areas would be backfilled and compacted with soil from a local borrow area, contour graded to match adjacent topography, covered with an erosion control blanket, and seeded using local grasses and forbs. Upslope soil and rock berms and drainage ditch system would be used to divert run-on around the restored and disturbed areas.
- **Mine portals** – The shafts and adits at CR-1 and CR-1E (Figure 2 and Figure 3) were closed during reclamation; however, the top of the two adits at CR-1E are currently uncovered. Further, waste excavation activities may disturb these mine portals. Therefore, the mine portal locations would be evaluated during the removal action to verify the integrity of the closure and corrective actions would be taken to repair or augment existing portal closures.
- **Access roads** – Access roads needed for CR-1E and the Kerr-McGee Ponds already exist; however, a new temporary access road would be constructed from Pipeline Canyon Road to CR-1 (Figure 31). Improvements would be made to the existing access roads and

Pipeline Canyon Road to allow construction traffic. After successful restoration of the disturbed areas of the site, the temporary access roads would be obliterated. Overbank materials would be moved back onto the road surface. The road pathways would be contour graded to match surrounding grade and seeded using local grasses and forbs. Water control bars would be used on portions of the road that have an extended length and a slope greater than 5 percent. Drainage swales would be covered with rock to reduce erosion.

- **Fencing** – Domestic livestock would not be allowed to enter the site until it is fully restored. Temporary 4-strand barbed wire fencing would be erected around the restored area (site and borrow area) to protect revegetation efforts from grazing over a period of up to 30 years. Once vegetation is restored and the site has stabilized, perimeter fencing at the Quivira Mines may be removed except where a repository is present. Repository perimeter fencing and signage would remain indefinitely. Restoration activities may take 30 years or more before adequate vegetation is in place and final stabilization is achieved.
- **Livestock controls** – In addition to fencing, berms or barricades would be constructed on temporary access roads and benches to reduce ease of access for livestock over the short term and allow for successful revegetation.

4.2.1.2 Common Elements for Maintenance

Common removal action elements at the Quivira Mines for maintenance for Alternatives 2 through 4 are described below.

This cost assumes maintenance of the ET cap would be required in perpetuity, but for cost estimating purposes was assumed to include cap inspections, erosion repairs, and revegetation for 30 years and cap inspections for up to 100 years. USEPA would be responsible for the long-term maintenance of the repository. Restoration maintenance at the Quivira Mines would consist of 10 years of erosion repairs and inspections and 30 years of vegetation surveys and maintenance of revegetation efforts.

Maintenance after Site Restoration. Maintenance at the Quivira Mines would consist of 10 years of erosion repairs with inspections, vegetation surveys, and maintenance of revegetation efforts extending up to 30 years for restored areas of the site, including excavation areas, removed roads, and borrow areas. For cost estimating purposes, maintenance would include:

- Inspection and vegetation survey in late spring (up to 30 years)
- Vegetation maintenance, including reseedings and removing weeds (first 10 years and as needed up to 30 years)
- Erosion control inspection and maintenance survey after the monsoon season (first 10 years)
- Maintenance of the access road until vegetation and restored areas have stabilized (first 10 years)
- Repairs to erosional features and water control berms (first 10 years)

On-Navajo Repository Closure and Long-Term Maintenance. Activities common to Alternative 2 include:

- Final grading, surface erosion controls, and revegetation of the onsite repository cap would be designed to limit the visual impact by mimicking local terrain and using local soils and vegetation (Appendix F).
- Erosion controls on the cap may include biodegradable matting and wattles and use berms and ditches to direct run-on water around the repository.
- Temporary range fencing would be installed around restored areas during the revegetation period to stop livestock from disturbing the soil cover and revegetation efforts.
- Permanent fencing and signage would be installed and maintained around the repository to control or restrict grazing and access since overgrazing, livestock foot traffic, or vehicle traffic could damage the cap. A gate would be installed to provide access for periodic rotational grazing on the cap.

Land use controls would be required for waste placed in a repository to protect the response action. The form of the land use controls would likely be a land withdrawal or an environmental covenant, such as an easement to restrict future residential use or activities that would disturb the cap.

Annual inspection and maintenance of the repository covers would be conducted as specified in a long-term surveillance plan (10 CFR § 40.28) with inspection frequencies adjusted based on the cover stability and inspection findings. The annual inspection would consist of checking for erosion and animal burrows and verifying the integrity of erosion controls. Maintenance would consist of filling burrows, filling and grading eroded surfaces, clearing accumulated erosion materials, replanting vegetation, and repairing access roads. Maintenance costs were developed based on a 100-year duration for the earthen covers placed on top of radiological waste contained within an onsite repository. For cost estimating purposes, maintenance would include:

- Inspection and vegetation survey in late spring (up to 30 years)
- Vegetation maintenance, including reseedings and removing weeds (first 10 years and as needed up to 30 years)
- Erosion control inspection and maintenance survey after the monsoon season (up to 100 years)
- Repairs to erosional features and water control berms (first 10 years and as needed up to 30 years)

The repository would be maintained in perpetuity. Additional maintenance costs beyond 100 years assumed for cost estimating purposes will depend on inspection results and updates to the long-term surveillance plan.

CERCLA Off-Site Rule. Alternatives that involve transportation off site for disposal or consolidation into a regional repository would require compliance with the CERCLA Off-Site Rule. In general, the CERCLA Off-Site Rule requires that facilities that accept contaminated or

hazardous wastes from a CERCLA site must follow all applicable regulations and laws (that is, they must be approved to take those wastes and be in compliance with the applicable federal, state, and local requirements to do so). The licensed disposal facilities considered for any alternatives involving offsite consolidation into a repository would be required to have existing approval under the CERCLA Off-Site Rule.

4.2.1.3 Potential Unavoidable Impacts

Except for Alternative 1 (no action), each of the removal action alternatives would result in an overall improvement to the local environment. However, for Alternatives 2 through 4, unavoidable impacts are expected and include:

- Existing vegetation at the Quivira Mines is limited to scrub and grasses with a few small trees. Geomorphic design of the onsite repository may require removal of juniper trees northeast of the site. Disturbed areas would be reclaimed after construction, but reestablishing the existing vegetation will take time.
- Local populations using Pipeline Canyon Road and State Road 566 will be inconvenienced by heavy equipment activity during the February to November construction period and by increased truck traffic on Pipeline Canyon Road, State Road 566, and all other access roads near the site and offsite disposal facility. Generation of dust on access roads would be minimized through spraying with water during construction and hauling activities or using chemical polymers, gravel cover, recycle asphalt, or paving of access and haul roads. Noise would be limited to normal work hours to avoid disturbing local residents.
- Disruption of sensitive species and habitat during construction activities is not anticipated at the Quivira Mines based on previous biological surveys. If sensitive species are subsequently identified during a biological survey before the removal action, the timing and location of construction activities would be adjusted to limit disturbance and biological monitoring would be conducted during construction activities.
- Cultural resources were not identified at the Quivira Mines during previous actions. However, cultural resources were identified west of CR-1 and east of the Kerr-McGee Ponds. A cultural resource specialist would be consulted during the removal design to avoid sensitive areas during proposed construction activities. Cultural resource monitors would be on site during construction activities to oversee that resources are not disturbed and identify any resources uncovered during excavation activities.
- Increased risk of traffic accidents and fatalities and greenhouse gas emissions is anticipated because of the trucking of fill, cover material, and waste. As the haul distance increases, the potential risks also increase. Water would be required for dust control during excavation, waste compaction, and restoration, and on roads during waste hauling. Water use, trucking mileage, greenhouse gas emissions, and traffic accident and fatalities are discussed for each alternative in Section 4.3.

4.2.2 Description of Removal Action Alternatives

The following subsections present descriptions of the five removal action alternatives identified in Section 4.1.2. All haul roads, laydown areas, water sources, and truck and access roads needed for the removal actions are shown on Figure 31.

4.2.2.1 Alternative 1: No Action

Under Alternative 1, radionuclide and metal COCs and COECs in the waste piles and surrounding soils would not be addressed. No land use controls, signage, range fencing, or barriers would be used to limit access at the site. Existing perimeter site fencing would remain. No removal or site stabilization activities would occur.

4.2.2.2 Alternative 2: Consolidate and Cap All Waste On Site

Alternative 2 includes consolidation and capping waste on site in a repository. Geomorphic design would be used to enhance the aesthetics of the repository and improve erosion control. The design approach would be to blend the repository into adjacent hillslopes to mimic topography and bedrock outcrops and to plant native vegetation compatible with repository cap and adjacent landscape. An example of a geomorphic design concept for CR-1 is shown in Appendix F.

Under Alternative 2, the RAOs would be accomplished through excavation, hauling, and consolidation of an estimated 1,005,500 bank cubic yards or 1,256,875 loose cubic yards of waste from the Quivira Mines in an onsite repository at or near CR-1 (including a canyon repository); containment of waste in the onsite repository; and implementation and maintenance of site restoration measures and land use and access controls to protect the repository and site restoration process. For cost estimating purposes a 3 mile radius was assumed around CR-1 for the furthest potential repository location. Site excavation and restoration elements common to all action alternatives are described in Section 4.2.1.1.

Containment in an onsite repository would involve the construction of an engineered cap over the consolidated mine waste. Based on HELP modeling, an ET cap of 36 inches of a soil and gravel admixture is assumed to prevent infiltration of precipitation and snowmelt, control radon gas flux, and reduce gamma activity to background. For cost estimating purposes a 48-inch cap is assumed, which is what was the ET cap design that will be used at NECR to cap the tailings. The ET cap can be designed to be stable on slopes between 5:1 and 3:1 and allow for slow dispersion of radon gas. Natural, local vegetation would be established on the ET cap. The ET cap would allow for grazing but would not be suitable as a location for irrigated agriculture or building development.

Waste would be placed and consolidated in such a manner as to mimic surrounding topography and benched to create sandstone-faced terraces to blend into the landscape. Every effort would be made to place waste within draws and box canyons areas and minimize the use of a monolithic stockpile that is currently present at the site. Nearby sources of soil for cap construction are available along Pipeline Canyon and include the fluvial deposits in the drainage

and above the earthen dam northeast of CR-1E. Investigations of these borrow sources performed in 2022 indicated that the soils are suitable material for an ET cap.

Waste from CR-1, CR-1E, and the Kerr-McGee Ponds would be hauled and consolidated at an onsite repository. Work sequencing assumes that all waste will be placed and compacted in the repository before capping begins. Excavation areas for Alternative 2 are shown on Figure 32, and capping and restoration areas are shown on Figure 33. Typical waste consolidation area features are shown on Figure 34. The onsite repository construction and maintenance costs are based on the volume of waste contributed to the repository from CR-1, CR-1E, and the Kerr-McGee Ponds. The overall estimated duration of the project is 4 years.

Site restoration activities include backfilling and grading of waste excavation areas, erosion controls, and revegetation. Permanent fencing and signage would be installed and maintained around the repository to prevent damage to the cap. A gate will be installed to provide access for periodic rotational grazing on the cap. Site restoration activities common to all action alternatives are described in Section 4.2.1.1. Post-removal visualizations of the restored Quivira Mines are included in Appendix F.

Removal Action Components

Additional information regarding individual components is provided in Section 4.2.1.1. Components of the removal action include:

- Excavation of all waste from CR-1, CR-1E, and the Kerr-McGee Ponds
- Excavation and stockpiling of borrow soil for repository cover and site restoration
- Consolidation of excavated waste from all lease areas in an onsite repository within 3 miles of CR-1
- Construction of an engineered cover over consolidated waste at the onsite repository
- Construction and maintenance of permanent fencing and signage around the onsite repository and installation of a gate to provide access for periodic rotational grazing on the cap
- Backfilling and restoration at CR-1, CR-1E, the Kerr-McGee Ponds, and the borrow areas with short-term erosion and stormwater controls, grading, and revegetation
- Construction of temporary fencing and signage around the onsite repository and around excavated areas at CR-1E, the Kerr-McGee Ponds, and the borrow areas
- Long-term cover maintenance at the onsite repository as described in Section 4.2.1.2
- Maintenance of site restoration areas as described in Section 4.2.1.2

4.2.2.3 Alternative 3: Dispose of All Mine Waste Off Site at Red Rocks Disposal Facility

Alternative 3 is the disposal of waste off site at the Red Rocks disposal facility in McKinley County, New Mexico. Under Alternative 3, the RAOs would be accomplished through excavation, transport, and off-Navajo Nation disposal of mine waste and contaminated soil. The site would be reclaimed through implementation of site restoration measures followed by

maintenance of restored features and use of access controls to protect the site restoration process. Site excavation and restoration elements common to all action alternatives are described in Section 4.2.1.1.

An estimated 1,005,500 bank cubic yards or 1,256,875 loose cubic yards of waste from the Quivira Mines would be hauled 44 miles off the Navajo Nation and disposed of at a specially designed and managed disposal area at the Red Rocks disposal facility adjacent to the existing landfill. This area would be created at the facility to manage only this type of waste. The waste would not be mixed with municipal waste at the neighboring landfill. The facility would have separate equipment and a separate workforce, and workers would be specially trained to transport and manage the waste. Waste would be transported on the recommended haul route: south on State Highway 566 to Interstate 40, exiting Interstate 40 at Thoreau, and north on State Highway 371 to the Red Rocks disposal facility. Further discussion of the evaluation of haul routes is provided in Section 4.1.2 and Tetra Tech (2024). The hauling of waste would comply with applicable Navajo and state permitting requirements for the transport of radioactive materials. No TCLP metals results exceeded the toxicity characteristic levels; therefore, the waste piles at the Quivira Mines do not exhibit RCRA hazardous waste characteristics. No pretreatment of the waste is expected to be required before disposal.

The waste also falls under the Bevill Amendment exemption and would not be regulated as a RCRA waste in this scenario. In general, the CERCLA Off-Site Rule requires that facilities that accept contaminated or hazardous wastes from a CERCLA site must follow all applicable regulations and laws (that is, they must be approved to take those wastes and be in compliance with the applicable federal, state, and local requirements to do so). The waste disposal facility would be located on the same property, but separate from the Red Rocks Landfill and operated under State of New Mexico Groundwater Discharge and Mining permits.

Site restoration activities include backfilling and grading of waste excavation areas, erosion controls, and revegetation. Site restoration activities common to all action alternatives are described in Section 4.2.1.1. The Red Rocks disposal facility is 44 miles from the site. A Stennett analysis was prepared by the U.S. Army Corps of Engineers (USACE) to evaluate the safety for site workers at the proposed Red Rocks disposal facility during waste tipping, consolidation, and capping. The Stennett analysis indicated that facility workers would be safe under the exposure scenario used to develop the analysis. Considerations of the analysis included the characteristics of the waste including contaminant concentrations, as well as construction equipment, methods, and durations of worker exposure (USACE 2022).

Figure 35 and Figure 36 show the proposed waste excavation and site restoration areas for Alternative 3 at the Quivira Mines. For Alternative 3, waste would be transported to and disposed of at the Red Rocks disposal facility in McKinley County, New Mexico. The recommended 44-mile haul route to the Red Rocks disposal facility is depicted on Figure 37. The proposed disposal cell at the Red Rocks disposal facility is shown on Figure 38. The overall estimated duration of the project is 4.5 years.

Removal Action Components

Additional information regarding individual components is provided in Section 4.2.1.1. Components of the removal action include:

- Excavation of waste from CR-1, CR-1E, and the Kerr-McGee Ponds
- Excavation and stockpiling of borrow soil for site restoration
- Hauling and offsite disposal of excavated contaminated soils at the Red Rocks disposal facility
- Backfilling and site restoration at CR-1, CR-1E, the Kerr-McGee Ponds, and the borrow areas with short-term erosion and stormwater controls, grading, and revegetation
- Construction of temporary fencing and signage around excavated and borrow areas
- Maintenance of site restoration areas as described in Section 4.2.1.2

4.2.2.4 Alternative 4: Dispose of All Mine Waste Off Site at a Resource Conservation and Recovery Act C or Low-Level Radioactive Waste Facility

Alternative 4 requires the disposal of waste off site at a RCRA C and State of Colorado radiological licensed facility, such as the Clean Harbors facility in Deer Trail, Colorado, or an NRC licensed LLRW facility, such as the WCS in Andrews, Texas, depending on waste concentration and acceptance limits. Under Alternative 4, the RAOs would be accomplished through excavation, transport, and off-Navajo Nation disposal of mine waste and contaminated soil. The site would be reclaimed through implementation of site restoration measures followed by maintenance of restored features and use of access controls to protect the site restoration process. Site excavation and restoration elements common to all action alternatives are described in Section 4.2.1.1.

An estimated 1,005,500 bank cubic yards or 1,256,875 loose cubic yards of waste from the Quivira Mines would be hauled 625 miles off the Navajo Nation and disposed of at the Clean Harbors facility in Colorado or 501 miles to the WCS facility in Texas. Waste would be transported on the recommended haul route: south on State Highway 566 to Interstate 40, east to Interstate 25, north on Interstate 25, northeast on State Highway 24, and north on State Highway 71 to Deer Trail, Colorado. Further discussion of the evaluation of haul routes is provided in Section 4.1.2 and Tetra Tech (2024).

The hauling of waste would comply with applicable Navajo and state permitting requirements for the transport of radioactive materials. Site restoration activities include backfilling and grading of waste excavation areas, erosion controls, and revegetation. Site restoration activities common to all action alternatives are described in Section 4.2.1.1.

The Clean Harbors facility, permitted to receive RCRA Class C hazardous waste and licensed by the State of Colorado to receive radioactive material, and the WCS facility, licensed by NRC to receive LLRW, are both in compliance with the CERCLA Off-Site Rule. In general, the CERCLA Off-Site Rule requires that facilities that accept contaminated or hazardous wastes from a CERCLA site must follow all applicable regulations and laws (that is, they must be

approved to take those wastes and be in compliance with the applicable federal, state, and local requirements to do so). The licensed disposal facilities considered for any alternatives involving offsite disposal would be required to have existing approval under the CERCLA Off-Site Rule.

Disposal at a permitted or licensed facility is a standard disposal method that involves transport to and disposal at the applicable waste disposal facility. Permitted or licensed facilities are generally constructed to prevent the release of hazardous or radioactive materials and include engineered cells and liners that exceed requirements for municipal or commercial solid waste disposal facilities. No TCLP metals results exceeded the toxicity characteristic levels; therefore, the waste piles at the Quivira Mines do not exhibit RCRA hazardous waste characteristics. No pretreatment of the waste is expected to be required before disposal.

Figure 35 and Figure 36 show the proposed waste excavation and site restoration areas for Alternative 4 at the Quivira Mines. For Alternative 4, the waste would be transported to and disposed of at the Clean Harbors RCRA C facility in Deer Trail, Colorado, or the WCS facility licensed by NRC to receive LLRW in Andrews, Texas. The recommended haul routes to the Deer Trail, Colorado, and Andrew, Texas, disposal facilities are depicted on Figure 39 and Figure 40, respectively. The shipment of waste by rail was determined not to be a viable option (see Section 4.1.2 and Tetra Tech [2024]). The overall estimated duration of the project is 17 to 18 years.

Removal Action Components

Additional information regarding individual components is provided in Section 4.2.1.1. Components of the removal action include:

- Excavation of waste from CR-1, CR-1E, and the Kerr-McGee Ponds
- Excavation and stockpiling of borrow soil for site restoration
- Hauling and offsite disposal of excavated contaminated soils at the Clean Harbors or WCS facility
- Backfilling and site restoration at CR-1, CR-1E, the Kerr-McGee Ponds, and the borrow areas with short-term erosion and stormwater controls, grading, and revegetation
- Construction of temporary fencing and signage around excavated and borrow areas
- Maintenance of site restoration areas as described in Section 4.2.1.2

4.3 DETAILED ANALYSIS OF ALTERNATIVES

As required by NCP and described in USEPA (1993) guidance, retained removal action alternatives are evaluated individually against the following three broad criteria: effectiveness, implementability, and cost.

In addition, based on USEPA (2016) guidance, five key elements in greener cleanup activities should be considered throughout the remedy selection process:

- Minimize total energy use and maximize renewable energy use

- Minimize air pollutants and carbon dioxide equivalent (CO_2e) emissions
- Minimize water use and negative impacts to water resources
- Improve materials management and waste reduction efforts by reducing, reusing, or recycling whenever feasible
- Protect ecosystem services

For the purposes of alternative evaluation in this EE/CA, these five elements were considered but a quantitative analysis will not completed until a preferred remedy is selected. NCP evaluation criteria are described below.

4.3.1 Effectiveness Criterion

This criterion evaluates the threshold criteria of protection and compliance with ARARs, along with short- and long-term effectiveness and permanence, and reduction in toxicity, mobility, and volume of waste.

- **Overall Protection of Human Health and the Environment** – This threshold criterion evaluates whether each alternative provides adequate protection of human health and the environment. The assessment of overall protection focuses on whether a specific alternative achieves adequate protection and how site risks posed through each pathway addressed by the EE/CA are eliminated, reduced, or controlled through treatment, engineering, or land use controls. Based on effectiveness and ARAR compliance, alternatives are either considered protective or not protective.
- **Compliance with ARARs** – This threshold criterion evaluates whether each alternative would meet the identified ARARs. Alternatives are either in compliance with ARARs or not in compliance.
- **Short-Term Effectiveness (during Removal Action)** – This criterion evaluates the effects that the alternative would have on human health and the environment under current conditions prior to the action and during its construction and implementation phase. The evaluation includes both radiation risks from exposure to the contaminated soils and risks to the workers and communities under current condition and from construction work, fuel consumption, greenhouse gas emissions, water use, waste and materials management, ecosystem protection, and traffic accident and fatality risk during implementation, and also takes into account the time necessary to complete the action.
- **Long-Term Effectiveness and Permanence (after Removal Action) –** This criterion evaluates the results of the removal action in terms of the risk remaining at the site after response objectives have been met. The primary focus of this evaluation is on the extent and effectiveness of the controls to manage the risk posed by wastes remaining at the site.
- **Reduction of Toxicity, Mobility, or Volume through Treatment** – This criterion addresses the statutory preference for remedies that employ treatment as a principal element by assessing the relative performances of treatment technologies for reducing toxicity, mobility, or volume of the contaminated media. Specifically, the analysis should examine the magnitude, significance, and irreversibility of each estimated reduction.

4.3.2 Implementability Criterion

This criterion evaluates the technical and administrative feasibility of implementing an alternative and the availability of required services and materials.

- **Technical Feasibility** – This criterion takes into account construction considerations, demonstrated performance, adaptability to environmental conditions, and timing.
- **Availability of Required Services and Materials** – This criterion evaluates whether staff, equipment services, disposal locations are available in the necessary time frames for construction and maintenance activities. This criterion was combined with technical feasibility for this EE/CA.
- **Administrative Feasibility** – This criterion considers regulatory approval and scheduling constraints.
- **Tribal, Supporting Agency, and Community Acceptance** – These criteria are initially addressed in this final EE/CA after input from Navajo Nation and supporting agencies. Additional input will be received during the public comment period on the final EE/CA and addressed in the responsiveness summary of the action memorandum.

4.3.3 Cost Criterion

The types of costs assessed include the following:

- Capital costs, including both direct and indirect costs
- Annual maintenance costs
- Net present value of capital and maintenance costs

In accordance with USEPA (1993, 2000) guidance, engineering costs are estimates within plus 50 to minus 30 percent of the actual project cost (based on year 2023 dollars).

4.3.4 Cost Estimating Process

Cost estimates were prepared in accordance with USEPA (2000) guidelines using engineer's estimates, unit costs (cubic yard, linear feet, and square foot quantities) from RSMeans 2023 cost estimating software (Gordian 2023), and vendor quotes. Gallup, New Mexico, was used as the reference city in the RSMeans software to ensure unit costs for labor, equipment, and supplies where applicable to work in the region. Unit costs were validated and adjusted where necessary by verifying that the crew size, equipment, and time allotted for an activity (production rate) were applicable to earthwork at a large mining construction site in the region.

In accordance with USEPA (1993, 2000) guidance, the engineering costs are estimates that are expected to be within plus 50 to minus 30 percent of the actual project cost (based on year 2023 dollars). Only the rolled up construction and capital costs, maintenance costs for site restoration, long-term maintenance costs for repositories, and net present values are presented for each alternative. Cost details and assumptions are presented in Appendix E.

Other construction-related costs were identified and included in the cost approach, including mobilization and demobilization, contractor site overhead, travel and lodging, third-party oversight, Navajo Nation tax for on-Navajo Nation activities, and a 20 percent contingency. Non-construction-related costs required before and during construction activities were also identified and included in the cost approach, including design, planning, resource surveys, confirmation sampling, and reporting.

Contingency costs for construction are based on the extra time, equipment, and personnel required to safely work with radioactive materials; remote location of the site; differences in labor pool costs between RSMeans estimating software reference cities and the project area; and potential for changes in material and transportation costs. Changes in the cost elements are likely as commodity prices change and new information and data are collected during the engineering design and construction pre-bid and walk-through meetings.

The needs for maintenance costs were identified, including the need for site restoration for a period of 10 years to address any erosion and 30 years to conduct vegetation surveys and address any revegetation efforts, and including the need for cap and cover inspection and maintenance for a period of 30 years and inspection from 31 to 100 years for onsite consolidation and capping. Project duration (30 years versus 100 years) varies depending on the alternative being evaluated and is addressed in the cost discussion for each alternative. Any onsite repository will be maintained in perpetuity. Additional maintenance costs beyond 100 years assumed for cost estimating purposes, will depend on inspection results and updates to the long-term surveillance plan.

Common capital and maintenance costs for each removal action alternative include access road construction, access road reclamation, site restoration, and annual maintenance of site restoration efforts over 30 years. Annual inspection and maintenance of the repository cap (erosion repairs and vegetation replanting) would be intensive for the first 30 years because of erosion and revegetation efforts but would decrease after vegetation is established and consist of inspection only for years 31 to 100. Maintenance of site restoration and cap restoration efforts is addressed in Section 4.2.1.2 in more detail. The net present value of each removal action alternative provides the basis for the cost comparison. The net present value represents the amount of money that, if invested in the initial year of the removal action at a given interest rate, would provide the funds required to make future payments to cover all maintenance costs associated with the removal action over its planned life.

To assess the required funds to be set aside for implementing maintenance activities in the future, this EE/CA uses a 7 percent discount rate as specified in USEPA (1993) guidance.

4.3.5 Alternative 1: No Action

This subsection provides the detailed analysis of the No Action alternative organized by NCP evaluation criteria. The No Action alternative is included as a baseline for evaluating the effects of no action and comparing no action to the other alternatives.

4.3.5.1 Effectiveness

Overall Protection of Public Health and the Environment – The No Action alternative is not protective and would not achieve RAOs. This alternative would not minimize potential exposure to or transport of COCs or COECs from the site or control radiation and physical hazards at the site. This alternative would not reduce risk to human health or the environment. Therefore, protection of human health and the environment would not be achieved under the No Action alternative.

Compliance with ARARs – Under this alternative, there are no ARARs with which to comply per CERCLA § 121(d). ARARs are triggered by an action and are, therefore, not pertinent if no cleanup occurs.

Short-Term Effectiveness – Alternative 1 has no action, so no short-term risks would exist for the community or workers from construction activities. However, threats to human and ecological receptors would persist in the short term. Because no construction activities would occur, no additional energy use, greenhouse gas emissions, water use, waste and materials management, and ecosystem protection requirements would be triggered. No additional traffic volume or potential accidents and fatalities associated with construction would occur. While the health risks would not be addressed, there is little exposure under current use conditions, so short-term exposure risk is low.

Long-Term Effectiveness and Permanence – The No Action alternative does not offer any long-term effectiveness and permanence in reducing potential risks to human and ecological receptors. No controls or long-term measures would be implemented to control COCs or COECs at the site other than routine maintenance consisting of erosion and stormwater control, vegetation maintenance, and site cover and existing fencing repair.

This alternative would not provide control through treatment of soils with concentrations of Ra-226 above the action level or reduce volume or mobility of contaminants. The resultant risks associated with the No Action alternative would be similar to those that existed at the time of the RSE field investigations with no increased protection of human health and the environment.

This alternative would not alter the potential exposure to or transport of contaminated soils from the Quivira Mines. Surface water discharge from the site to both Unnamed Arroyo #2 and the Pipeline Canyon Arroyo would have continued potential to transport contaminated soils to the downstream watershed. Nearby residents would continue to be potentially exposed to wind- and water-borne contaminants. Domestic livestock and their owners and caretakers would potentially be exposed to surface soil contamination through direct contact and dust inhalation.

Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 1 employs no treatment, so no reductions in toxicity, mobility, or volume through active treatment would occur.

4.3.5.2 Implementability

Technical Feasibility and Availability of Services and Materials – Alternative 1 is readily implementable because no construction is involved. This alternative would not impact the ability

to conduct removal or remedial actions in the future. No services or materials would be needed to implement Alternative 1.

Administrative Feasibility – Alternative 1 is administratively feasible as taking no action is feasible.

4.3.5.3 Costs

No removal action costs would be incurred for Alternative 1 as it involves no removal activities and no legal or administrative activities.

4.3.6 Alternative 2: Consolidate and Cap All Waste On Site

Alternative 2 assumes that contaminated soils with concentrations above the action levels would be excavated, hauled up to 3 miles, and consolidated in an onsite repository at or near CR-1, including a canyon repository. An estimated 57,140 truckloads of waste (90 truckloads per day) would be transported to the onsite repository using on-highway haul trucks holding 22 cubic yards (33 tons) of waste.

4.3.6.1 Effectiveness

Overall Protection of Public Health and the Environment – Alternative 2 is protective of human health and the environment as the contaminated soils exceeding the action level at CR-1, CR-1E, and the Kerr-McGee Ponds would be consolidated and covered at an onsite repository. The capped area would be covered with a soil ET cap. The engineered cap is a physical barrier that offers protection from water infiltration and percolation into the contaminated soils, protects groundwater resources, and provides adequate shielding from ionizing radiation to protect human health and the environment. The cover would prevent direct contact between the wastes and the public or the environment. Proper construction and design of the cover includes the establishment of vegetation, which reduces erosion. Proper stormwater controls and maintenance of the cover would prevent release of the contaminated soils back into the environment. A 100-year maintenance period is used for onsite capping alternative cost estimating and comparison purposes. Additional maintenance costs beyond 100 years will depend on inspection results and updates to the long-term surveillance plan.

Compliance with ARARs – Alternative 2 would meet federal, state, and Navajo Nation ARARs for the Quivira Mines. Common ARARs for Alternative 2 are found in Table 6.

Short-Term Effectiveness – The primary considerations for short-term effectiveness are protection of the community, workers, and environment during and shortly after implementation. Alternative 2 involves excavating, loading haul trucks, and hauling waste between CR-1, CR-1E, the Kerr-McGee Ponds, and an onsite repository; consolidation and capping of waste; importing backfill soil; and restoring the lease areas.

- **Protection of the Community during Removal Action** – Under Alternative 2, a preselected USEPA contractor would perform the removal action. Most construction work will be at CR-1, CR-1E, and the Kerr-McGee Ponds and at the selected repository location. Impacts to the community are expected to be limited because waste would

remain local, limiting hauling through the community. Construction will create noise and some dust. Dust control measures, such as water spraying, would be used during excavation, repository construction, waste compaction, and capping of the waste. However, some dust generation is unavoidable. Air monitors would be placed around the construction zone at the site and repositories to measure potential risks to the community. Trucks hauling equipment and supplies would also add noise. However, the trucks would be routed east of the Quivira Mines to Pipeline Canyon Road and then onto temporary access road to CR-1 to the east of the residences on Red Water Pond Road.

This alternative disturbs a large amount of waste because of excavation and consolidation, requires hauling a portion of soils on roads shared by nearby communities, and has up to a 4-year duration. Haul trucks hauling the waste between lease areas would be covered if they pass through the community. Truck traffic would be coordinated under a transportation plan for routes, times of operation, and onsite traffic rules. Attempts would be made to minimize trucking across Navajo Nation roadways. Emergency spill containment and cleanup contingencies would be included in the transportation plan to address material spills. Alternative 2 is estimated to require 691,290 miles of hauling over 4 years, which would result in a 22.4 percent increase in (or 0.23 additional) traffic accidents and 1.04 percent increase in (or 0.01 additional) traffic fatalities (Appendix D, Table D-2).

- **Protection of Workers** – All removal actions would be performed by a USEPA-contracted construction company prequalified to remediate uranium mine waste. Onsite workers would require standard 40-hour Occupational Safety and Health Administration (OSHA) hazardous materials training and radiation awareness training and would be adequately protected by using appropriate personal protective equipment and following safe work practices and standards. Radiation exposure monitoring would be required. Short-term impacts to air quality in the surrounding environment may occur during excavation and loading of waste for offsite transport. Dust suppression and monitoring would be required to reduce worker exposure to or inhalation of radionuclides in particulates. Decontamination of workers and equipment would be required before exiting the site.

  Under Alternative 2, heavy equipment would be used to clear and grub, excavate, transfer, load, and transport waste to the onsite repository; consolidate waste and construction a cap on the onsite repository; and reclaim the site by grading the footprints of the removal areas, applying growth media, and applying native seed and soil amendments for local vegetation establishment. Potential exposure and protection procedures for workers engaged in these activities would be addressed in a site safety and health plan. During excavation and material handling activities, measures would be taken to reduce fugitive dust emissions and associated impacts to workers. Water would be imported for dust control, and workers in the controlled area would use appropriate safety equipment and implement safety practices such as air monitoring. Work areas would be secured (for example, marked or fenced) for access by authorized personnel only.

  Short-term risks of physical injury would exist for site workers during construction, primarily related to operating equipment during access road construction, waste excavation, site restoration, and repository construction. All workers would be required to wear personal dosimeters to ensure that exposure does not exceed OSHA limits.

- **Environmental Impacts** – Even with control measures, short-term environmental impacts could occur from excavation and placement of waste in an onsite repository. These environmental impacts may include sedimentation of local drainages, residual track-in and track-out effects of soil and mud, noise, disturbed vegetation, and dust generation. Other environmental impacts include fuel burning and releasing of emissions that would lead to climate impacts. The threat to the environment is low because the waste rock hauling would be a short distance and consolidation and capping would occur within 4 years in comparison to hauling off site over a 4.5- to 18-year time frame (Alternatives 3 and 4). In addition, revegetation would expedite the return of native flora once cleanup actions are complete. However, revegetation may not occur immediately. The short-term threat posed by exposure to uranium and radionuclides would be minimal.
- **Environmental Metrics Analysis** – A qualitative evaluation of all environmental metrics was conducted. The results are presented in Appendix D, Table D-1. Alternative 2 has an overall moderate greenness score of 28 out of 48 (where a higher number is good). Fuel consumption and greenhouse gas emissions were also quantitatively evaluated for Alternative 2, where onsite hauling, material import, and water import is estimated to consume 120,290 gallons of fuel and generate 1,200 metric tons of greenhouse gas (CO_2e) emissions over 697,680 miles travelled (Appendix D, Table D-2).
- **Time Until Removal Action Objectives Are Achieved** – The time period to implement Alternative 2 is estimated to be 4 years following 1-2 years of design, bidding, planning, and permitting. Construction may be extended depending on schedule-limiting factors such as monsoon rains and snowfall.

Long-Term Effectiveness and Permanence – Alternative 2 is effective over the long term. The cover for Alternative 2 would be an engineered ET cap. Landfills and mines in the southwestern U.S. are routinely closed on site with ET caps and a maintenance plan. The Navajo Nation Abandoned Mine Lands Reclamation Department (NAMLRD) has a demonstration repository in the Tse Tah area, and Tetra Tech (2021) has prepared a white paper that provides additional support for the use of ET caps. Cover maintenance is a well-established practice. Since contaminated soils would remain on the site, potential exposure reductions to those accessing the site would be dependent on the maintenance of the cover. Drainage features and stormwater controls would be included in the design so that surface water would be diverted from the capped areas and aid in prolonging the integrity of the cover. Alternative 2 is expected to effectively mitigate the long-term effects on potential human and ecological receptors for as long as the cover and permanent fencing and signage are maintained. A gate would be installed to provide access for periodic rotational grazing on the cap. An engineered ET cap would meet the RAOs and ARARs and be protective of human health and the environment for at least 200 years.

Reduction of Toxicity, Mobility, or Volume through Treatment– Alternative 2 employs no treatment, so no reductions in toxicity, mobility, or volume through active treatment would occur.

4.3.6.2 Implementability

Technical Feasibility and Availability of Services and Materials– Alternative 2 would use conventional techniques, materials, and labor for the excavation and associated activities. The Quivira Mines are readily accessible. Excavation would be scheduled and performed to maximize direct loading and promote worker and public safety. Engineering controls for fugitive dust and site monitoring would be used to minimize exposure of sensitive receptors to radioisotopes.

Alternative 2 consists mainly of simple earthwork and material hauling and repository cap construction. Construction and environmental monitoring equipment and services are all readily available. Labor would be available both on the Navajo Nation and in the regional market. Access to approximately 24 million gallons of water for dust suppression, waste compaction, and cover and backfill compaction is necessary, which would be obtained through construction of an onsite water well or trucked in from the Gallup municipal supply. Sources of borrow material are enough to meet the needs for fill, topsoil, and gravel for capping options under all potential cap designs and for restoration after excavation. Some specialized labor for adit and shaft closure after excavation may be required depending on if these features are discovered during construction and their condition.

Alternative 2 would be completed as a single phase, and no future removal actions are anticipated. Maintenance of the repository cap would be required for up to a 100-year period and reevaluated thereafter. The expertise and equipment needed for long-term monitoring and maintenance of the repository cap, erosional features and controls, and revegetation are available. Run-on water control berms and drainage ditches at the repository would be repaired as necessary. Permanent range fencing and warning signs around the repository would also be checked and repaired or replaced as necessary.

Administrative Feasibility – Alternative 2 is administratively implementable and would require coordination between USEPA, NNEPA, UNC, NAMLRD, the Navajo Nation Department of Water Resources (NNDWR), the Navajo Nation Minerals Department (NNMD), and the Coyote Canyon, Pinedale, and Standing Rock Chapters to address federal and Navajo ARARs. The contaminated soils would be transported within CR-1 for consolidation and from the Kerr-McGee Ponds and CR-1E to CR-1. Construction of an engineered cover at an onsite repository would not require permitting because of the Bevill Amendment exemption and the contaminated soils are considered LLRW and not RCRA hazardous waste. In addition, permits are not required for onsite CERCLA actions. Onsite CERCLA actions must comply with the substantive requirements of any Navajo local permit but not with the administrative requirements. Community and stakeholder engagement may be significant because the waste would remain on the Navajo Nation. Negotiations with the Navajo Nation or other landowners with potential offsite soil borrow sources would need to be conducted and agreements crafted.

4.3.6.3 Costs

The total cost is estimated to be $61.6 million or $62 per bank cubic yard for Alternative 2 (Appendix E, Table E-1 through Table E-2). This cost assumes that maintenance of the ET cap would be required in perpetuity but, for cost estimating purposes, was assumed to include cap

inspections, erosion repairs, and revegetation for 30 years and cap inspections for up to 100 years. USEPA would be responsible for the long-term maintenance of the repository. Restoration maintenance at the Quivira Mines would consist of 10 years of erosion repairs and inspections and up to 30 years of vegetation surveys and maintenance of revegetation efforts. A breakdown of the major cost categories associated with implementing Alternative 2 is presented in Exhibit 16.

Exhibit 16. Alternative 2 Cost Breakdown

Cost Component	Alternative 2
Estimated Excavated Surface Area (Acres)	62.9
Estimated Excavated Volume (Bank Cubic Yards)	1,005,500
Estimated Excavated Volume (Loose Cubic Yards)	1,256,875
Direct Capital Costs	
Field Overhead and Oversight	$6,608,000
General Site Work	$156,000
Earthwork	$19,326,000
Transportation and Consolidation	$19,756,000
Subtotal Direct Capital Costs	$45,847,000
Indirect Capital Costs	$6,274,000
Subtotal Capital Costs	$52,121,000
Capital Cost Contingency (15%)	$7,758,150
Total Capital Costs	$59,879,000
Maintenance Costs	
Present Worth of 10, 30, and 100 Years of Maintenance (Depending on Activity) at a Discount Rate of 7%	$1,377,000
Contingency Allowance (25%)	$344,300
Total Present Worth Maintenance Cost	$1,721,000
Total Cost	**$61,600,000**

4.3.7 Alternative 3: Dispose of All Mine Waste Off Site at Red Rocks Disposal Facility

Alternative 3 assumes that contaminated soils with concentrations above the action levels would be excavated and transported 44 miles to the Red Rocks state-permitted disposal facility in McKinley County, New Mexico. The 44-mile recommended haul route for the waste is assumed to be Pipeline Canyon Road to Highway 566 to Interstate 40 and then Interstate 40 from Church Rock to Thoreau and the facility (Figure 37). An estimated 76,180 truckloads of waste (96 truckloads per day) would be transported to the Red Rocks disposal facility using on-highway haul trucks holding 16.5 cubic yards (25 tons) of waste. Waste would be transported on the recommended haul route: south on State Highway 566 to Interstate 40, exiting Interstate 40 at Thoreau, and north on State Highway 371 to the Red Rocks disposal facility. Further discussion of the evaluation of haul routes is provided in Section 4.1.2 and Tetra Tech (2024). Exhibit 17 presents the processing and transportation costs for the Red Rocks disposal facility. The facility is currently a RCRA D landfill and is not licensed to accept uranium mine waste. However, the facility has additional adjacent land where a State of New Mexico permit for a new facility that can accept uranium mine waste for permanent disposal is planned. The

State of New Mexico is not opposed to the facility development and has provided guidance on how such a facility would be permitted. USACE (2022) evaluated the operations of the facility in a Stennett analysis and determined that, under the operating conditions assumed, the facility would be safe for workers.

Exhibit 17. Red Rocks Transportation and Tipping Costs

Receiving Facility	Processing and Transportation Costs
Red Rocks Disposal Facility	$95.40 per loose cubic yard*

Note:
* Exact costs have not been obtained for the Red Rocks disposal facility yet. This placeholder cost is for the Red Rocks disposal facility and will be updated with information from the facility when available.

4.3.7.1 Effectiveness

Overall Protection of Public Health and the Environment – Alternative 3 would protect human health and the environment as the contaminated soils exceeding the action level at the Quivira Mines would be excavated for offsite transportation and disposal at the Red Rocks disposal facility, a permitted facility designed to manage radioactive waste. This alternative would significantly minimize potential long-term exposure to contaminated soils from the Quivira Mines. Potential short-term exposures during excavation, transport, and at the final disposal site would be managed through engineering controls.

From a contaminant exposure perspective, Alternative 3 is protective of human health and the environment. However, highway fatality calculations indicate shipping soils to the Red Rocks disposal facility for disposal would result in an increase of a highway traffic accidents. This is discussed further in the evaluation of short-term effectiveness.

Compliance with ARARs – Alternative 3 would meet federal, state, and Navajo Nation ARARs for the Quivira Mines. Common ARARs across Alternatives 2 through 4 are found in Table 6.

Short-Term Effectiveness – Under Alternative 3 all waste would be excavated, loaded into haul trucks, transported, and disposed of off site at the Red Rocks disposal facility. The short-term impacts to the community, workers, and environment under Alternative 3 are as described below.

- **Protection of the Community during Removal Action** – Under this alternative, a preselected USEPA contractor would perform the removal action. Most construction work will be at CR-1, CR-1E, and the Kerr-McGee Ponds. Impacts to the community would include noise and some dust. Dust control measures, such as water spraying, would be used during waste excavation and loading for offsite transport. However, some dust generation is unavoidable. Air monitors would be placed around the construction zone to measure potential risks to the community. Trucks hauling equipment and supplies would also add noise. Traffic will be routed around the communities to the maximum extent possible but construction traffic will mix with community traffic on Pipeline Canyon Road, State Road 566, I-40, and through Thoreau to the facility. However, the trucks would be routed east of the Quivira Mines to Pipeline Canyon Road and then onto the State Road 566 to avoid the residences on Red Water Pond Road. This alternative

also leaves the waste in place for the 3 to 5 years of state permitting, design, and facility construction.

This alternative excavates all of the waste, requires hauling all of the waste through communities and on highways, and has the second longest overall duration (4.5 years). Bulk carriers hauling the containerized wastes off site would be covered, secured, and weighed to document compliance with total and axle load limits. Truck traffic would be coordinated under a transportation plan for routes, times of operation, and onsite traffic rules. Emergency spill containment and cleanup contingencies would also be included in the transportation plan. Alternative 3 is estimated to require 7.1 million miles of hauling over approximately 4.5 years (depending on fleet size), resulting in a 229 percent increase in (or 2.3 additional) traffic accidents and an 10.7 percent increase in (or 0.11 additional) traffic fatalities (Appendix D, Table D-2).

- **Protection of Workers during Removal Action** – All removal actions would be performed by an EPA-contracted construction company pre-qualified to remediate uranium mine waste. Onsite workers would require standard 40-hour OSHA hazardous materials training and radiation awareness training and would be adequately protected by using appropriate personal protective equipment and following safe work practices and standards. Radiation exposure monitoring would be required. Short-term impacts to air quality in the surrounding environment may occur during excavation and loading of waste for offsite transport. Dust suppression and monitoring would be required to ensure that workers are not exposed to or inhale radionuclides in particulates. Decontamination of workers and equipment would be required before exiting the site.

  Under Alternative 3, heavy equipment would be used to clear and grub, excavate, transfer, load, and transport waste to a facility, as well as reclaim the site by grading the footprints of the removal areas, applying growth media, and applying native seed and soil amendments for local vegetation establishment. Potential exposure and protection procedures for workers engaged in these activities would be addressed in a site safety and health plan. During excavation and material handling activities, measures would be taken to reduce fugitive dust emissions and associated impacts to workers. Water would be imported for dust control, and workers in the controlled area would use appropriate safety equipment and implement safety practices such as air monitoring. Work areas would be secured (for example, marked or fenced) to ensure access by authorized personnel only.

  Short-term risks of physical injury would exist for site workers during construction, primarily related to operating equipment during access road construction, waste excavation, site restoration, and repository construction. All workers would be required to wear personal dosimeters to ensure that exposure does not exceed OSHA limits.

- **Environmental Impacts** – Even with control measures, short-term environmental impacts could occur from excavation, hauling, and placement of waste in an offsite repository. These environmental impacts may include residual track-in and track-out effects of soil and mud, noise, disturbed vegetation, and dust generation. Other environmental impacts include additional fuel burning and releasing of emissions that would lead to increased climate impacts. However, the threat to the environment is moderate because the waste rock could be hauled off site over a 5-year time frame in comparison to a 17- to 18-year time frame for Alternative 4. In addition, revegetation

would expedite the return of native flora once cleanup actions are complete. However, revegetation may not occur immediately. The short-term threat posed by exposure to uranium and radionuclides would be minimal.

- **Environmental Metrics Analysis** – A qualitative evaluation of all environmental metrics was conducted. The results are presented in Appendix D, Table D-1. Alternative 3 has an overall moderate greenness score of 21 out of 48 (where a higher number is good). Fuel consumption and greenhouse gas emissions were also quantitatively evaluated for Alternative 3, where offsite hauling, fill material import, and water import is estimated to consume 1,226,462 gallons of fuel and generate 12,600 metric tons of greenhouse gas (CO_2e) emissions over 7.1 million miles travelled (Appendix D, Table D-2).
- **Time until Removal Action Objectives Are Achieved –** Excavation, hauling off-Navajo Nation, and disposal of waste at the Red Rocks disposal facility would meet preliminary RAOs in the short term. The construction time required to achieve RAOs for Alternative 3 would be approximately 4.5 years. Construction may be extended depending on schedule-limiting factors such as truck availability, monsoon rains, and snowfall.

Long-Term Effectiveness and Permanence – Since all contaminated soils would be excavated and removed from the site, potential exposure reductions to receptors accessing the site would be permanent. Long-term maintenance is low under this alternative because it focuses on native vegetation re-establishment only and does not require repository maintenance. Alternative 3 is expected to effectively mitigate the long-term effects on potential onsite human and ecological receptors.

Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 3 employs no treatment, so no reductions in toxicity, mobility, or volume through active treatment would occur.

Managing waste at landfills reduces the overall mobility of bulk waste but does not treat the waste. Alternative 3 does not reduce contaminant toxicity, mobility, or volume through treatment. Under Alternative 3, waste would be disposed of at the Red Rocks disposal facility near Gallup, New Mexico, which is or would be permitted for uranium mine waste disposal.

4.3.7.2 Implementability

Technical Feasibility and Availability of Services and Materials – Alternative 3 is technically feasible and would use conventional techniques, materials, and labor for the excavation and associated activities. The Quivira Mines is readily accessible. Excavation would be scheduled and performed to maximize direct loading and ensure worker and public safety. Engineering controls for fugitive dust and site monitoring would be used to control potential exposures to sensitive receptors. Profiling and manifesting of the material would be done in coordination with the transporters and the offsite disposal facility. Some specialized labor for adit and shaft closure after excavation may be required depending on if these features are discovered during construction and what their condition is.

Alternative 3 consists mainly of simple earthwork and material hauling. Construction and environmental monitoring equipment and services are all readily available. Labor would be available both on the Navajo Nation and in the regional market. Access to approximately 27 million gallons of water for dust suppression and compaction of backfill is necessary, which would be obtained through construction of an onsite water well or trucked in from the Gallup municipal supply. Sources of borrow material near the site are adequate to meet the needs for fill and topsoil for restoration after excavation.

Alternative 3 would be completed as a single phase, and no future removal actions are anticipated. Maintenance of site restoration erosional controls and revegetation efforts would be required. Run-on water control berms, drainage ditches, and sediment detention basins would be repaired, as necessary. Temporary range fencing would also be checked and repaired, as necessary.

The Red Rocks disposal facility does not currently have an operating permit. Because all waste would be disposed of off site, reliance on the ability to obtain an operating permit and future disposal capacity of the Red Rocks disposal facility brings some uncertainty to the availability of services at the time of the removal action. However, the State has indicated how the facility could be permitted and estimates a time frame for permitting of 1 to 2 years. However, an overall 3- to 5-year time frame is estimated for permitting and facility design.

Administrative Feasibility – Alternative 3 is administratively implementable and would require coordination between USEPA, NNEPA, UNC, NAMLRD, NNDWR, NNMD, and the Coyote Canyon, Pinedale, and Standing Rock Chapters to address federal and Navajo ARARs, but federal permits for onsite actions under CERCLA are not required. This alternative would also require the Red Rocks disposal facility to successfully obtain a groundwater discharge permit from the State of New Mexico and develop the transportation, operation, and closure plans. Finally, negotiations with the Navajo Nation or other landowners with potential offsite soil borrow sources would need to be conducted and agreements crafted.

Alternative 3 is administratively feasible. It would require State of New Mexico to issue a groundwater discharge permit to facilitate uranium mine waste disposal at the facility. The permitting options were identified by the State, and they estimated the permit process, which includes a public comment period, would take 1 to 2 years. However, an overall 3- to 5-year time frame is estimated for permitting and facility design.

4.3.7.3 Costs

The total cost for Alternative 3 is estimated to be $182.5 million or $182 per bank cubic yard (Appendix E, Table E-3 and Table E-4). This cost assumes the Red Rocks disposal facility would be responsible for the long-term maintenance of the wastes it receives. Restoration maintenance at the Quivira Mines would consist of 10 years of erosion repairs and inspections and 30 years of vegetation surveys and maintenance of revegetation efforts. A breakdown of the major cost categories associated with implementing Alternative 3 for the Quivira Mines is presented in Exhibit 18.

Exhibit 18. Alternative 3 Cost Breakdown

Cost Component	Alternative 3
Estimated Excavated Surface Area (Acres)	62.9
Estimated Excavated Volume (Bank Cubic Yards)	1,005,500
Estimated Excavated Volume (Loose Cubic Yards)	1,256,875
Direct Capital Costs	
Field Overhead and Oversight	$7,552,000
General Site Work	$156,000
Earthwork	$14,626,000
Transportation and Disposal	$126,180,000
Subtotal Direct Capital Costs	$148,515,000
Indirect Capital Costs	$8,965,000
Subtotal Capital Costs	$157,480,000
Capital Cost Contingency (15%)	$23,622,000
Total Capital Costs	$181,102,000
Maintenance Costs	
Present Worth of 10 and 30 Years of Maintenance (Depending on Activity) at a Discount Rate of 7%	$1,148,000
Contingency Allowance (25%)	$287,000
Total Present Worth Maintenance Cost	$1,435,000
Total Cost	**$182,537,000**

4.3.8 Alternative 4: Dispose of All Mine Waste Off Site at a Resource Conservation and Recovery Act C or Low-Level Radioactive Waste Facility

Alternative 4 assumes that contaminated soils with concentrations above the action levels would be excavated and disposed of at a RCRA C and State of Colorado radiological licensed facility, such as the Clean Harbors facility in Deer Trail, Colorado, or an NRC-licensed LLRW facility, such as the WCS in Andrews, Texas. Disposal at the WCS LLRW facility in Andrews, Texas, may be considered where Ra-226 concentration in waste or contaminated soil exceeds 222 pCi/g, or the annual acceptance limit at the Clean Harbors facility is reached. An estimated 76,180 truckloads of waste (25 truckloads per day) would be transported to the Clean Harbors or WCS facilities using on-highway haul trucks holding 16.5 cubic yards (25 tons) of waste. Waste would be transported on the recommended haul route: south on State Highway 566 to Interstate 40, east to Interstate 25, north on Interstate 25, northeast on State Highway 24, and north on State Highway 71 to Deer Trail. Further discussion of the evaluation of haul routes is provided in Section 4.1.2 and Tetra Tech (2024).

Exhibit 19 presents the processing and transportation costs for the Clean Harbors and WCS facilities. The Deer Trail facility currently has the appropriate permitting, licensing, bonding, and CERCLA Off-Site Rule approvals. For the purposes of the detailed and comparative analysis of this alternative, all mine waste will be disposed of at the Deer Trail facility because of lower transportation and tipping costs. A change to the disposal facility, such as the WCS facility in Andrews, Texas, could be selected in the action memorandum, if necessary, to address volume

and concentration limits at the Deer Trail facility. The 625-mile recommended haul route for the waste to the Deer Trail facility is assumed to be Pipeline Canyon Road to Highway 566 to Interstate 40 to Interstate 25 to Highway 24 to Highway 71 and the Deer Trail facility (Figure 39) while the recommended 501-mile haul route to the WCS facility is assumed to be Pipeline Canyon Road to Highway 566 to Interstate 40 to Highway 285 to Highway 62 to Highway 176 and the WCS facility (Figure 40).

Exhibit 19. Disposal Facility Transportation and Tipping Costs

Receiving Facility	Transportation and Tipping Costs
Clean Harbors RCRA C Deer Trail facility	$285 per loose cubic yard
Waste Control Specialist LLRW facility	$375 per loose cubic yard

Notes:
LLRW Low-level radioactive waste
RCRA Resource Conservation and Recovery Act

4.3.8.1 Effectiveness

Overall Protection of Public Health and the Environment – Alternative 4 would protect human health and the environment as the contaminated soils exceeding the action level at the Quivira Mines would be excavated and removed for offsite transportation and disposal at a permitted and licensed facility designed to manage radioactive waste. This alternative would significantly minimize potential long-term exposure to contaminated soils from the Quivira Mines. Potential short-term exposures during excavation, transport, and disposal would be managed through engineering controls.

From a contaminant exposure perspective, Alternative 4 is protective of human health and the environment. However, highway fatality calculations indicate shipping soils to Deer Trail for disposal would result in a large increase in highway traffic accidents and fatalities. This is discussed further in the evaluation of short-term effectiveness.

Compliance with ARARs – Alternative 4 would meet federal, state, and Navajo Nation ARARs for the Quivira Mines. Common ARARs across Alternatives 2 through 4 are found in Table 6.

Short-Term Effectiveness – Under Alternative 4 all waste would be excavated, loaded into haul trucks, transported, and disposed of off site. The short-term impacts to the community, workers, and environment under Alternative 4 are as described below.

- **Protection of the Community during Removal Action** – Under this alternative, a preselected USEPA contractor would perform the removal action. Most construction work will be at CR-1, CR-1E, and the Kerr-McGee Ponds. Impacts to the community would include noise and some dust. This is expected to be more disturbance than either Alternative 2 or 3 because of the significantly longer duration (17 to 18 years) of this action. Dust control measures, such as water spraying, would be used during waste excavation and loading for offsite transport. However, some dust generation is unavoidable. Air monitors would be placed around the construction zone to measure potential risks to the community. Trucks hauling equipment and supplies would also add noise. Traffic will be routed around the communities to the maximum extent possible but

for 17 to 18 years construction traffic will mix with community traffic on Pipeline Canyon Road, State Road 566, and the interstate highways taken to the facility. However, the trucks would be routed east of the Quivira Mines to Pipeline Canyon Road and then onto the State Road 566 to avoid the residences on Red Water Pond Road.

This alternative excavates all of the waste, requires hauling all of the waste through communities and on highways, and has the longest overall duration because of the hauling distance. Bulk carriers hauling the containerized wastes off site would be covered, secured, and weighed to document compliance with total and axle load limits. Truck traffic would be coordinated under a transportation plan for routes, times of operation, and onsite traffic rules. Emergency spill containment and cleanup contingencies would also be included in the transportation plan. Alternative 4 is estimated to require 97 million miles of hauling over 17 to 18 years (depending on fleet size), resulting in a 3,120 percent increase in (or 31.2 additional) traffic accidents and a 146 percent increase in (or 1.46 additional) traffic fatalities (Appendix D, Table D-2).

- **Protection of Workers during Removal Action** – All removal actions would be performed by an EPA-contracted construction company pre-qualified to remediate LLRW. Onsite workers would require standard 40-hour OSHA hazardous materials training and radiation awareness training and would be adequately protected by using appropriate personal protective equipment and following safe work practices and standards. Radiation exposure monitoring would be required. Short-term impacts to air quality in the surrounding environment may occur during excavation and loading of waste for offsite transport. Dust suppression and monitoring would be required to ensure that workers are not exposed to or inhale radionuclides in particulates. Decontamination of workers and equipment would be required before exiting the site.

  Under Alternative 4, heavy equipment would be used to clear and grub, excavate, transfer, load, and transport waste to a facility, as well as reclaim the site by grading the footprints of the removal areas, applying growth media, and applying native seed and soil amendments for local vegetation establishment. Potential exposure and protection procedures for workers engaged in these activities would be addressed in a site safety and health plan. During excavation and material handling activities, measures would be taken to reduce fugitive dust emissions and associated impacts to workers. Water would be imported for dust control, and workers in the controlled area would use appropriate safety equipment and implement safety practices such as air monitoring. Work areas would be secured (for example, marked or fenced) to ensure access by authorized personnel only.

  Short-term risks of physical injury would exist for site workers during construction, primarily related to operating equipment during access road construction, waste excavation, site restoration, and repository construction. All workers would be required to wear personal dosimeters to ensure that exposure does not exceed OSHA limits.

- **Environmental Impacts** – Even with control measures, short-term environmental impacts could occur from excavation, hauling, and placement of waste in an offsite repository. These environmental impacts may include residual track-in and track-out effects of soil and mud, noise, disturbed vegetation, and dust generation. Other environmental impacts include a very high rate of fuel burning and releasing of emissions from long distance hauling that would lead to very large climate impacts. The threat to

the environment is very high because the waste rock would take 4 times as long to haul off site to Deer Trail, Colorado (17 to 18 years) than it would take to haul to Red Rocks disposal facility (4.5 years) under Alternative 3. In addition, revegetation would expedite the return of native flora once cleanup actions are complete. However, revegetation may not occur immediately. The short-term threat posed by exposure to uranium and radionuclides would be minimal.

- **Environmental Metrics Analysis** – A qualitative evaluation of all environmental metrics was conducted. The results are presented in Appendix D, Table D-1. Alternative 4 has an overall low greenness score of 11 out of 48 (where a higher number is good). Fuel consumption and greenhouse gas emissions were also quantitatively evaluated for Alternative 4, where offsite hauling and material import is estimated to consume 16.7 million gallons of fuel and generate 172,100 metric tons of greenhouse gas (CO_2e) emissions over 97 million miles travelled (Appendix D, Table D-2).
- **Time until Removal Action Objectives Are Achieved** – Excavation, hauling off-Navajo Nation, and disposal of waste at the Deer Trail disposal facility would meet preliminary RAOs in the short term. The construction time required to achieve RAOs for Alternative 4 would be approximately 17 to 18 years based on the 625-mile distance to the disposal facility, the 3-day turnaround time between the site and the disposal facility, and likely limited availability of trucks for transportation. If additional haul trucks can be dedicated to the project (more than 25 trucks a day), then the project duration can be decreased up to the maximum number of trucks that can be loaded per day. Construction may be extended depending on schedule-limiting factors such as truck availability, monsoon rains, and snowfall.

Long-Term Effectiveness and Permanence –Since all contaminated soils would be excavated and removed from the site, potential exposure reductions to receptors accessing the site would be permanent. Long-term maintenance is low under this alternative because it focuses on native vegetation re-establishment only and does not require repository maintenance. Alternative 4 is expected to effectively mitigate the long-term effects on potential onsite human and ecological receptors.

Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 4 employs no treatment, so no reductions in toxicity, mobility, or volume through active treatment would occur.

Managing waste at landfills reduces the overall mobility of bulk waste but does not treat the waste. Alternative 4 does not reduce contaminant toxicity, mobility, or volume through treatment. Under Alternative 4, waste would be disposed of at RCRA C facility in Deer Trail, Colorado, which is licensed to accept uranium mine waste.

4.3.8.2 Implementability

Technical Feasibility and Availability of Services and Materials – Alternative 4 is technically feasible because it would use conventional techniques, materials, and labor for the excavation and associated activities. The Quivira Mines is readily accessible. Excavation would be scheduled and performed to maximize direct loading and ensure worker and public safety.

Engineering controls for fugitive dust and site monitoring would be used to control potential exposures to sensitive receptors. Profiling and manifesting of the material would be done in coordination with the transporters and the offsite landfill. Some specialized labor for adit and shaft closure after excavation may be required depending on if these features are discovered during construction and what their condition is.

Alternative 4 consists mainly of simple earthwork and material hauling. Construction and environmental monitoring equipment and services are all readily available. Labor would be available both on the Navajo Nation and in the regional market. Access to approximately 99 million gallons of water for dust suppression and backfill compaction is necessary, which would be obtained through construction of an onsite water well or trucked in from the Gallup municipal water supply. Sources of borrow material near the site are adequate to meet the needs for fill and topsoil for restoration after excavation.

Alternative 4 would be completed as a single phase, and no future removal actions are anticipated. Maintenance of site restoration erosional controls and revegetation efforts would be required. Run-on water control berms, drainage ditches, and sediment detention basins would be repaired, as necessary. Temporary range fencing would also be checked and repaired, as necessary.

The disposal of waste at the Deer Trail hazardous waste landfill has a haul distance of 625 miles, resulting in a 3-day turnaround time for haul trucks and construction over a 17- to 18-year period, at least 4 times as long as Alternative 3. The Deer Trail facility is currently in compliance with their operating permits and with the CERCLA Off-Site Rule. Because all waste would be disposed of off site, reliance on the disposal capacity of the Deer Trail facility brings uncertainty to the availability of services at the time of and throughout the 17- to 18-year duration of the removal action. A change to the disposal facility could be selected in the action memorandum if necessary.

Administrative Feasibility – Alternative 4 is administratively implementable and would require coordination between USEPA, NNEPA, UNC, NAMLRD, NNDWR, NNMD, and the Coyote Canyon, Pinedale, and Standing Rock Chapters to address federal and Navajo ARARs, but federal permits for onsite actions under CERCLA are not required. Finally, negotiations with the Navajo Nation or other landowners with potential offsite soil borrow sources would need to be conducted and agreements crafted.

Alternative 4 is administratively feasible since shipping of waste (ore for reprocessing) is fairly common and would only require scheduling and obtaining the necessary permits. All contaminated soil is anticipated to be accepted by licensed facilities. Offsite disposal of materials from a CERCLA site must comply with the CERCLA Off-Site Rule. The facility identified to dispose of the waste has approval under the Off-Site Rule and would need to maintain such approval.

4.3.8.3 Costs

The total cost for Alternative 4 is estimated to be $563 million or $560 per bank cubic yard (Appendix E, Table E-5 and Table E-6). This cost assumes the Clean Harbors RCRA C Deer Trail facility would be responsible for the long-term maintenance of the wastes it receives. Restoration maintenance at the Quivira Mines would consist of 10 years of erosion repairs and inspections and 30 years of vegetation surveys and maintenance of revegetation efforts. A breakdown of the major cost categories associated with implementing Alternative 4 is presented in Exhibit 20.

Exhibit 20. Alternative 4 Cost Breakdown

Cost Component	Alternative 4
Estimated Excavated Surface Area (Acres)	62.9
Estimated Excavated Volume (Bank Cubic Yards)	1,005,500
Estimated Excavated Volume (Loose Cubic Yards)	1,256,875
Direct Capital Costs	
Field Overhead and Oversight	$22,320,000
General Site Work	$156,000
Earthwork	$24,137,000
Transportation and Disposal	$382,304,300
Subtotal Direct Capital Costs	$428,917,000
Indirect Capital Costs	$59,389,000
Subtotal Capital Costs	$488,306,000
Capital Cost Contingency (15%)	$73,245,900
Total Capital Costs	$561,552,000
Maintenance Costs	
Present Worth of 10 and 30 Years of Maintenance (Depending on Activity) at a Discount Rate of 7%	$1,148,000
Contingency Allowance (25%)	$287,000
Total Present Worth Maintenance Cost	$1,435,000
Total Cost	**$562,987,000**

5.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section presents the approach for the comparative analysis of alternatives and a summary of the analysis. The comparative analysis includes the evaluation of the relative effectiveness, implementability, and cost between alternatives. The comparative analysis ranks the three criteria for each alternative qualitatively as very poor, poor, average, good, or very good.

5.1 COMPARATIVE ANALYSIS APPROACH

The final step of this EE/CA is to conduct a comparative analysis of the removal action alternatives. This analysis evaluates each alternative's strengths and weaknesses relative to the other alternatives with respect to the three criteria and in achieving RAOs. An explanation of the evaluation and ranking criteria is presented in Section 4.3.

5.2 SUMMARY OF COMPARATIVE ANALYSIS

All alternatives except for Alternative 1 meet the threshold criterion of being protective of public health and the environment. Exhibit 21 presents a comparative rating of alternatives.

Exhibit 21. Comparative Rating of Alternatives

Alternative		Attainment of Threshold Criteria[a]	Effectiveness	Implementability	Cost Rating (Million)[b]
1	No Action	Fail	Short-Term: Average Long-Term: Very Poor	Tech: Very Good Admin: Very Good	Very Good ($0)
2	Consolidate and Cap All Waste On Site	Pass	Short-Term: Average Long-Term: Good	Tech: Good Admin: Good	Good ($61.6)
3	Dispose of All Mine Waste Off Site at Red Rocks Disposal Facility	Pass	Short-Term: Average Long-Term: Very Good	Tech: Very Good Admin: Average	Poor ($182.5)
4	Dispose of All Mine Waste Off Site at a RCRA C or LLRW Facility	Pass	Short-Term: Very Poor Long-Term: Very Good	Tech: Very Good Admin: Good	Very Poor ($563)

Notes:
[a] Threshold criteria are (a) overall protection and (b) compliance with applicable or relevant and appropriate requirements.
[b] Estimated costs are net present value.
Admin Administrative feasibility
LLRW Low-level radioactive waste
RCRA Resource Conservation and Recovery Act
Tech Technical feasibility

5.2.1 Effectiveness

Effectiveness comprises two threshold criteria (protection and compliance with ARARs) and includes short- and long-term effectiveness and permanence of the remedy.

5.2.1.1 Protection of Human Health and the Environment

All alternatives except for Alternative 1 are protective of public health and the environment.

5.2.1.2 Compliance with ARARs

All action alternatives would be performed in compliance with federal and Navajo ARARs identified in Table 6.

5.2.1.3 Short-Term Effectiveness (during Removal Action)

Short-term effectiveness comprises four criteria: protection of the community and workers during the removal action, environmental impacts, and time to meet RAOs. Overall short-term effectiveness is rated **Average** for Alternative 1, **Average** for Alternative 2, **Average** for Alternative 3, and **Very Poor** for Alternative 4.

Protection of the Community during Removal Action

The Alternative 2 haul route between lease areas is away from the community, would be in use over a shorter duration (4 years), and is rated **Good**. Water would be used for dust suppression on roads and speed would be limited to reduce dust generation and to minimize potential for accidents. This alternative creates the least traffic and dust impacts to the community as truck traffic would only be increased on the Pipeline Canyon Road to transport waste and construction materials for onsite repository construction. No excavated waste would be hauled through the community on Red Water Pond Road or on State Road 566. Lower haul miles through the community would also result in fewer traffic accidents.

The Alternatives 3 and 4 haul routes from the lease areas are via temporary access roads to Pipeline Canyon Road and then via State Road 566 towards Gallup, would be in use over moderate (4.5 years) to very long (17 to 18 years) durations, would have the highest impact on traffic, truck and dust emissions, and would have the moderate to very high likelihood of on-highway traffic accidents and fatalities. Further discussion of the evaluation of haul routes is provided in Section 4.1.2 and Tetra Tech (2024). Water would be used for dust suppression on roads, loads would be covered, and speed would be limited to reduce dust generation and to minimize potential for accidents. Therefore, Alternatives 3 and 4 are rated **Average** and **Very Poor** because of the respective moderate to very long project durations and moderate to very long round-trip distances to the disposal facilities. Extended project durations increase the amount of water required for dust suppression. In addition, Alternative 3 leaves the waste in place for 3 to 5 years before the Red Rocks disposal facility is permitted, designed, and constructed, so the potential for exposure to mine waste exists for that duration. Because of the very long time frame to move the waste, Alternative 4 would leave the waste in place onsite for a longer time frame than Alternatives 2 and 3.

Estimated accidents and fatalities resulting from on- and offsite trucking of waste, import of fill, and import of water are presented in Exhibit 22. Onsite disposal is safest from a traffic perspective, followed by Alternative 3, and then Alternative 4. Alternative 4 has a very high probability of a traffic fatality.

Alternative 1 is rated **Very Good** as no removal activities would be conducted to impact the community.

Exhibit 22. Potential Community and Worker Impacts

Removal Alternatives	Water Import (million gallon)	Truckloads and Miles Traveled[a]	Project Duration	Accident Risk	Fatality Risk
Alternative 1: No Action	0	0	0	0	0
Alternative 2: Consolidate and Cap All Waste On Site	23.7	85,423 (0.69 million)	4 years	Low (22.4% or 0.23 accident)	Low (1.1% or << 1 fatality)
Alternative 3: Disposal of All Mine Waste Off Site at Red Rocks Disposal Facility	26.7	101,182 (7.1million)	4.5 years	Moderate (229% or 2.3 accidents)	Low (10.7% or << 1 fatality)
Alternative 4: Disposal of All Mine Waste Off Site at a RCRA C or LLRW Facility	98.8	119,206 (97 million)	17 to 18 years	Very High (3,120% or 31.2 accidents)	Very High (146% or 1.5 fatalities

Notes:
[a] Truckloads and mileage includes mine waste, backfill, and water truckloads.
LLRW Low-level radioactive waste
RCRA Resource Conservation and Recovery Act

Protection of Workers during Removal Action

Worker protection primarily involves radiation exposure, dust inhalation hazards, physical injury, and traffic accidents. The contractors that will perform the actions are pre-qualified by EPA to perform work with low-level radioactive wastes at CERCLA sites, so they are expected to have the training and experience to mitigate risks associated with the action. All action alternatives involve the same degree of excavation work; therefore, all action alternatives have equal amounts of potential radiation exposure, potential dust inhalation hazards, and potential for injury to workers. However, Alternatives 2 and 3 involve construction of a repository, which introduces an additional level of threat to workers because of additional handling activities and duration of exposure during consolidation and capping. A Stennett analysis has been completed for Alternative 3, which shows that the operation of the disposal facility is safe for facility workers under the parameters of the analysis (USACE 2022). However, the risk associated with repository construction are greatly exceeded by risk associated with hauling waste off site.

The rate of traffic accidents and fatalities is proportional to the amount of hauling for that alternative. For the action alternatives, the total haul distance on all roadways for Alternative 2 is 3 miles (maximum distance from CR-1), Alternative 3 is 44 miles (disposal at the Red Rocks disposal facility), and Alternative 4 is 625 miles (disposal at the Clean Harbors Deer Trail facility). Traffic risks associated with each alternative are addressed above in Exhibit 22.

Even though Alternative 2 poses an additional hazard associated with additional handling and exposure to waste during consolidation and capping, the long-haul distances for off-Navajo

Nation disposal pose the greatest accident threat to truck drivers. Therefore, Alternative 3 was rated **Average** because of a medium haul distance of 44 miles, and Alternative 4 was rated **Very Poor** because of a long-haul distance of 625 miles. Alternative 2 is rated **Good** based on the small footprints and short haul distances. Alternative 1 is rated **Very Good** as no removal activities would be conducted to impact workers.

Environmental Impacts

All of the action alternatives will involve excavation of waste and substantial site disturbance. Shorter construction durations under Alternative 2 minimize the potential for construction-related environmental impacts to occur in the during road construction, waste excavation, and site restoration that would require mitigation, and shorter haul distances minimize impacts that would occur both between the lease areas and on public roads. These impacts may include residual track-in and track-out effects of soil and mud, noise, nuisance, soil spills during waste hauling, sedimentation of local drainages, and harmful emissions. Alternative 3 would cause additional impacts because of the longer 4.5-year project duration while Alternative 4 impacts would require 17 to 18 years to complete. These additional impacts are primarily related to hauling distances and duration.

Water pumping or import would also have an impact, depending on source, import distance, and volume required for dust control and waste compaction. The nearest potential water source is approximately 20 miles away in Gallup, and the sustainable productivity of a new construction well is unknown. Onsite consolidation and capping under Alternative 2 would use less water than offsite hauling because of the shorter project duration (4 years) compared to 4.5-year and 17- to 18-year project durations for Alternatives 3 and 4. Finally, onsite consolidation and capping would result in less noise and activity disturbance of sensitive biological species because of the overall shorter project duration.

Environmental Metrics Analysis

A qualitative evaluation of environmental metrics for each action alternative was conducted for the EE/CA. The metrics do not include post-removal site maintenance activities. The results are presented in Appendix D, Table D-1. Exhibit 23 presents the environmental impacts of the alternatives, including water use, greenhouse gas metrics, and a qualitative greenness score for each alternative.

Exhibit 23. Environmental Impacts of Alternatives

Removal Alternatives	Water Import (million gallon)	Estimated Diesel Use (gallon)	All Truckloads and Miles Traveled[a]	Greenhouse Gas Emissions (metric ton CO_2e)	Greenness Score[b]
Alternative 1: No Action	Low (0)	Low (0)	Low (0)	Low (0)	Very Good (48/48)
Alternative 2: Consolidate and Cap All Waste On Site	Moderate (23.7)	Low (0.12 million)	Low 85,423 (0.69 million)	Low (1,200)	Good (28/48)

Exhibit 23. Environmental Impacts of Alternatives (Continued)

Removal Alternatives	Water Import (million gallon)	Estimated Diesel Use (gallon)	All Truckloads and Miles Traveled[a]	Greenhouse Gas Emissions (metric ton CO_2e)	Greenness Score[b]
Alternative 3: Disposal of All Mine Waste Off Site at Red Rocks Disposal Facility	Moderate (26.7)	Moderate (1.22 million)	Moderate 101,182 (7.1million)	Moderate (12,500)	Average (21/48)
Alternative 4: Disposal of All Mine Waste Off Site at a RCRA C or LLRW Facility	Very High (98.8)	Very High (16.6 million)	Very High 119,206 (97 million)	Very High (170,900)	Very Poor (11/48)

Notes:
[a] Truckloads and mileage includes mine waste, backfill, and water truckloads.
[b] The higher the greenness score, the less impact on the environment. See Appendix D, Table D-1.
CO_2e Carbon dioxide equivalent
LLRW Low-level radioactive waste
RCRA Resource Conservation and Recovery Act

Alternative 2 is rated **Good** because of the least amount of water used for compaction and dust control, least amount of species disturbance because of the shortest project durations, shorter haul distances that require less energy, and smaller greenhouse gas footprint than offsite hauling under Alternatives 3 and 4. However, Alternative 2 could limit future land uses because of the need to protect repository caps. Alternatives 3 and 4 are rated **Average** and **Very Poor** because of the increased water use for dust control and species disturbance over moderate to very long project durations and moderate and to very large energy requirements and greenhouse gases produced by the truckloads of waste hauled off site to local and regional disposal facilities and water imported for dust control. Alternative 1 is rated **Very Good** as no action would occur.

Time until Removal Action Objectives Are Achieved

A summary of the construction completion time for each alternative is presented in Exhibit 24. All action alternatives (aside from Alternative 1: No Action) could be completed between 4 and 18 years. Alternatives 2 and 3 are similar, but Alternative 4 time to completion is very long and is limited by the number of trucks and a 3-day turnaround time for the haul trucks.

Exhibit 24. Construction Completion Time for Alternatives

Alternative	Construction Completion Time
Alternative 1: No Action	0 year
Alternative 2: Consolidate and Cap All Waste On Site	4 years
Alternative 3: Disposal of All Mine Waste Off Site at Red Rocks Disposal Facility	4.5 years
Alternative 4: Disposal of All Mine Waste Off Site at a RCRA C or LLRW Facility	17 to 18 years

Notes:
LLRW Low-level radioactive waste RCRA Resource Conservation and Recovery Act

5.2.1.4 Long-Term Effectiveness and Permanence (after Removal Action)

For all action alternatives, waste removal or containment from source areas would reduce the magnitude of residual risk to background levels for radionuclides. Noncancer hazards would be removed, and the risk to ecological receptors would be reduced to levels below known effects concentrations and background levels. None of the alternatives reduce the toxicity, mobility, or volume through treatment.

Alternatives 3 and 4 are rated **Very Good** as sources of risk at the site would be removed and waste disposed of off the Navajo Nation. The cap and liner at the disposal facilities would eliminate exposure pathways. Alternatives 3 and 4 would also allow for unrestricted future use of the entire site. Removing waste from the Navajo Nation eliminates the long-term surveillance requirements associated with a repository under Alternative 2. The receiving facilities would be responsible for the long-term maintenance of the waste under Alternatives 3 and 4.

Alternative 2 would consolidate all waste in a repository. Permanence of risk reduction would rely on the repository design standards (at least 200 years) to minimize long-term maintenance, but long-term surveillance of the repository by USEPA would still be required. Alternative 2 is rated **Good**. Although the onsite repositories are expected to be protective in both the short and long term, the ET cap will require long-term maintenance and monitoring. Replacement of repository components would not be required because their lifespan is indefinite, especially under a monitoring and maintenance regime.

Alternative 1 is rated **Very Poor** because no removal action would be performed. Human health risk may be partially reduced through increased awareness of risks, but no reduction in risk to the ecosystem would occur. Uncontrolled and untreated waste would remain and continue to be accessible by humans and animals and subject to potential migration to uncontaminated or less contaminated areas.

5.2.2 Implementability

Implementability comprises two criteria: (1) technical feasibility and availability of services and materials, and (2) administrative feasibility.

5.2.2.1 Technical Feasibility and Availability of Services and Materials

Action alternatives consist mainly of simple earthwork and material hauling. The alternatives are technically feasible with labor available through the local and regional market and equipment and materials located 1.5 to 2 hours away.

The action alternatives would be completed as a single phase, and no future remedial actions are anticipated. Short-term monitoring of site restoration features will occur under all action alternatives while long-term monitoring and maintenance, particularly inspection and repair of erosional features and controls and revegetation, would be required for Alternative 2 onsite repository. Experienced contractors, construction equipment, and materials are available within the region.

Among the action alternatives, Alternatives 3 and 4 are the most technically feasible to implement as all waste is removed from the Quivira Mines to offsite disposal facilities. Design methods, construction practices, and engineering requirements are well documented and understood. However, the reliance on the disposal capacity of contracted services brings uncertainty to the availability of off-Navajo Nation disposal capacity. Therefore, Alternatives 3 and 4 are rated **Very Good**.

Alternative 2 is technically feasible as waste is consolidated in an onsite repository. Design methods, construction practices, and engineering requirements are well documented and understood. Because all waste under Alternative 2 would be disposed of on site, no reliance on the treatment, storage, or disposal capacity of contracted services would be required. Therefore, Alternative 2 is rated **Good**.

Alternative 1 is rated **Very Good** as it is readily implementable and no construction is involved. Alternative 1 would not impact the ability to conduct removal or remedial actions in the future. No services or materials would be needed because no removal action would be performed.

5.2.2.2 Administrative Feasibility

Administratively, Alternative 3 is rated **Average** because it will require a groundwater discharge permit from the State of New Mexico, which is supportive of the Red Rocks disposal facility. Alternative 4 is rated **Good** as it requires the least amount of design, permitting, and approvals from and coordination with USEPA, NNEPA, UNC, NAMLRD, NNDWR, NNMD, and the Coyote Canyon, Pinedale, and Standing Rock Chapters as no onsite repository would be involved. Post-remedy inspections, reviews, and land use controls would be limited in comparison to onsite repository construction. However, limitations and delays on waste acceptance at off-Navajo Nation facilities are possible because of the volume of waste or disposal facility permit limitations.

Alternative 2 is rated **Good** as less design, permitting, approvals, and coordination with USEPA, NNEPA, UNC, NAMLRD, NNDWR, NNMD, and the Coyote Canyon, Pinedale, and Standing Rock Chapters is required for an onsite repository in comparison to Alternative 3 with an offsite repository.

Alternative 1 is rated **Very Good** as taking no action is feasible.

5.2.2.3 Tribal, Supporting Agency, and Community Acceptance

USEPA and NNEPA believe that Alternative 3 (dispose of all mine waste off site at the Red Rocks disposal facility) has the highest likelihood of acceptance by the Navajo Nation, State of New Mexico, and Red Water Pond and Pipeline Canyon communities. Community acceptance may be reduced by a 3- to 5-year delay for permitting, design, and facility construction and a 4.5-year waste hauling period with increased community disruption, noise, and haul truck traffic volume on local highways.

USEPA and NNEPA believe that Alternative 2 (consolidate and cap all waste on site) may not receive acceptance from the Navajo Nation and the local communities because it does not require removal of all wastes from the communities. Alternative 2 is more easily implementable (1 to

2 years of design and 4 years of construction) and will have significantly lower community disruption, noise, and truck traffic impacts because of limited hauling of waste through the community than Alternative 3.

USEPA and NNEPA believe that Alternative 4 (dispose of all mine waste off site at a RCRA C or LLRW facility) might be acceptable to the Navajo Nation and the community because all waste would be removed from the community; however, the longer construction period will cause 17 to 18 years of community disruption, noise, and haul truck traffic because of the large volume of waste, 3-day turnaround time, and long roundtrip distance (up to 625 miles) to the RCRA C or LLRW disposal facility. Navajo Nation, State of New Mexico, and community acceptance will be further addressed through the public comment process.

Alternatives 2 and 3 would provide potential job opportunities during construction and short-term monitoring and maintenance. Alternative 2 would provide additional opportunities during the required long-term inspection and maintenance of the ET cap. Alternatives 3 and 4 would provide additional job opportunities for truck drivers hauling waste to the offsite disposal facilities. No long-term maintenance would occur under Alternatives 3 and 4.

Community input received during informal community meetings and workshops have identified concerns related to moving radioactive materials through the community, traffic, and safety of leaving the waste on site or placing the waste in the Red Rocks disposal facility. The following potential mitigations could address community concerns:

- Dust will be controlled using water during loading and on haul roads. Air monitoring will evaluate dust leaving the site to identify changes required, including applying more water or stopping work on a windy day.
- Before leaving the site, each truck will be inspected to ensure loads are covered, loose material has been cleaned and removed to avoid tracking material off site and scanned for radioactivity to safely pass through communities.
- Strict limits will be set for truck load volume and weight leaving the site to reduce damage to road surfaces.
- Protection will be achieved through a combination of time and distance. For example, the exposure from a truck passing by on a road or highway is lower as exposure time decreases with the truck's speed. Distance also minimizes exposure, where low levels of gamma activity from waste rock decrease rapidly when measuring from even several feet away.
- A traffic control plan will be prepared to control haul routes, haul times, and days and to identify and avoid locations of schools or other sensitive populations.
- An accident contingency plan will be prepared to plan for responding to a haul truck accident. Typically, an accidental spill of waste rock presents a smaller danger compared to an accident involving gasoline, propane, or other chemical. A waste rock spill can be quickly contained and cleaned up with a front end loader and a gamma detector.
- Waste material will be transferred from trucks only at a controlled area at the Red Rocks disposal facility designed for material handling and with dust control and spill response

materials. Waste rock will not be mixed with other municipal waste. Dust will be controlled using water. Air monitoring will evaluate dust leaving the site to identify any changes required, including applying more water or stopping work on a windy day.

- Long-term risk to the community around the Red Rocks disposal facility is low because the disposal cell is isolated from the community, waste rock will be covered daily during operation, will be closed with an engineered cap, and monitoring wells in shallow groundwater will detect any potential releases.

This EE/CA will be available to the public for a 30-day public comment period to give community members an opportunity to review and comment on the documents, especially the recommended alternative proposed in the EE/CA. During the public comment period, a public meeting will be held to present information contained in the EE/CA and to solicit questions and comments from the community. USEPA will coordinate scheduling and provide formal announcement of the public comment period and meeting. This process offers the community and other stakeholders the opportunity to provide input and comment for the USEPA to take into consideration when making decisions about the site cleanup.

5.2.3 Projected Costs

A summary of the cost for each alternative is presented in Exhibit 25. Alternative costs are presented as a rating (comparing each alternative to the others) and as the total estimated cost based on 2023 price evaluations for each alternative.

Exhibit 25. Alternative Costs and Ratings

Alternative	Capital Cost	Onsite Maintenance Present Value 7% Discount Rate	Total Present Value Cost	Cost Rating
Alternative 1: No Action	$0	$0	$0	Very Good
Alternative 2: Consolidate and Cap All Waste On Site	$59.9 million	$1.7million (100 years)	$61.6 million	Good
Alternative 3: Disposal of All Mine Waste Off Site at Red Rocks Disposal Facility	$181.1 million	$1.4 million (30 years)	$182.5 million	Average
Alternative 4: Disposal of All Mine Waste Off Site at a RCRA C or LLRW Facility	$561.6 million	$1.4 million (30 years)	$563 million	Very Poor

Notes:
Higher cost alternatives rate lower in cost ratings, which is consistent with the rating scheme where low equals less desirable.
LLRW Low-level radioactive waste
RCRA Resource Conservation and Recovery Act

Present values, including maintenance costs, for each action alternative using a baseline 30-year project duration for site restoration maintenance and 100-year cap maintenance under CERCLA

for onsite consolidation and capping (Alternative 2) at a 7 percent discount rate specified in USEPA (1993) guidance are summarized in Exhibit 25.

Alternative 1 is the least expensive because no construction and maintenance costs are incurred and is rated **Very Good**. Alternative 2 ($61.6 million) is rated **Good** and is $121 million less than Alternative 3. Alternative 3 is rated **Average** and Alternative 4 is rated **Very Poor** because their respective costs are 3 to 9.1 times higher than Alternative 2, and Alternative 4 costs are 3.1 times more than Alternative 3.

6.0 RECOMMENDED ALTERNATIVE

As required by NCP and described in USEPA (1993) guidance, alternatives were evaluated individually against the following three broad criteria: effectiveness, implementability, and cost (see Section 4.3). Section 5.0 includes a comparative analysis evaluating the strengths and weaknesses of each alternative relative to the other alternatives with respect to the three criteria and in achieving RAOs.

USEPA's recommended alternative for the Quivira Mines is Alternative 3 (dispose of all mine wastes at Red Rocks disposal facility). The primary elements of the recommended alternative are:

- Excavation of an estimated 1,005,500 bank cubic yards or 1,256,875 loose cubic yards of waste from the Quivira Mines to the cleanup goals identified in Exhibit 15.
- Completion of permitting, design, and construction of the Red Rocks disposal facility, which is expected to take 3 to 5 years.
- Transportation of an estimated 1,256,875 loose cubic yards of waste from the Quivira Mines in covered trucks over the 44-mile recommended haul route to the Red Rocks disposal facility over 4.5 years for disposal in a separate facility and disposal cell from the municipal landfill.
- The recommended truck haul route is south on State Highway 566 to Interstate 40, exiting Interstate 40 at Thoreau, and north on State Highway 371 to the Red Rocks disposal facility. Section 4.1.2 and Tetra Tech (2024) provides an evaluation of rail and truck haul routes.
- Site restoration at CR-1, CR-1E, and the Kerr-McGee Ponds by regrading, implementing erosion and stormwater controls, backfilling, amending, and revegetating the areas.
- Preparation of a short-term monitoring and maintenance plan after the remedy is identified in the action memorandum.
- Short-term monitoring and maintenance of the site restoration areas for 30 years.
- Long-term monitoring and maintenance of the Red Rocks disposal facility, which would be the responsibility of the Northwest New Mexico Regional Solid Waste Authority supported by financial assurance bonding.

The largest capital costs for Alternative 3 are excavation, transportation, and disposal of the mine wastes at the Red Rocks disposal facility. A Stennett analysis showed this alternative to be safe for disposal facility workers receiving waste under the parameters of the analysis (USACE 2022). RAOs and cleanup levels for surface soil, air, and radiation would be achieved at the completion of the remedy construction. A 10- to-30-year period of recovery will be needed to achieve site vegetative restoration, depending on precipitation patterns.

The cost estimate for Alternative 3 is included in Exhibit 18 and Appendix E. The total cost for Alternative 3 is estimated to be $182.5 million, which is 3 times higher than Alternative 2 (consolidate and cap all waste on site) and 3.1 times less than Alternative 4 (dispose of all mine waste at a RCRA C or LLRW facility).

All action alternatives are protective. Alternatives 3 and 4 remove waste from the Red Water Pond and Pipeline Canyon communities while the capped waste remains in the community in Alternative 2. Alternative 3 transports the waste 44 miles for disposal compared to 625 miles in Alternative 4. The shorter distance would produce significantly lower diesel exhaust emissions from long-haul transportation and also significantly reduce community disruption from noise and potential traffic accidents and fatalities.

USEPA and NNEPA expect that Alternative 3 will be more acceptable to the Navajo Nation and the local communities than Alternatives 1 and 2 because all waste would be removed from the site, resulting in unrestricted land use once vegetation is reestablished. All alternatives would provide job opportunities to the community during construction, waste hauling and short-term maintenance while Alternatives 2 and 3 would provide long-term inspection and maintenance job opportunities at on- and off-site repositories. Training programs would be used to develop job skills to allow the local community to participate in both short- and long-term construction and maintenance opportunities.

Next Steps

Though USEPA has identified a recommended alternative, USEPA will solicit input from Navajo Nation officials, regulators, chapter representatives, other stakeholders, and community on this final EE/CA and recommended alternative during a public comment period. USEPA and NNEPA will hold a public meeting during the comment period to listen to input. USEPA will select a final removal action alternative after reviewing and considering all information submitted during the public comment period. Comments received at the public meeting and the final removal action alternative will be documented in an action memorandum. USEPA may modify the recommended alternative or select another alternative presented in this EE/CA based on new information or public comments. Therefore, interested parties are encouraged to review and comment on all of the removal action alternatives presented in this EE/CA. USEPA will carefully consider Navajo Nation Fundamental Law and Diné Lifeways in its restoration approach.

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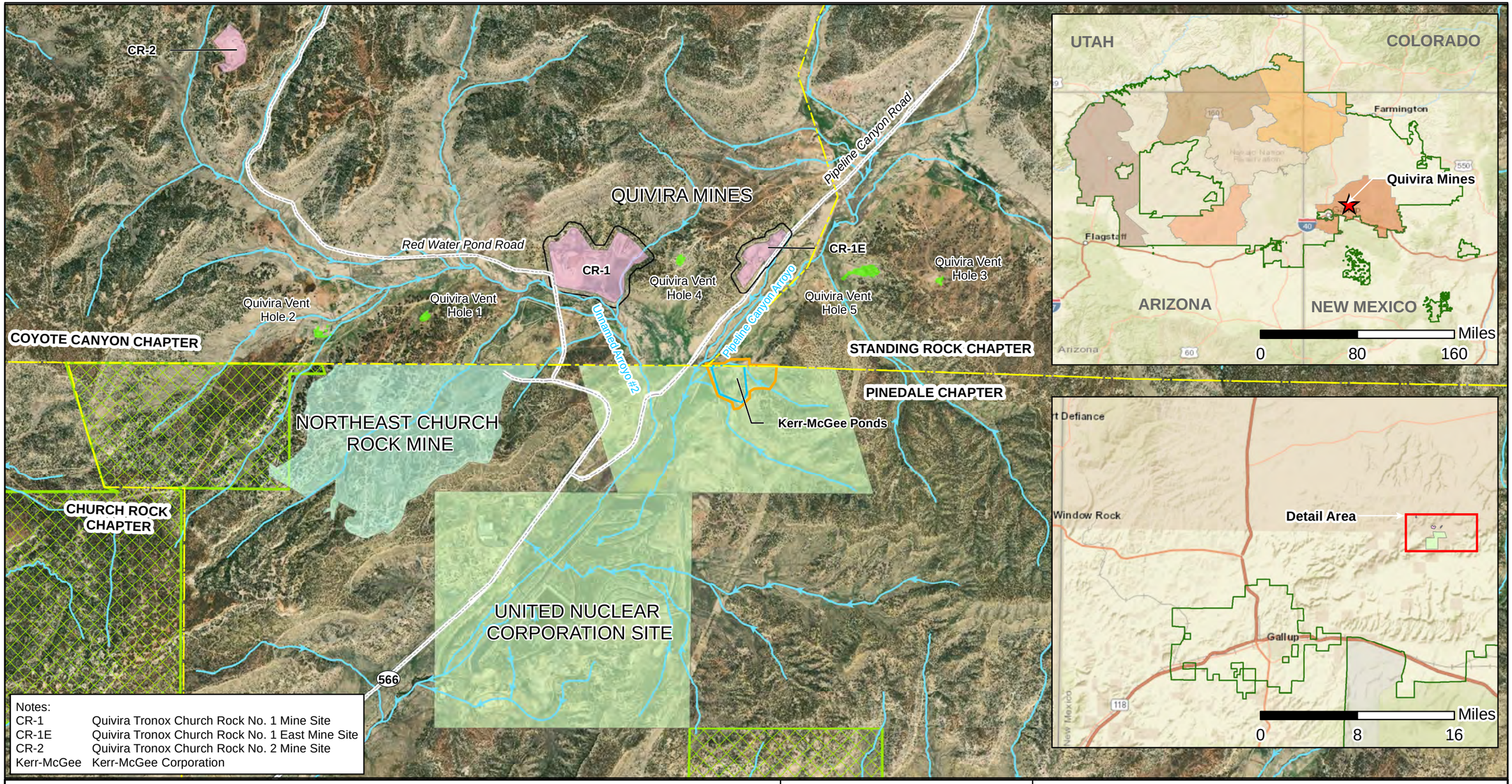
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FIGURES



Notes:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
CR-2	Quivira Tronox Church Rock No. 2 Mine Site
Kerr-McGee	Kerr-McGee Corporation

- Drainage
- Road
- Former Vent Hole Closed by Removal Action
- Kerr-McGee Ponds Investigation Boundary
- Northeast Church Rock Mine Area
- Church Rock Mine Lease Area
- 100-Foot Step-Out Boundary
- Kerr-McGee Ponds Fenceline
- United Nuclear Corporation Site Area (Private Property)
- Bureau of Land Management Property
- Navajo Nation Boundary
- Navajo Nation Chapter Boundary

Navajo Nation Regions

- Central Region
- Eastern Region
- North Central Region
- Northern Region
- Southern Region
- Western Region

N

0 2,000 4,000 Feet

Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH

QUIVIRA MINES LOCATION

Task Order No.: 0001	Contract No.: 68HE0923D0002	Figure No.: 1
Location: QUIVIRA MINES	Date: 3/6/2024	



CR-1 Lease Boundary
CR-1 100-Foot Step-Out Boundary
Waste Rock Pile
Former Industrial Area
Former Building
Former Pond
Sub Area Limit

Existing Water Pipeline Easement
Proposed Water Pipeline Easement
Unnamed Arroyo #2
Road
Adit
Former Pond Outfall

N

0 250 500 Feet

Note:
CR-1 Quivira Tronox Church Rock No. 1 Mine Site

Prepared for: U.S. EPA Region 9

Prepared By:
TETRA TECH

QUIVIRA CR-1 MINE SITE FEATURES

Task Order No.: 0001	Contract No.: 68HE0923D0002	Figure No: 2
Location: QUIVIRA MINES	Date: 07/22/2020	



- CR-1E Lease Boundary
- CR-1E 100-Foot Step-Out Boundary
- CR-1E Former Buildings
- CR-1E Former Pond
- Waste Rock Area
- Former Industrial Area
- Pipeline Canyon Road
- Pipeline Canyon Arroyo
- Communication Line
- Natural Gas Line
- Petroleum Line
- Adit
- Shaft

Note:
CR-1E Quivira Tronox Church Rock No. 1 East Mine Site

1 inch = 150 feet

1:1,800

N W E S

150 75 0 150 Feet

QUIVIRA CR-1E MINE SITE FEATURES

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.:	Contract No.:
0001	68HE0923D0002
Location:	**Date:**
QUIVIRA MINES	3/6/2024

Coordinate System:	Figure No.:
NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	3



Road
Arroyo
Former Pond
Kerr-McGee Ponds Investigation Boundary
Former Stockpile Area
Former Equipment Storage Area
Kerr-McGee Ponds Fenceline
United Nuclear Corporation Site Boundary
Navajo Nation Chapter Boundary

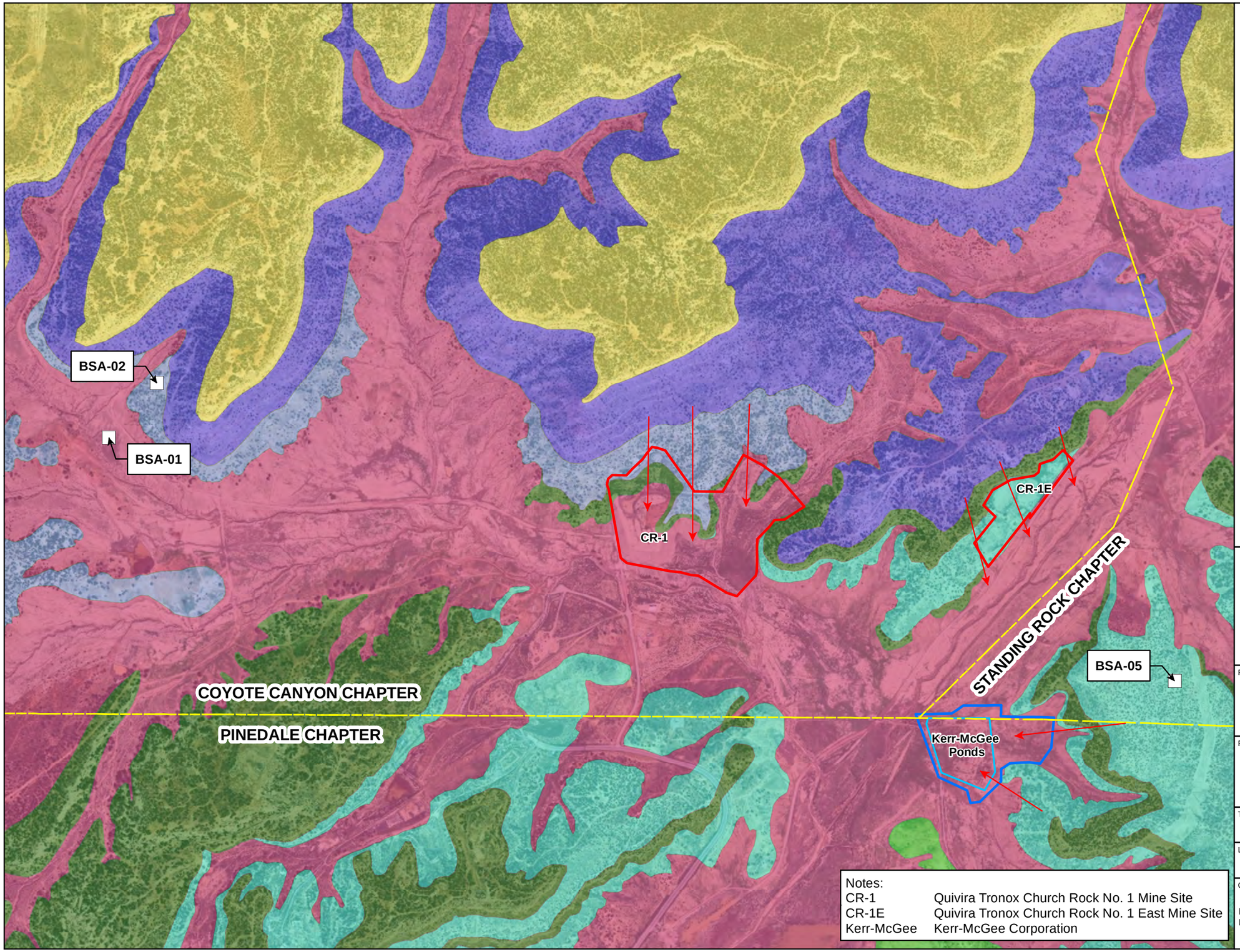
Note:
Kerr-McGee Kerr-McGee Corporation

Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH

KERR-MCGEE PONDS SITE FEATURES

Task Order No.:	Contract No.:	Figure No:
0001	68HE0923D0002	4
Location: QUIVIRA MINES	Date: 3/6/2024	



Background Study Area
Lease Boundary
Kerr-McGee Ponds Investigation Boundary
Kerr-McGee Ponds Fenceline
Navajo Nation Chapter Boundary

Geology

Quaternary Alluvium, Valley Fill Member, Undifferentiated (Qa)
Crevasse Canyon Formation, Bartlett Barren Member (Kcb)
Crevasse Canyon Formation, Dalton Sandstone Member (Kcda)
Crevasse Canyon Formation, Dilco Coal Member (Kcdi)
Crevasse Canyon Formation, Gibson Coal Member (Kcg)
Crevasse Canyon Formation, Mulatto Tongue of Mancos Shale Member (Kcda)
Crevasse Canyon Formation, Point Lookout Member (Kpl)
Erosion from Upslope to Downslope Areas

1 inch = 1,000 feet

1:12,000

N
W E
S

1,000 500 0 1,000 Feet

Notes:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
Kerr-McGee	Kerr-McGee Corporation

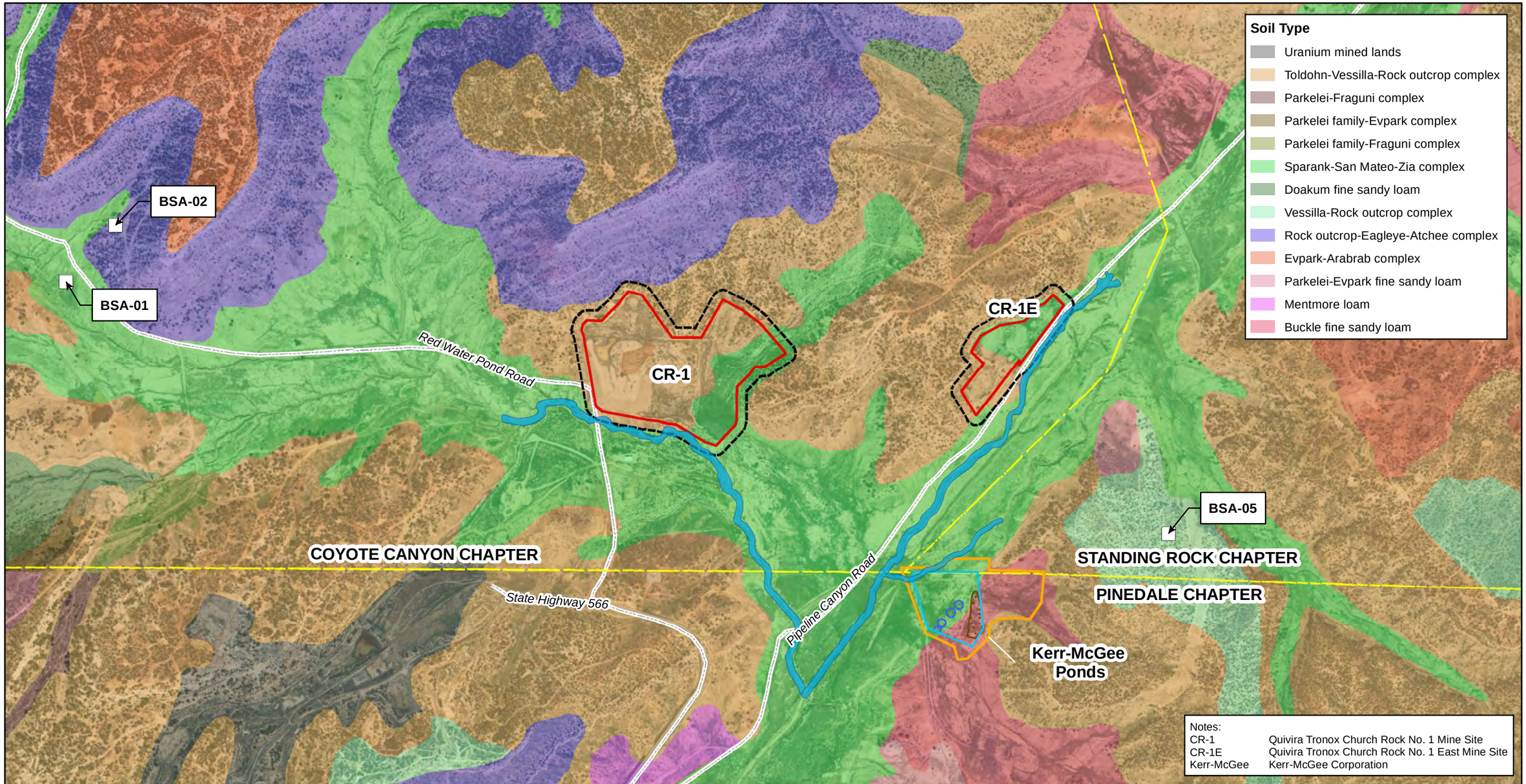
LOCAL GEOLOGY AND BACKGROUND STUDY AREAS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/6/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: 5



Background Study Area
Road
Arroyos
Quivira Lease Boundary
100-Foot Step-Out Boundary
Former Kerr-McGee Pond
Kerr-McGee Ponds Lease Boundary
Former Stockpile Area
Kerr-McGee Ponds Fenceline
Navajo Nation Chapter Boundary

N

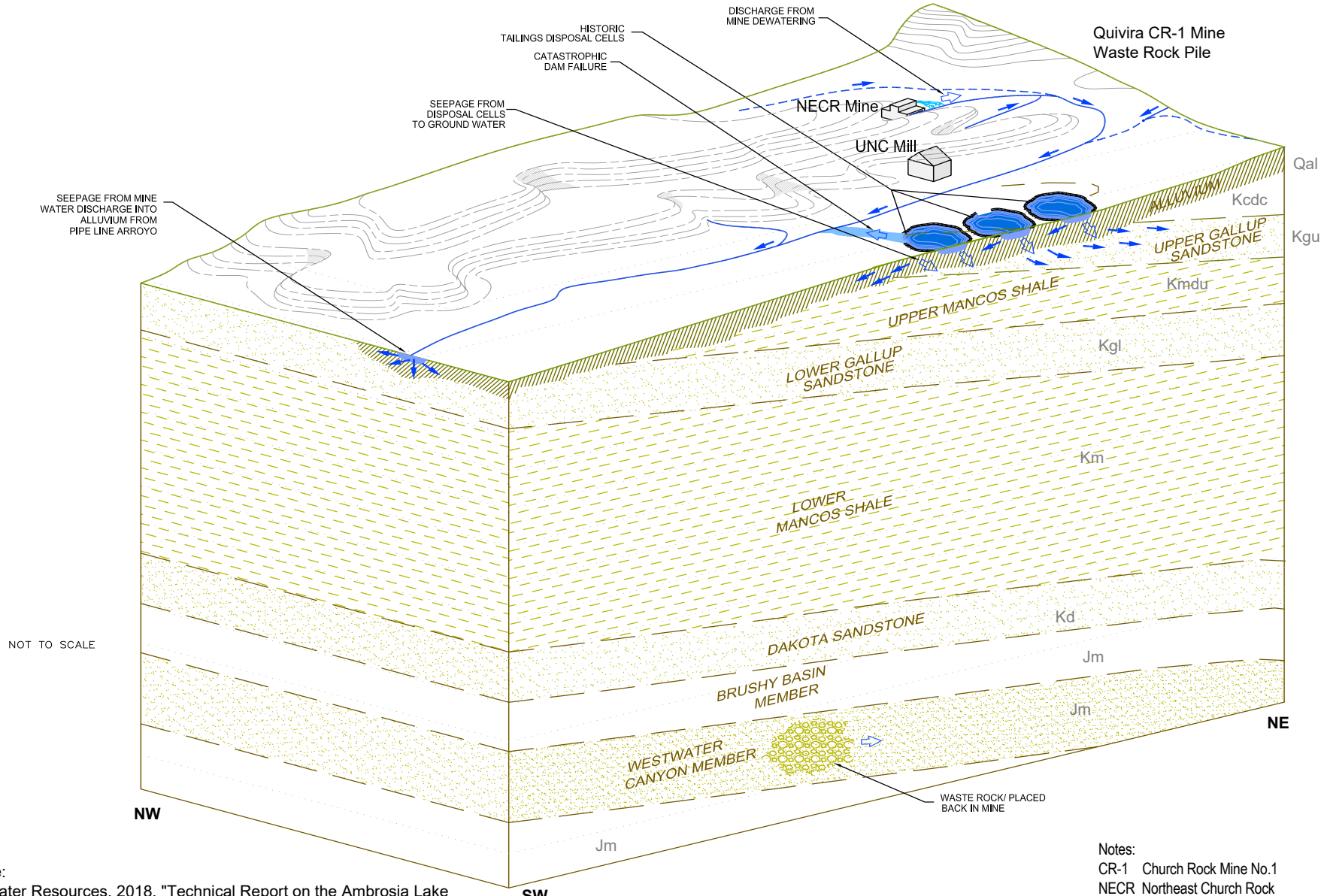
0 1,000 2,000 Feet

Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH

LOCAL SOILS AND BACKGROUND STUDY AREAS

Task Order No.:	Contract No.:	Figure No:
0001	68HE0923D0002	6
Location: QUIVIRA MINES	Date: 09/10/2020	



Source:
Westwater Resources, 2018. "Technical Report on the Ambrosia Lake Uranium Project, McKinley County, New Mexico, USA." March 30.

Notes:
CR-1 Church Rock Mine No.1
NECR Northeast Church Rock
UNC United Nuclear Corporation

Legend

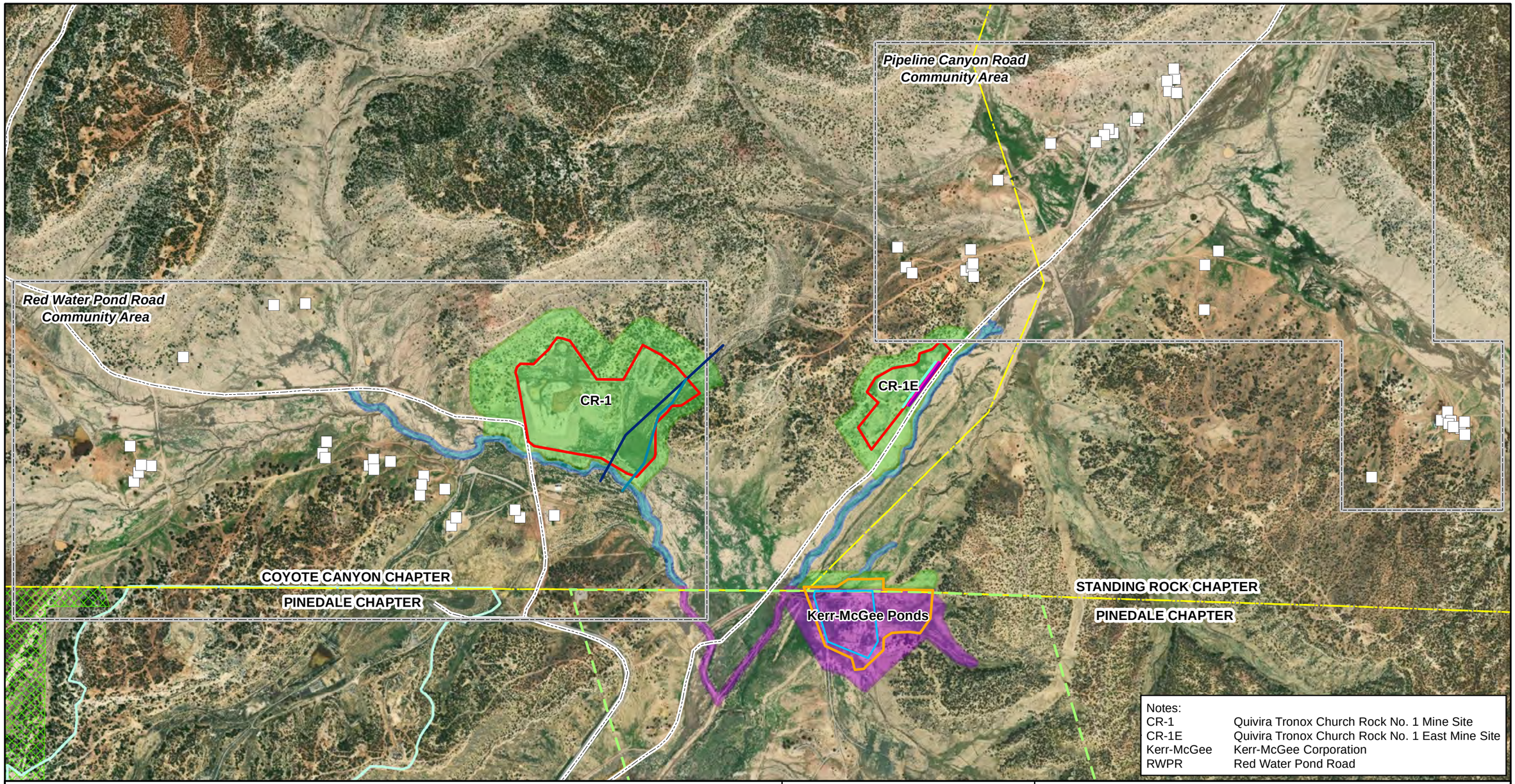
- Mine
- Tributary Alignment
- Ephemeral Stream
- Geologic Contact
- Water Flow Direction
- Historic Release

Prepared for:

Prepared By: TETRA TECH

CONCEPTUAL DRAWING OF HISTORIC RELEASES AND WATER FLOW

Task Order No.:	Contract No.:	Figure No.:
TO 0001	68HE0923D0002	7
Location: NAVAJO NATION	Date: 2/21/24	



Notes:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
Kerr-McGee	Kerr-McGee Corporation
RWPR	Red Water Pond Road

Legend

- Homesites
- Road
- Navajo Nation Chapter Boundary
- Mine Boundary
- Kerr-McGee Pond Fenceline
- Kerr-McGee Ponds Investigation Boundary
- Northeast Church Rock Mine Boundary
- United Nuclear Corporation Site Boundary (Private Property)
- Community Area
- Bureau of Land Management Property
- Existing Water Pipeline Easement
- Proposed Water Pipeline Easement
- Communication Line
- Natural Gas Line
- Petroleum Line

Land Use

- Navajo Residential
- Navajo Difficult Access Open Space
- United Nuclear Corporation Outdoor Worker

N

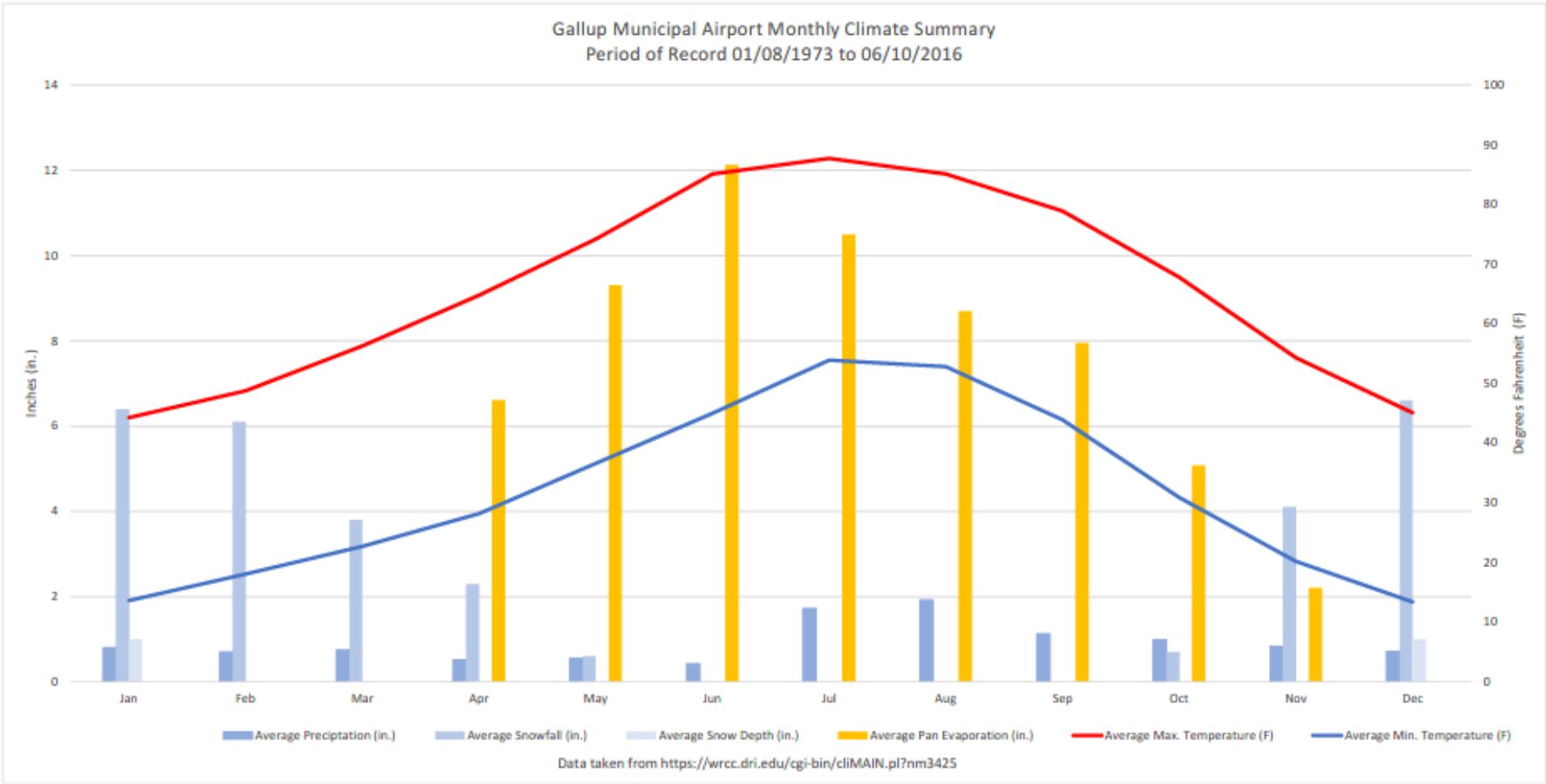
0 1,100 2,200 Feet

Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH

LAND USE DESIGNATIONS

Task Order No.: 0001	Contract No.: 68HE0923D0002	Figure No.: 8
Location: QUIVIRA MINES	Date: 3/4/2024	



Unofficial values based on averages/sums of smoothed daily data. Information is computed from available daily data during the 1973-2016 period. Smoothing, missing data, and observation-time changes may cause these 1973-2016 values to differ from official National Climatic Data Center (NCDC) values. This table is presented for use at locations that don't have official NCDC data. No adjustments were made for missing data or time of observation.

Pan Evaporation data is from Western Regional Climate Center: Comparative Table (dri.edu) – Gallup Ranger Station

Data taken from https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?nm3425 and https://wrcc.dri.edu/Climate/comp_table_show.php?stype=pan_evap_avg

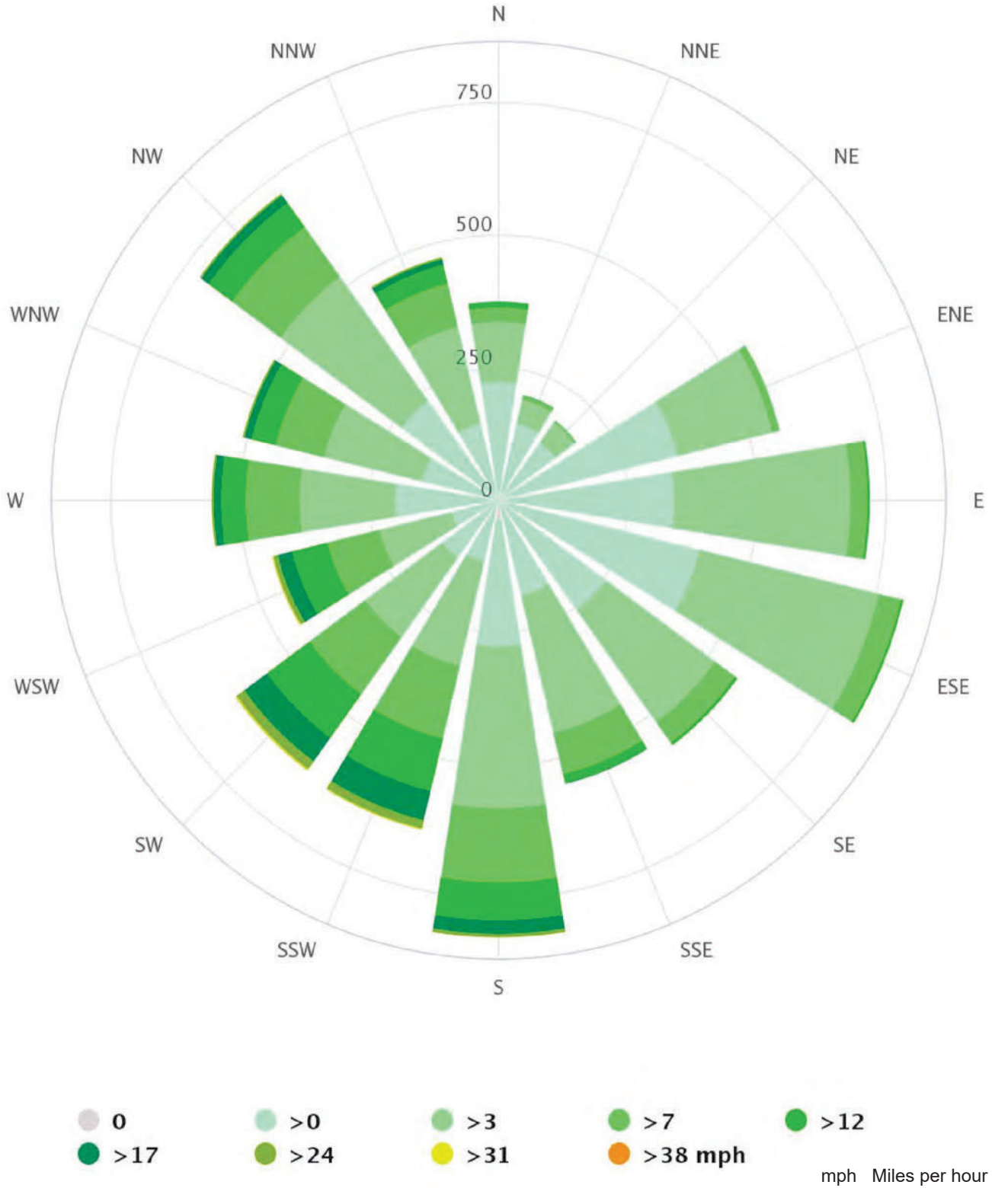
Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH

MONTHLY AVERAGE TEMPERATURE, PRECIPITATION, AND EVAPOTRANSPIRATION

Task Order No.:	Contract No.:	Figure No.:
TO0001	68HE0923D0002	9
Location: QUIVIRA MINES	Date: 02/21/24	

Date Saved: 1/19/2023



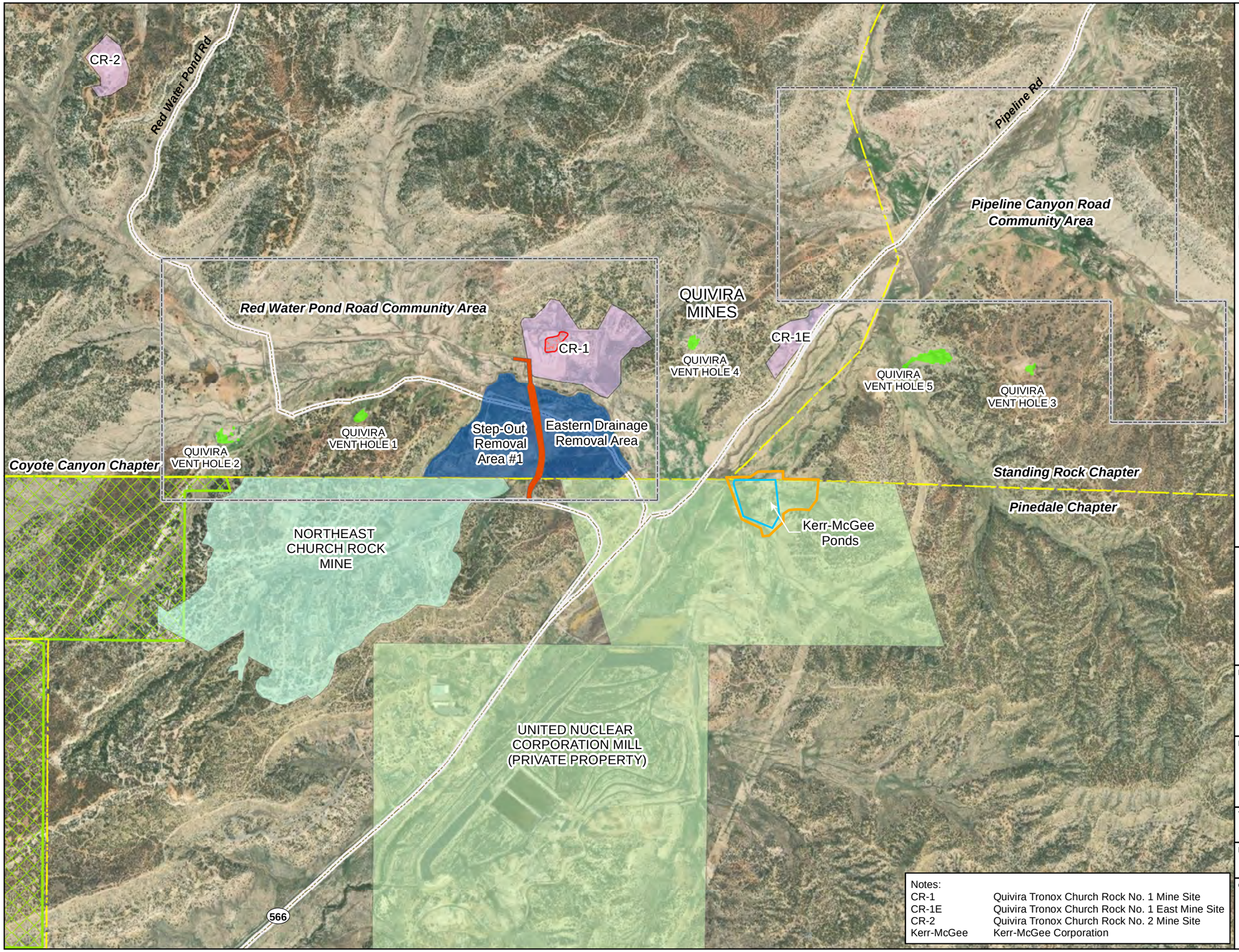
SOURCE: REPRODUCED FROM METEOBLUE CLIMATE DIAGRAMS (https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/gallup_united-states-of-america_5468773)

Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

GALLUP, NEW MEXICO
WIND ROSE DIAGRAM

Task Order No.:	Contract No.:	Figure No.:
TO 0001	68HE0923D0002	10
Location: Quivira Mines	Date: 2/21/24	



- Quivira Mine Lease Boundary
- Northeast Church Rock Mine Boundary
- United Nuclear Corporation Site Area (Private Property)
- Red Water Pond Road Removal Area
- Quivira Vent Hole Removal Area
- Kerr-McGee Ponds Fenceline
- Kerr-McGee Ponds Investigation Boundary
- Northeast Church Rock Removal Area
- Community Area
- Access Route
- Waste from Removal Actions
- Navajo Nation Chapter Boundary
- Bureau of Land Management Property

1 inch = 1,500 feet

1:18,000

N
W E
S

1,500 750 0 1,500 Feet

Notes:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
CR-2	Quivira Tronox Church Rock No. 2 Mine Site
Kerr-McGee	Kerr-McGee Corporation

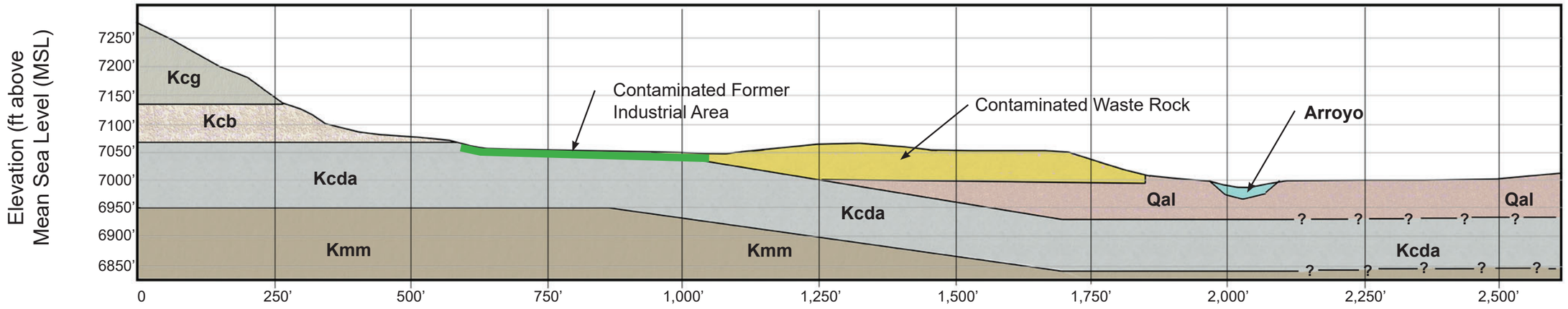
PRIOR REMOVAL ACTION LOCATIONS

Prepared For: U.S. EPA Region 9

Prepared By:

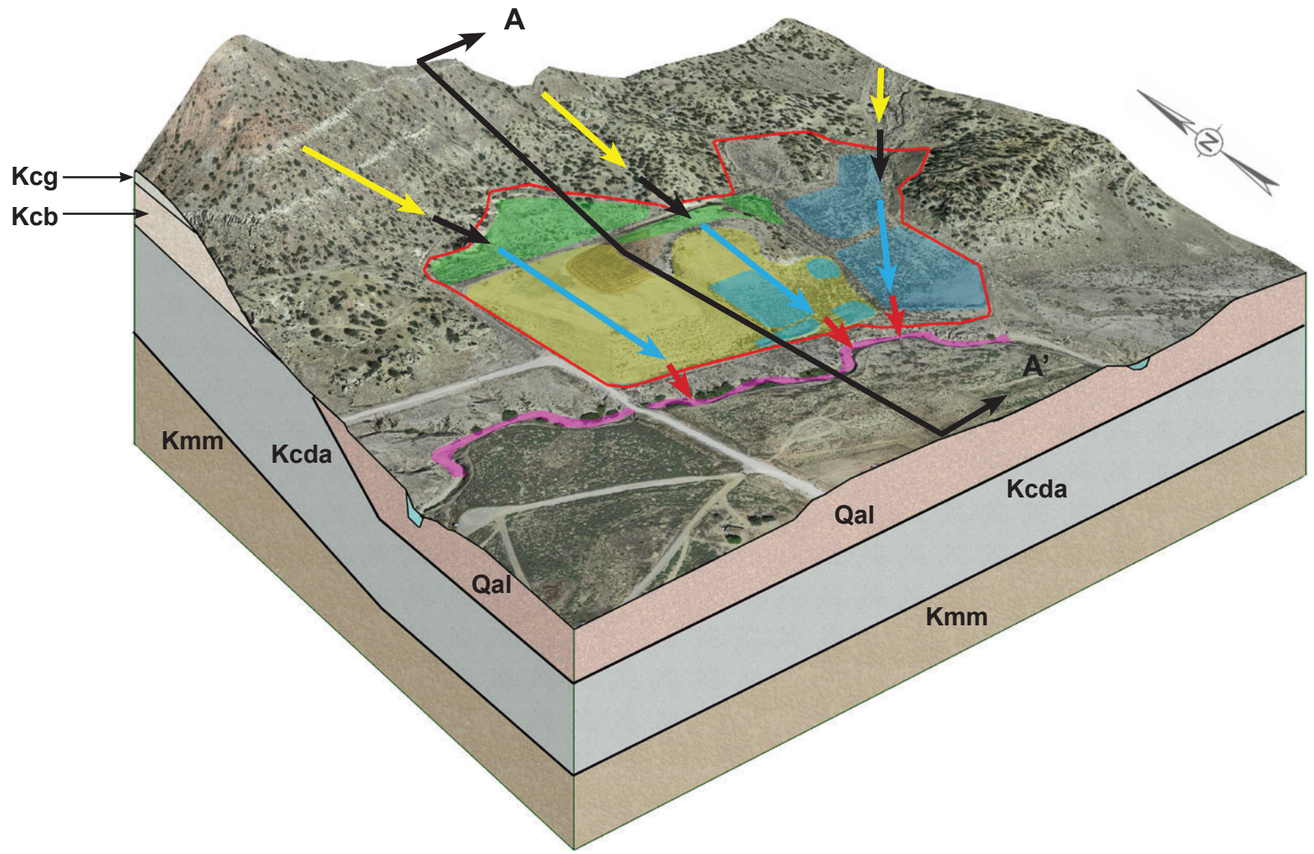
TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: 11



CROSS-SECTION A-A’ THROUGH MINE AREA

1” = 200 feet



TRANSPORT PATHWAY MODEL

NOT TO SCALE

GEOLOGY LEGEND

Kcg	Gibson Coal Member of Canyon Formation
Kcb	Bartlett Barren Member of Crevasse Canyon Formation
Kcda	Dalton Sandstone Member of Crevasse Canyon Formation
Kmm	Mulato Tongue of Mancos Shale
Qal	Alluvial Deposits

SURFACE LEGEND

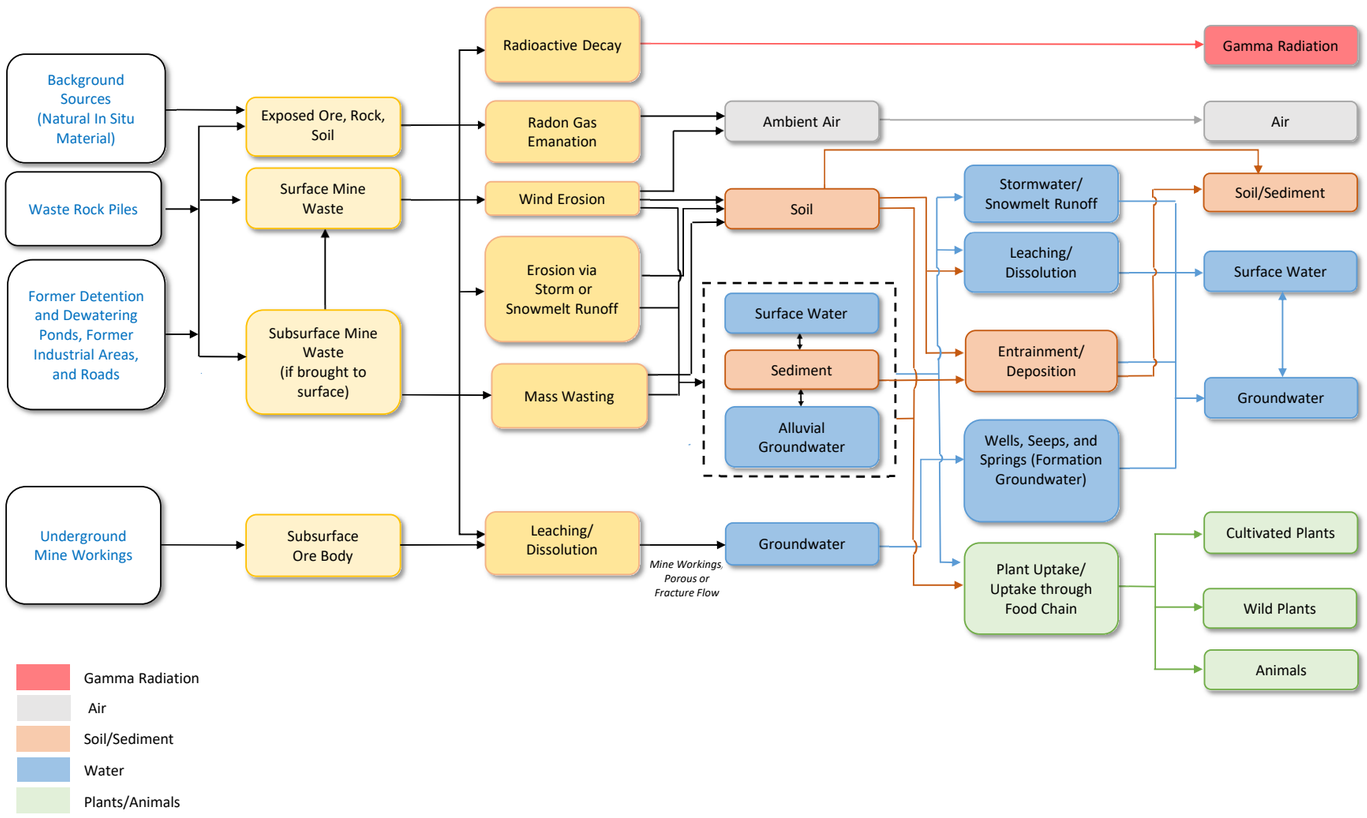
- Mine Boundary
- Contaminated Former Industrial Area
- Contaminated Waste Rock
- Contaminated Ponds
- Arroyo
- Background Source Erosion
- Mass Wasting
- Waste Deposition, Erosion and Redeposition
- Waste Rock/Pond Erosion

Prepared for: U.S. EPA Region 9

QUIVIRA MINES
TRANSPORT MODEL

Prepared By: TETRA TECH

Task Order No.:	Contract No.:	Figure No.:
TO 0001	68HE0923D002	12
Location: Quivira Mines	Date: 02/21/24	



EXPOSURE ROUTES	APPLICABLE HUMAN EXPOSURE SCENARIOS: Kee'da'whíí téél (Full-Time Navajo Resident)	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)	United Nuclear Corporation Outdoor Worker	ECOLOGICAL EXPOSURE SCENARIOS: EXPOSURE ROUTES	Plants and Invertebrates	Birds and Mammals
External Exposure	X	X	X	External Exposure	X [6]	X [6]
Inhalation	X [1]	X [1]	--	Inhalation	X [7]	X [7]
Incidental Ingestion Dermal Inhalation	X	X	X	Dermal/Direct Contact Ingestion Trophic Transfer	X	X
Ingestion Dermal Inhalation	-- [2]	-- [2]	-- [2]	Dermal/Direct Contact Ingestion Trophic Transfer	X [8]	X [8]
Ingestion Dermal Inhalation	-- [2]	-- [2]	-- [2]			
Ingestion	X [3]	--	--			
Ingestion Dermal Inhalation	X [4]	X [4]	--	Ingestion	--	X
Ingestion	X [5]	X [5]	--	Ingestion Trophic Transfer	--	X

Notes:
X Indicates the exposure pathway is potentially complete and is evaluated in the risk assessment except as noted.
-- Indicates the exposure pathway is not complete or *de minimus* and is not evaluated in the risk assessment

[1] The human health risk evaluation does not include inhalation of radon by humans or animals. Because radon is a gas and readily disperses in outdoor air, the risk in outdoor is considered to be minimal. Radon in indoor air is a potential risk for future residential receptors; however, radon exposure is building specific and the buildings are not currently present and, thus, cannot be evaluated. Furthermore, because radon is a known risk in the area, any future buildings would likely be constructed to mitigate this known risk.

[2] The human health risk evaluation does not include ingestion of surface water or groundwater by humans or animals. Safe drinking water is supplied to residents in the Quivira Tronox Mines area. Wells used for livestock have been tested and are upgradient of the known groundwater contamination in the area. The arroyos are mostly dry, and the ponds are dry since mine operations have stopped. If surface or groundwater use patterns change in the future, the risk from use should be evaluated.

[3] The human health risk evaluation includes ingestion of select cultivated plants (crops) by this receptor. Scenario inputs were provided by the Navajo Nation Environmental Protection Agency (NNEPA) (2021).

[4] The human health risk evaluation includes ingestion, dermal (metals only), and inhalation of select wild herbs and medicinal plants by this receptor. Scenario inputs were provided by NNEPA (2021).

[5] The human health risk evaluation includes ingestion of home-raised animals (meat, milk, and eggs) and hunted animals (meat only) for this receptor. Scenario inputs were provided by NNEPA (2021).

[6] The ecological risk evaluation includes evaluation of external radiation based on exposure to gamma-emitting radionuclides from contaminated soil and evaluation of internal radiation through plant uptake, incidental soil ingestion, and food web uptake (Los Alamos National Laboratory 2015).

[7] Potential exposures include inhalation of ambient air and air in burrows and underground mines. The ecological risk evaluation does not include evaluation of the inhalation pathway.

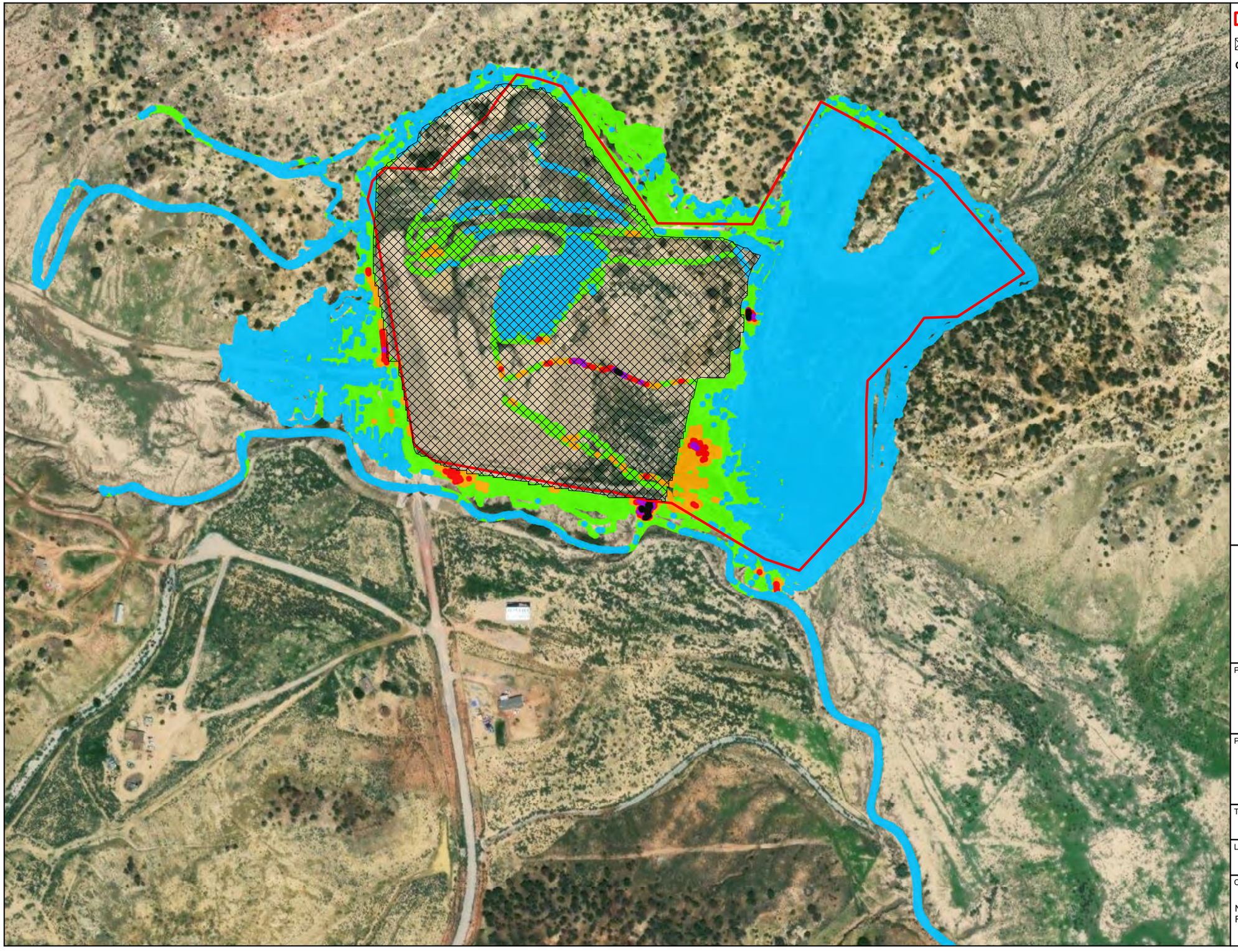
[8] The ecological risk evaluation does not include evaluation of direct contact with or ingestion of surface water.

References:

Navajo Nation Environmental Protection Agency (NNEPA). 2021. "Navajo Tribe Provisional Reasonable Maximum Exposures RME for the Navajo Risk Assessments." Draft. September 15.

Los Alamos National Laboratory. 2015. “Screening-Level Ecological Risk Assessment Methods." Revision 4. EP2015-0174. October 29.

Figure 13. Quivira Mines Conceptual Site Model Wire Diagram



Mine Lease Boundary

Area predominately covered by static gamma measurements

Gamma Rate (cpm)

≤ 13,700	≤ BTV
13,700 - 27,400	1 x BTV - 2 x BTV
27,400 - 41,100	2 x BTV - 3 x BTV
41,100 - 54,800	3 x BTV - 4 x BTV
54,800 - 68,500	4 x BTV - 5 x BTV
> 68,500	> 5 x BTV

Notes:

BTV	Background threshold value
cpm	Counts per minute
CR-1	Quivira Tronox Church Rock No. 1 Mine Site

1 inch = 300 feet

1:3,600

N W E S

250 125 0 250 Feet

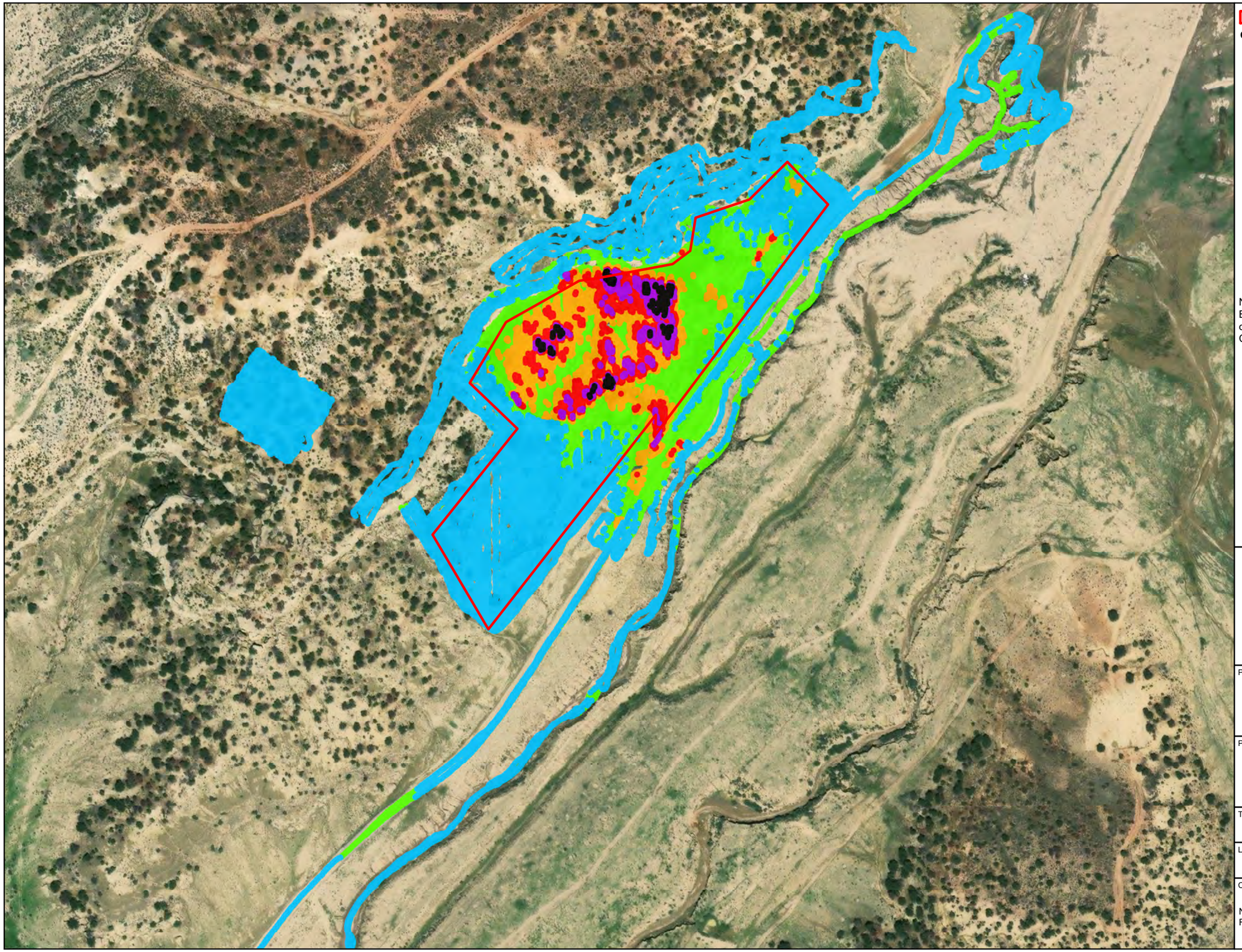
2022 CR-1 TRANSECT GAMMA SCAN MEASUREMENTS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **14**



Mine Lease Boundary

Gamma Rate (cpm)

≤ 13,700	≤ BTV
13,700 - 27,400	1 x BTV - 2 x BTV
27,400 - 41,100	2 x BTV - 3 x BTV
41,100 - 54,800	3 x BTV - 4 x BTV
54,800 - 68,500	4 x BTV - 5 x BTV
> 68,500	> 5 x BTV

Notes:

BTV	Background threshold value
cpm	Counts per minute
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site

1 inch = 250 feet

1:3,000

N W E S

300 150 0 300 Feet

2022 CR-1E TRANSECT GAMMA SCAN MEASUREMENTS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **15**

Navajo Nation
United Nuclear
Corporation

Kerr-McGee Ponds
Investigation Boundary

UNC Mill Site Boundary

Contamination Associated with a
UNC Site Further to the Southeast

Gamma Rate (cpm)

≤ 13,700	≤ BTV
13,700 - 27,400	1 x BTV - 2 x BTV
27,400 - 41,100	2 x BTV - 3 x BTV
41,100 - 54,800	3 x BTV - 4 x BTV
54,800 - 68,500	4 x BTV - 5 x BTV
> 68,500	> 5 x BTV

Notes:

BTV	Background threshold value
cpm	Counts per minute
Kerr-McGee	Kerr-McGee Corporation
UNC	United Nuclear Corporation

1 inch = 300 feet

1:3,600

N
W E
S

200 100 0 200 Feet

2022 KERR-MCGEE PONDS TRANSECT GAMMA SCAN MEASUREMENTS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **16**

Mine Lease Boundary

Interpolated Ra-226 Greater than 2 pCi/g

Data Excluded from Ra-226 Interpolation as Known Contaminated Area Previously Addressed by Static Gamma Survey

TENORM Boundary

Reclaimed Ponds Backfilled with NORM

Interpolated Ra-226 (pCi/g)

≤ 2.0	≤ BTV
2.0 - 4.0	1 x BTV - 2 x BTV
4.0 - 6.0	2 x BTV - 3 x BTV
6.0 - 8.0	3 x BTV - 4 x BTV
8.0 - 10	4 x BTV - 5 x BTV
> 10	> 5 x BTV

Surface Soil Samples - Ra-226

Below RAG of 2 pCi/g

Above RAG of 2 pCi/g

Notes:

BTV	Background threshold value
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
NORM	Naturally occuring radioactive material
pCi/g	Picocurie per gram
RAG	Removal action goal
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material

1 inch = 700 feet

1:8,400

N W E S

700 350 0 700 Feet

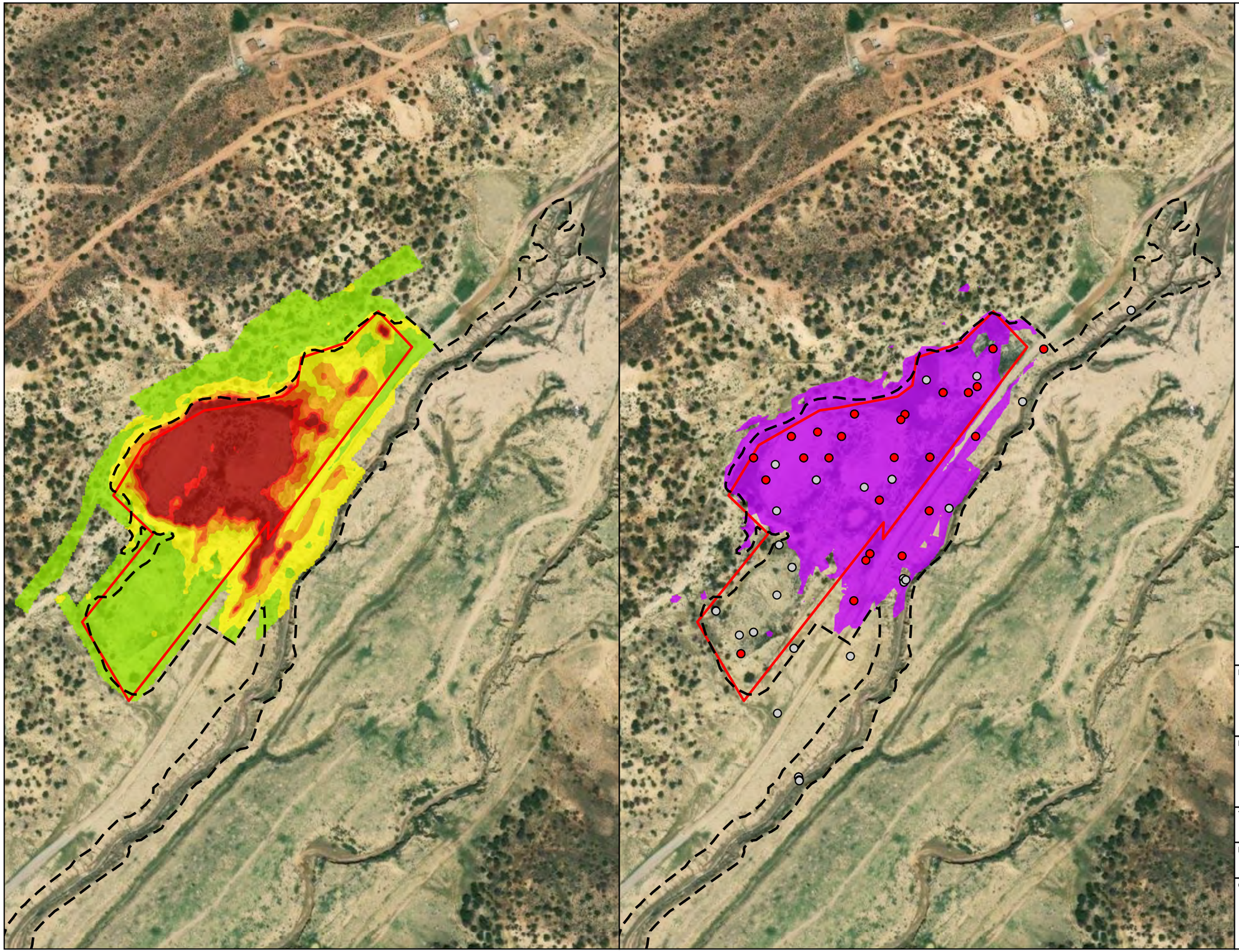
CR-1 CORRELATED AND LABORATORY RA-226 RESULTS IN SURFACE SOILS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **17**



Mine Lease Boundary
Interpolated Ra-226 Greater than 2 pCi/g
TENORM Boundary

Interpolated Ra-226 (pCi/g)

≤ 2.0	≤ BTV
2.0 - 4.0	1 x BTV - 2 x BTV
4.0 - 6.0	2 x BTV - 3 x BTV
6.0 - 8.0	3 x BTV - 4 x BTV
8.0 - 10	4 x BTV - 5 x BTV
> 10	> 5 x BTV

Surface Soil Samples - Ra-226

- Below RAG of 2 pCi/g
- Above RAG of 2 pCi/g

Notes:

BTV	Background threshold value
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
pCi/g	Picocurie per gram
RAG	Removal action goal
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material

1 inch = 300 feet

1:3,600

N
W E
S

300 150 0 300
Feet

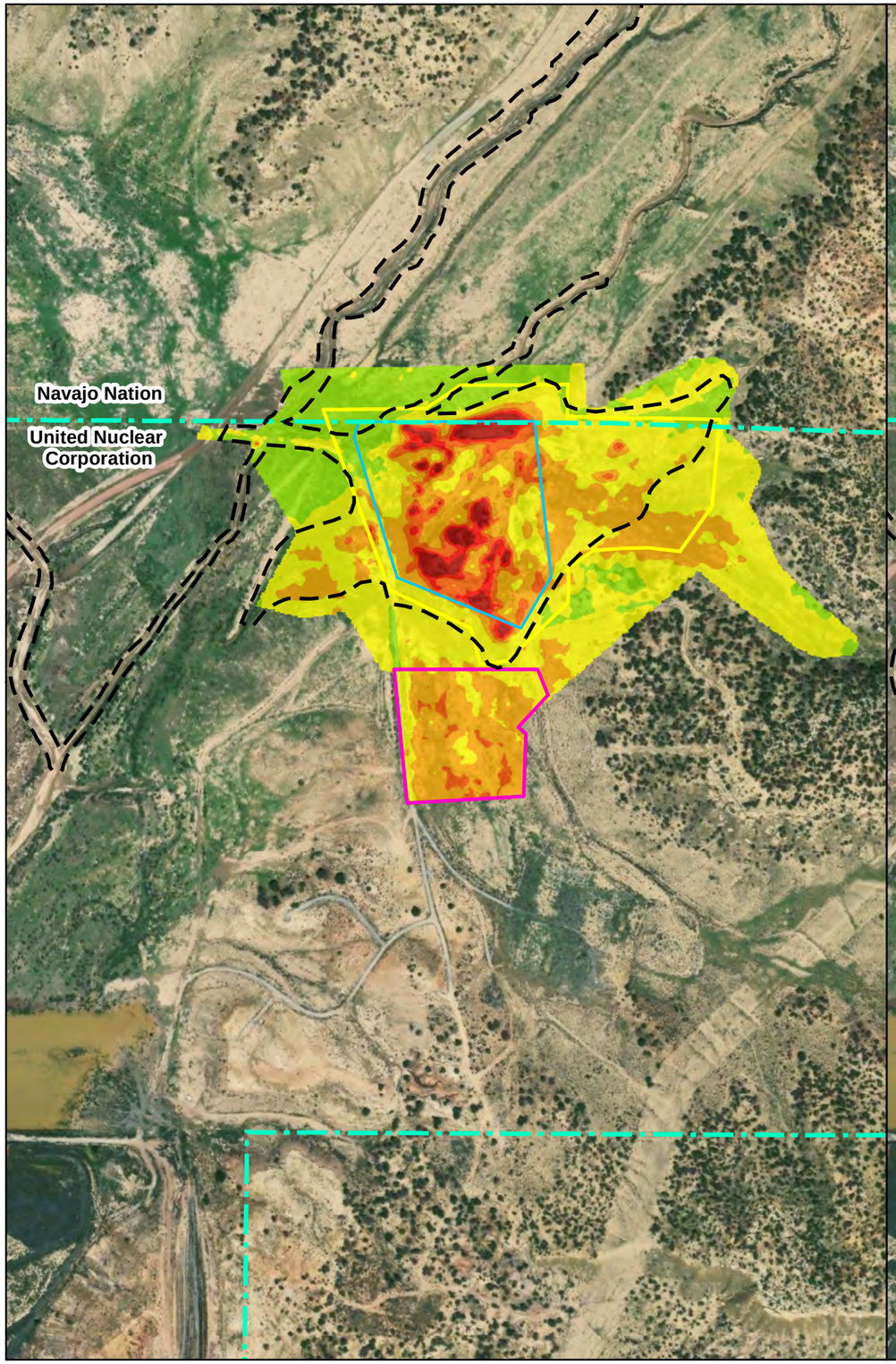
CR-1E CORRELATED AND LABORATORY RA-226 RESULTS IN SURFACE SOILS

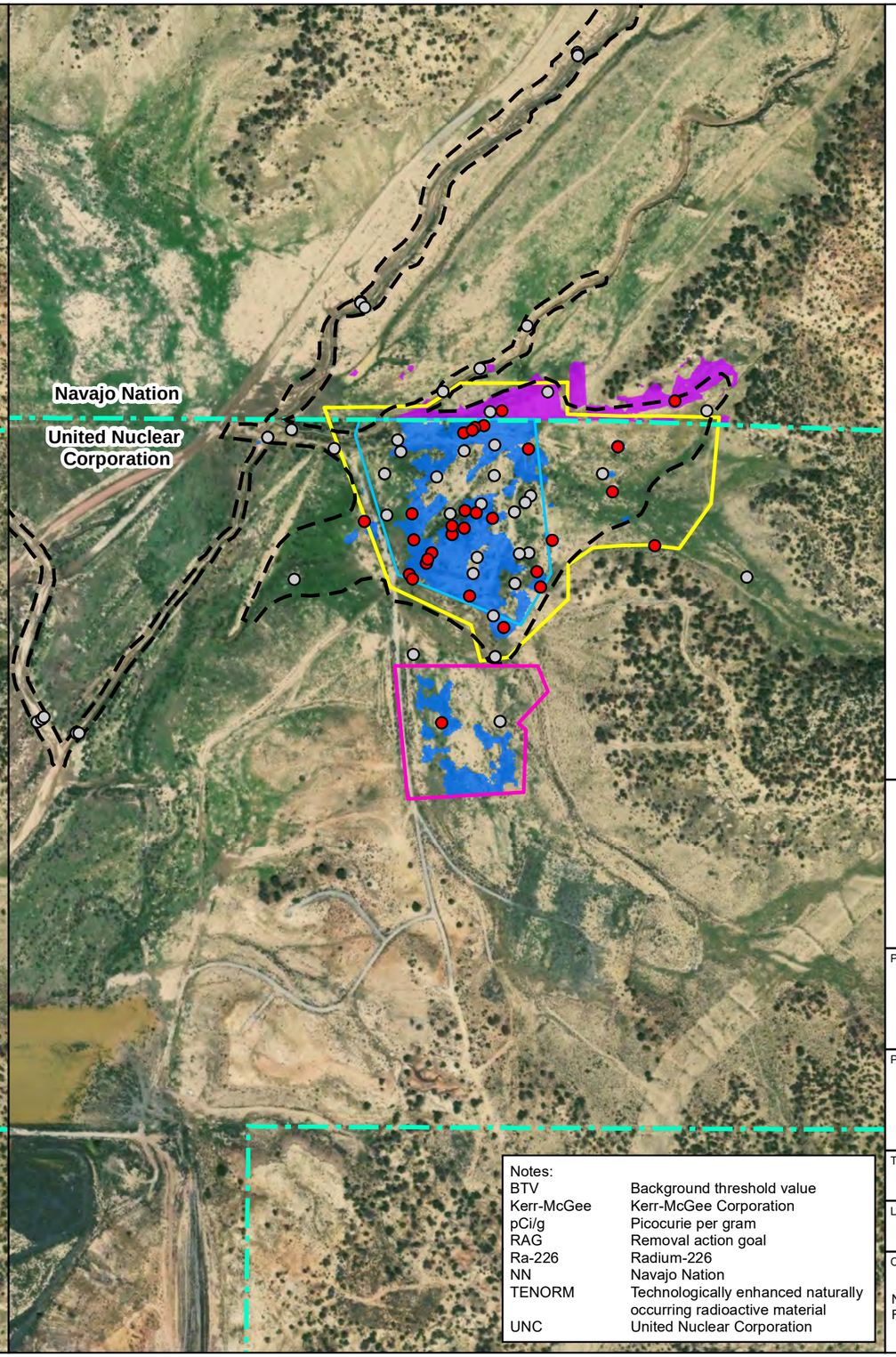
Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/6/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **18**





Kerr-McGee Ponds Investigation Boundary
Kerr-McGee Ponds Fenceline
UNC Site Boundary
Contamination Associated with a UNC Site Further to the Southeast
Interpolated Ra-226 Greater than 2 pCi/g
Interpolated Ra-226 Greater than 5.4 pCi/g, which is Based on a UNC Worker Exposure Scenario
TENORM Boundary

Interpolated Ra-226 (pCi/g)

≤ 2.0	≤ BTV
2.0 - 4.0	1 x BTV - 1 x BTV
4.0 - 6.0	1 x BTV - 2 x BTV
6.0 - 8.0	2 x BTV - 4 x BTV
8.0 - 10	4 x BTV - 5 x BTV
> 10	> 5 x BTV

Surface Soil Samples - Ra-226

Below NN RAG of 2.0 pCi/g or UNC RAG of 5.4 pCi/g
Above NN RAG of 2.0 pCi/g or UNC RAG of 5.4 pCi/g

1 inch = 500 feet

1:6,000

N W E S

500 250 0 500 Feet

Notes:

BTV	Background threshold value
Kerr-McGee	Kerr-McGee Corporation
pCi/g	Picocurie per gram
RAG	Removal action goal
Ra-226	Radium-226
NN	Navajo Nation
TENORM	Technologically enhanced naturally occurring radioactive material
UNC	United Nuclear Corporation

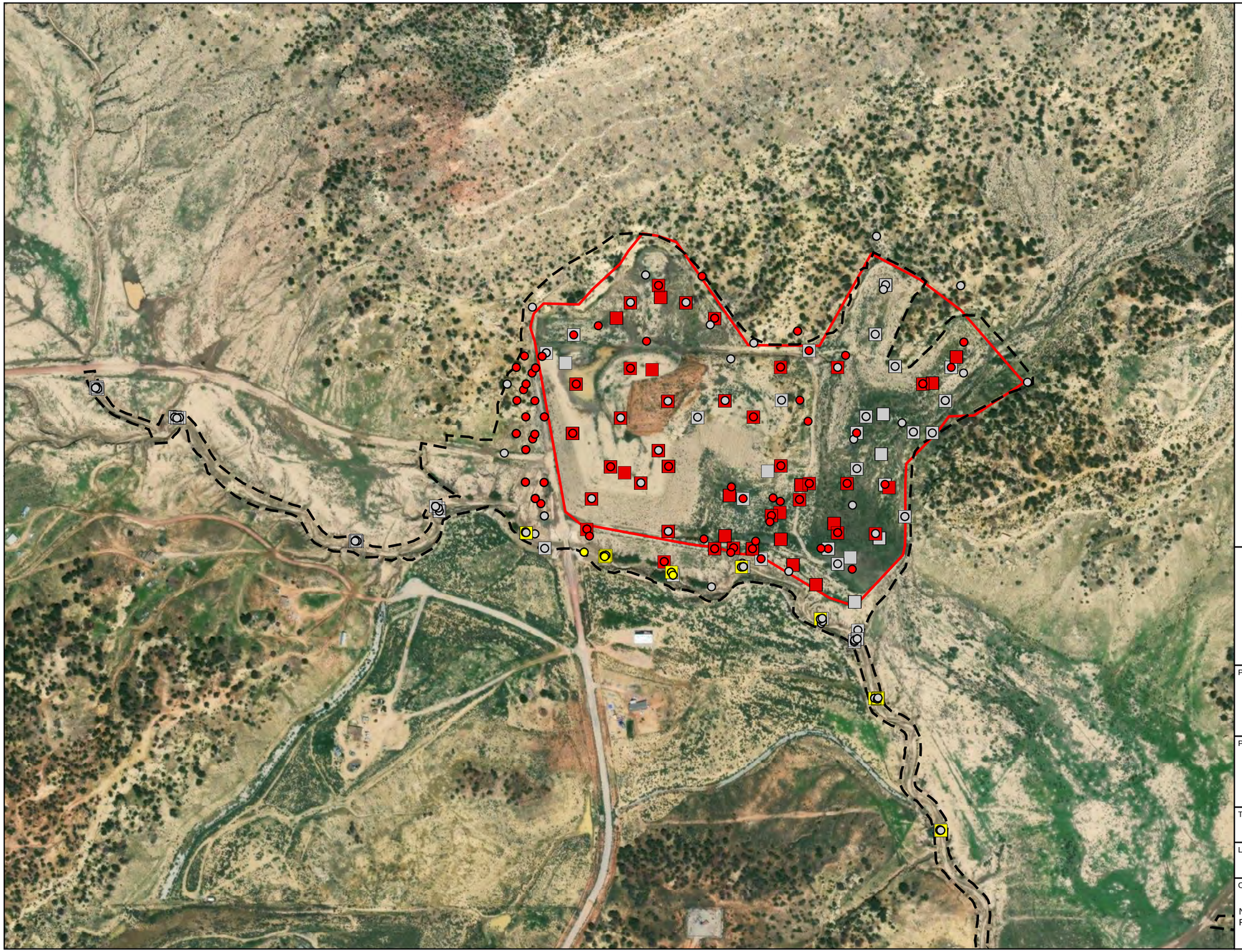
KERR-MCGEE PONDS CORRELATED AND LABORATORY RA-226 RESULTS IN SURFACE SOILS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: 19



Mine Lease Boundary

TENORM Boundary

Surface Soil Samples[1] - Ra-226

- Below RAG of 2 pCi/g
- CR-1 Sample Above RAG of 2 pCi/g
- Arroyo Sample Above RAG of 2 pCi/g

Subsurface Soil Samples[2] - Ra-226

- Below RAG of 2 pCi/g
- CR-1 Sample Above RAG of 2 pCi/g
- Arroyo Sample Above RAG of 2 pCi/g

Note:
[1]Surface soil samples are 0 to 6 inches below grade.
[2]Subsurface soil samples are 6 to 72 inches below grade.

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
pCi/g	Picocurie per gram
RAG	Removal action goal
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material

1 inch = 400 feet

1:4,800

N W E S

400 200 0 400 Feet

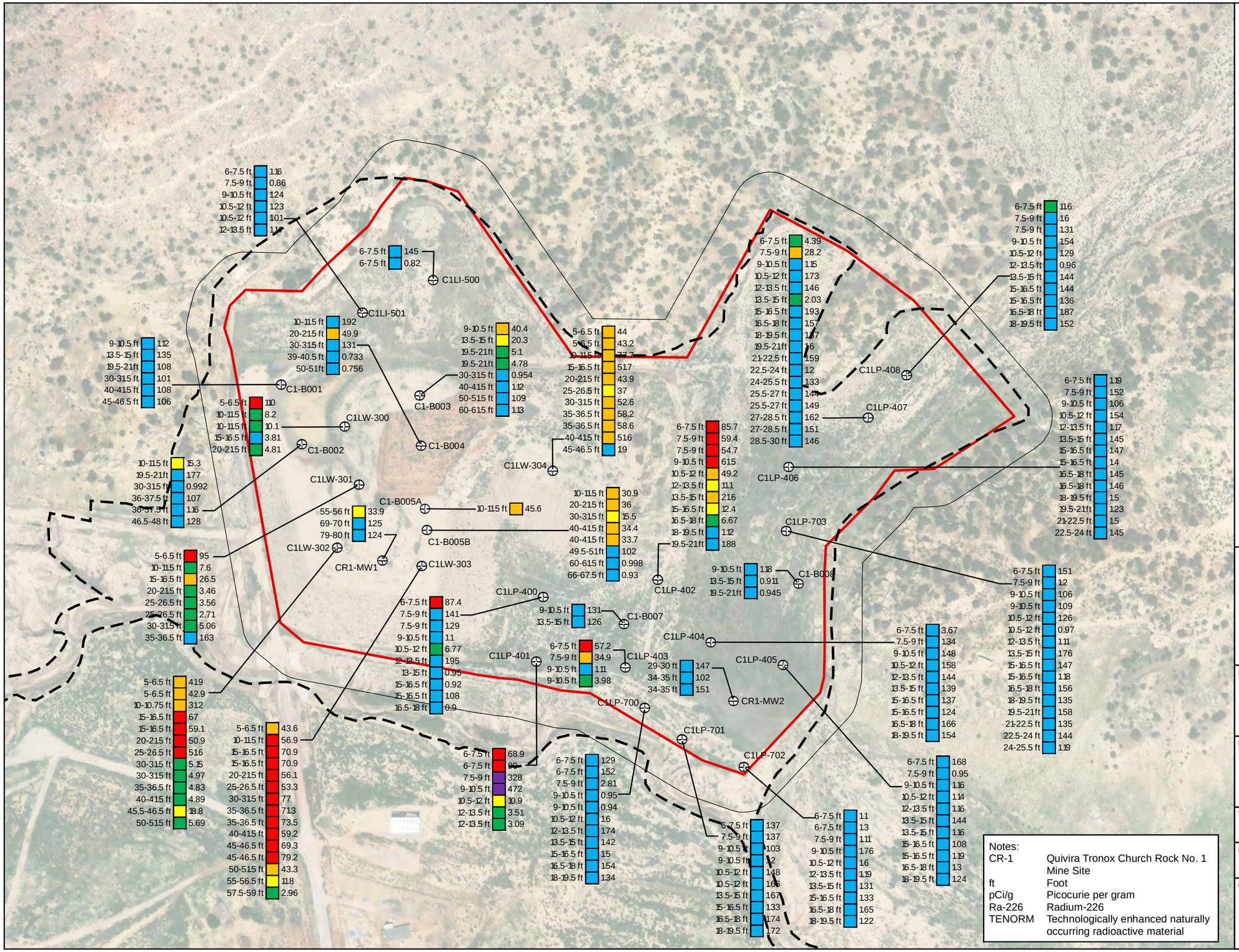
CR-1 DISTRIBUTION OF RA-226 IN SURFACE AND SUBSURFACE SOILS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **20**



Soil Sample Location

100-Foot Step-Out Boundary

Mine Lease Boundary

TENORM Boundary

Borehole Legend

Depth Range | Lab Result (pCi/g)

Illustrative Data Ranges

Color	Ra-226 (pCi/g)	Description
	Above 100	Above 50x Removal Action Goal
	50 to 100	Up to 50x Removal Action Goal
	20 to 50	Up to 25x Removal Action Goal
	10 to 20	Up to 10x Removal Action Goal
	2 to 10	Up to 5x Removal Action Goal
	Below 2	Below Removal Action Goal

1 inch = 250 feet

1:3,000

N W E S

250 125 0 250 Feet

CR-1 WASTE PILE VERTICAL EXTENT OF RA-226 AT DEPTHS GREATER THAN 6 FEET BELOW GRADE

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Notes:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
ft	Foot
pCi/g	Picocurie per gram
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: 21

Mine Lease Boundary

TENORM Boundary

Surface Soil Samples[1] - Ra-226

Below RAG of 2 pCi/g

CR-1E Sample Above RAG of 2 pCi/g

Arroyo Sample Above RAG of 2 pCi/g

Subsurface Soil Samples[2] - Ra-226

Below RAG of 2 pCi/g

CR-1E Sample Above RAG of 2 pCi/g

Arroyo Sample Above RAG of 2 pCi/g

Note:
[1]Surface soil samples are 0 to 6 inches below grade.
[2]Subsurface soil samples are 6 to 72 inches below grade.

CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
pCi/g	Picocurie per gram
RAG	Removal action goal
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material

1 inch = 250 feet

1:3,000

N W E S

250 125 0 250 Feet

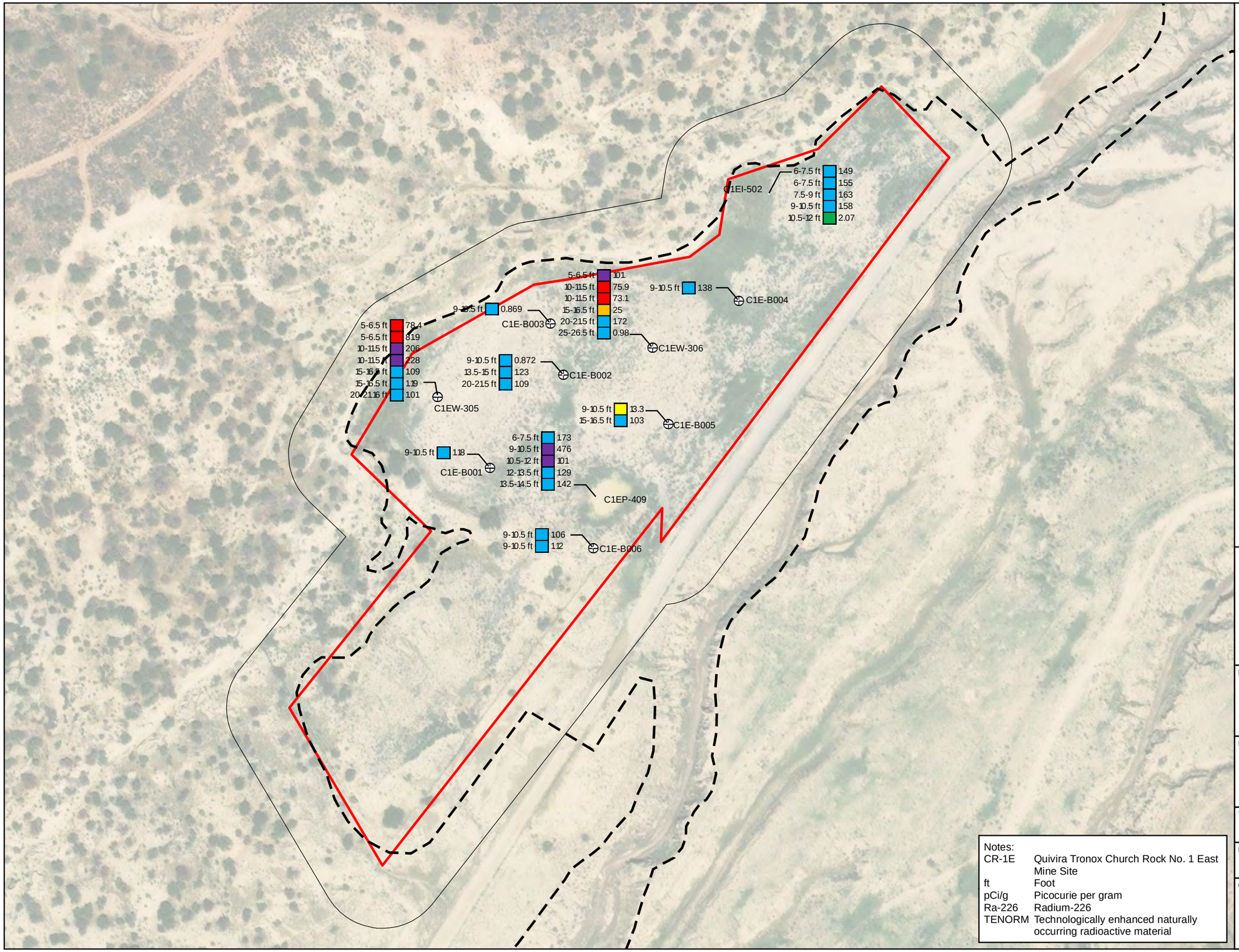
CR-1E DISTRIBUTION OF RA-226 IN SURFACE AND SUBSURFACE SOILS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **22**



Soil Sample Location
100-Foot Step-Out Boundary
Mine Lease Boundary
TENORM Boundary

Borehole Legend

Depth Range | Lab Result (pCi/g)

Illustrative Data Ranges

Color	Ra-226 (pCi/g)	Description
	Above 100	Above 50x Removal Action Goal
	50 to 100	Up to 50x Removal Action Goal
	20 to 50	Up to 25x Removal Action Goal
	10 to 20	Up to 10x Removal Action Goal
	2 to 10	Up to 5x Removal Action Goal
	Below 2	Below Removal Action Goal

1 inch = 150 feet

1:1,800

N W E S

150 75 0 150 Feet

CR-1E VERTICAL EXTENT OF RA-226 AT DEPTHS GREATER THAN 6 FEET BELOW GRADE

Prepared For: U.S. EPA Region 9

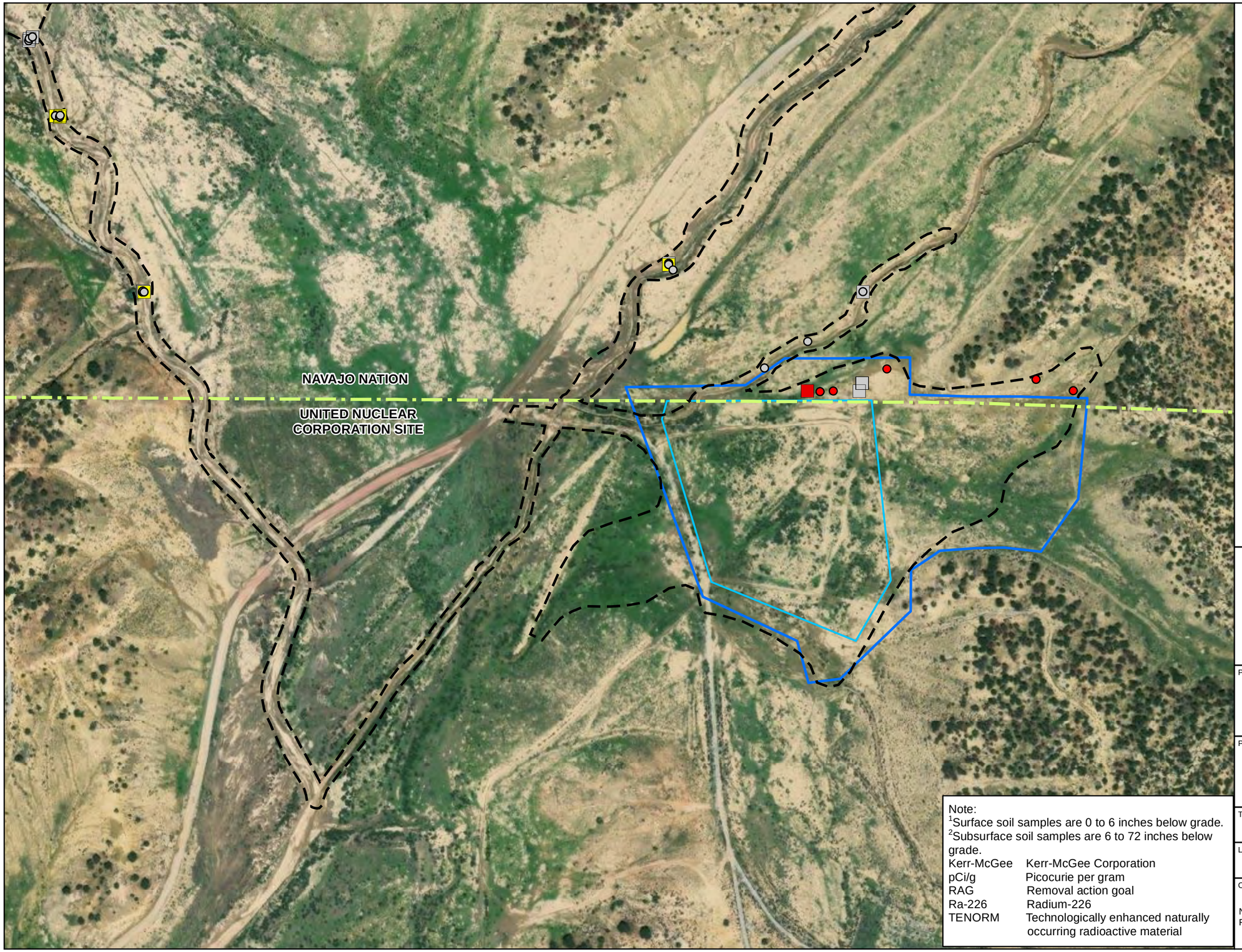
Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: 23

Notes:

CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
ft	Foot
pCi/g	Picocurie per gram
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material



Kerr-McGee Ponds Investigation Boundary

Kerr-McGee Ponds Fenceline

United Nuclear Corporation Site Boundary

TENORM Boundary

Surface Soil Samples[1] - Ra-226

- Below RAG of 2 pCi/g
- Kerr-McGee Ponds Sample on Navajo Nation Above RAG of 2 pCi/g
- Arroyo Sample Above RAG of 2 pCi/g

Subsurface Soil Samples[2] - Ra-226

- Below RAG of 2 pCi/g
- Kerr-McGee Ponds Sample on Navajo Nation Above RAG of 2 pCi/g
- Arroyo Sample Above RAG of 2 pCi/g

1 inch = 300 feet

1:3,600

N W E S

300 150 0 300 Feet

Note:
[1]Surface soil samples are 0 to 6 inches below grade.
[2]Subsurface soil samples are 6 to 72 inches below grade.

Kerr-McGee	Kerr-McGee Corporation
pCi/g	Picocurie per gram
RAG	Removal action goal
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material

KERR-MCGEE PONDS DISTRIBUTION OF RA-226 ABOVE 2 PCI/G IN SURFACE AND SUBSURFACE SOILS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **24**



Kerr-McGee Ponds Investigation Boundary

Kerr-McGee Ponds Fenceline

TENORM Boundary

Surface Soil Samples[1] - Ra-226

Below RAG of 5.4 pCi/g

Above RAG of 5.4 pCi/g

Subsurface Soil Samples[2] - Ra-226

Below RAG of 5.4 pCi/g

Above RAG of 5.4 pCi/g

Note:
[1]Surface soil samples are 0 to 6 inches below grade.
[2]Subsurface soil samples are 6 to 72 inches below grade.

Kerr-McGee	Kerr-McGee Corporation
pCi/g	Picocurie per gram
RAG	Removal action goal
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material

1 inch = 220 feet

1:2,640

N W E S

220 110 0 220 Feet

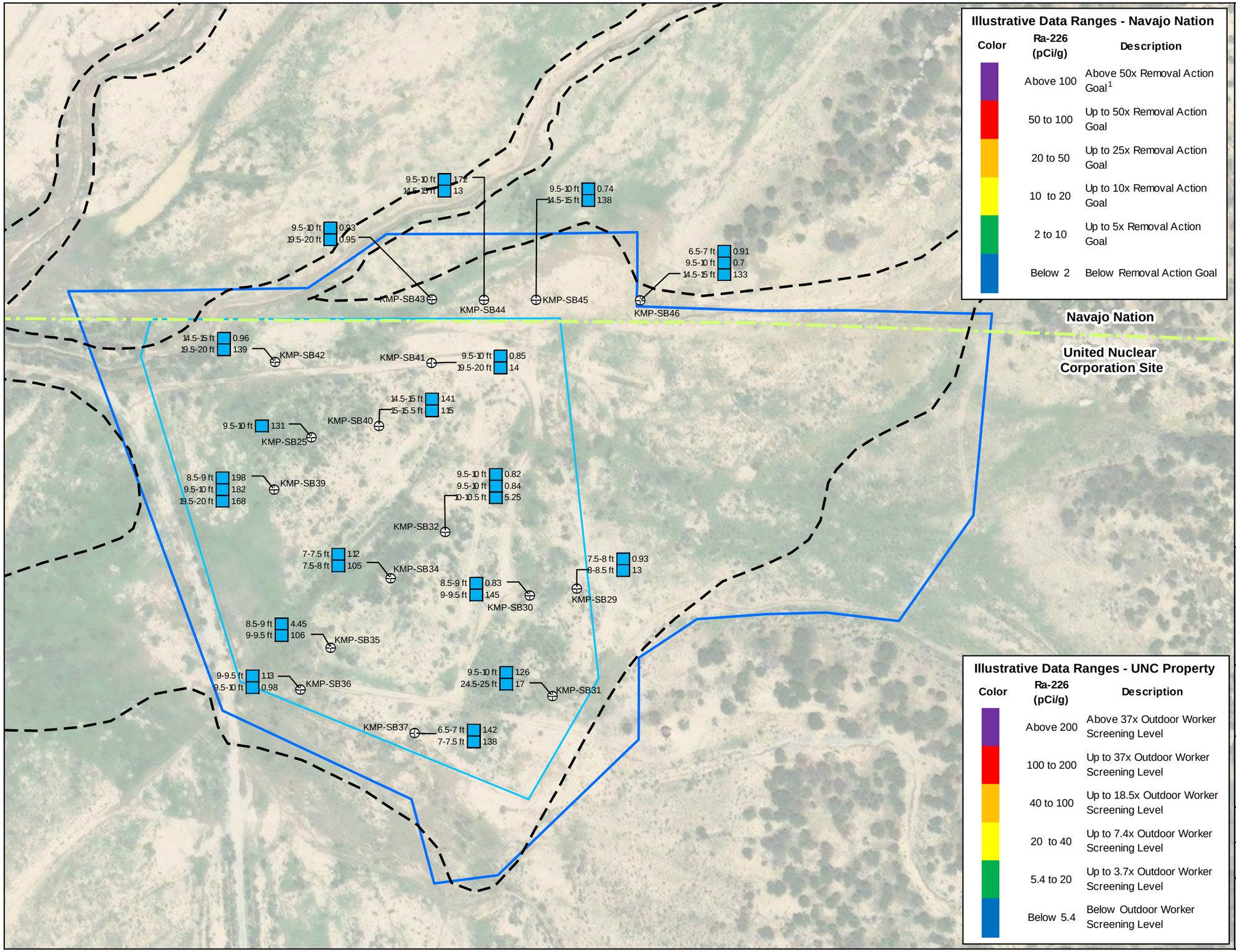
KERR-MCGEE PONDS DISTRIBUTION OF RA-226 ABOVE 5.4 PCI/G IN SURFACE AND SUBSURFACE SOILS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **25**



Illustrative Data Ranges - Navajo Nation

Color	Ra-226 (pCi/g)	Description
	Above 100	Above 50x Removal Action Goal[1]
	50 to 100	Up to 50x Removal Action Goal
	20 to 50	Up to 25x Removal Action Goal
	10 to 20	Up to 10x Removal Action Goal
	2 to 10	Up to 5x Removal Action Goal
	Below 2	Below Removal Action Goal

Illustrative Data Ranges - UNC Property

Color	Ra-226 (pCi/g)	Description
	Above 200	Above 37x Outdoor Worker Screening Level
	100 to 200	Up to 37x Outdoor Worker Screening Level
	40 to 100	Up to 18.5x Outdoor Worker Screening Level
	20 to 40	Up to 7.4x Outdoor Worker Screening Level
	5.4 to 20	Up to 3.7x Outdoor Worker Screening Level
	Below 5.4	Below Outdoor Worker Screening Level

- Soil Sample Location
- UNC Mill Boundary
- Kerr-McGee Ponds Investigation Boundary
- Kerr-McGee Pond Fenceline
- TENORM Boundary

Borehole Legend

Depth Range | Lab Result (pCi/g)

Notes:
[1]Removal Action Goal of 2.0 pCi/g is based on the background threshold value for Ra-226. The background threshold value is based on the 95 percent upper tolerance limit with 95 percent coverage of the background dataset.

ft	Foot
Kerr-McGee	Kerr-McGee Corporation
pCi/g	Picocurie per gram
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material
UNC	United Nuclear Corporation

1 inch = 150 feet

1:1,800

N W E S

150 75 0 150 Feet

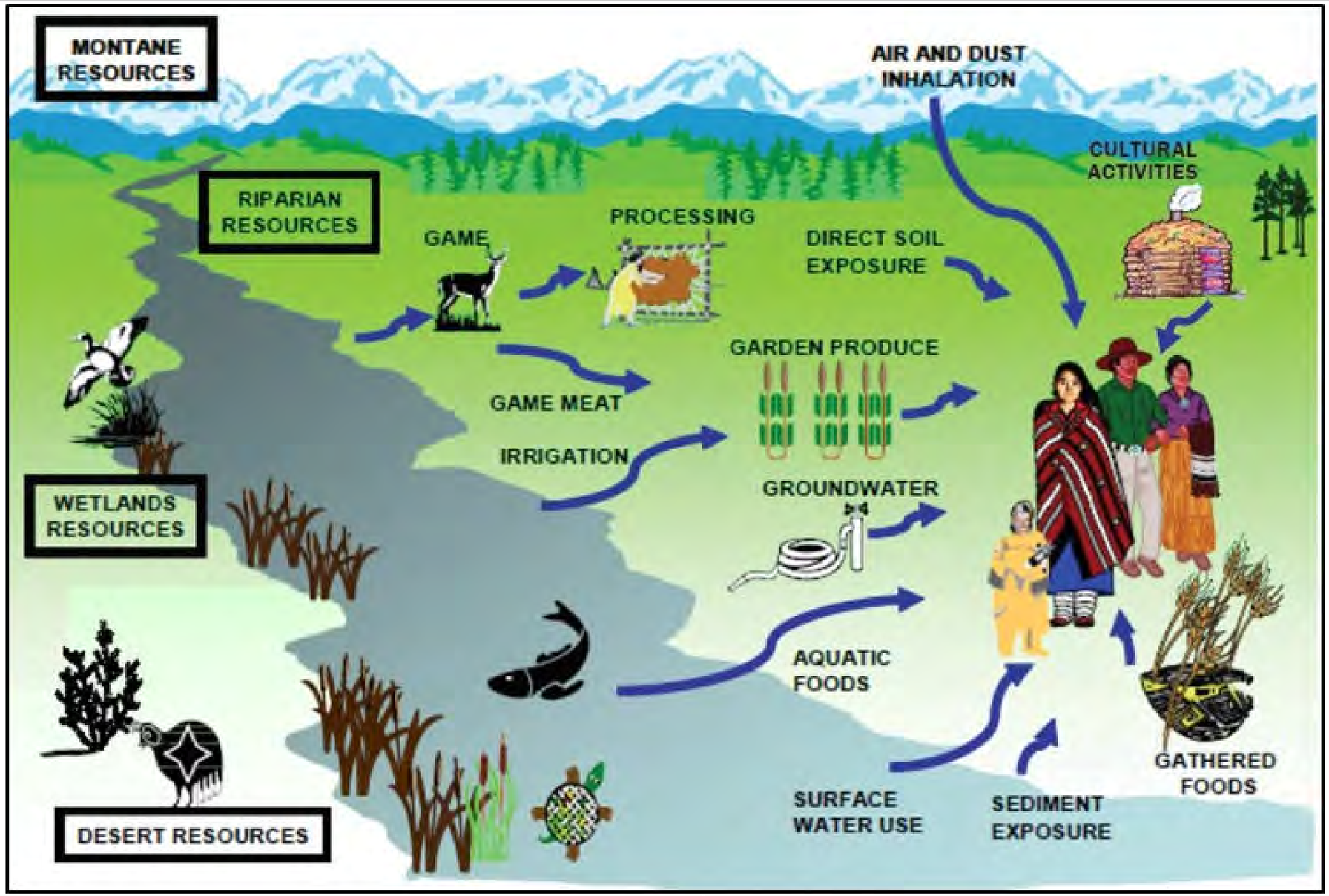
KERR-MCGEE PONDS VERTICAL EXTENT OF RA-226 AT DEPTHS GREATER THAN 6 FEET BELOW GRADE

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/6/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: 26



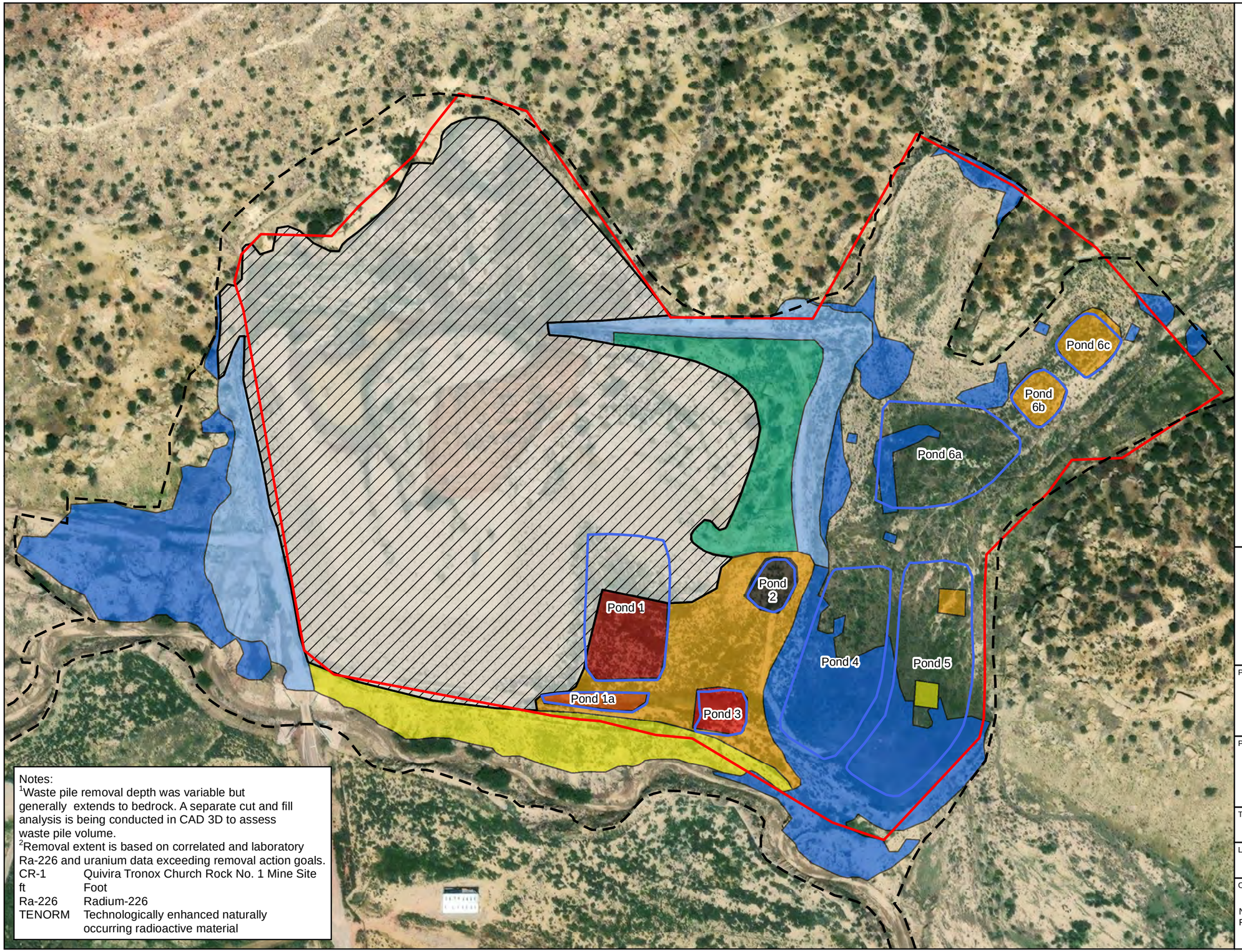
Notes:
Some exposure pathways depicted above are not included in the exposure assessment. See the conceptual site model wire diagrams (Figure 13) for a description of the included pathways.
Adapted from Harper and others (2007).

Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH

GRAPHIC DEPICTION OF NAVAJO RESIDENTIAL EXPOSURE PATHWAYS INCLUDING THE DINÉ LIFEWAYS

Task Order No.:	Contract No.:	Figure No:
TO 0001	68HE0923D0002	**27**
Location: NAVAJO NATION	Date: 2/21/24	



Mine Lease Boundary
TENORM Boundary
Waste Pile Removal Action Extent[1]
Former Pond

Removal Action Extent Depth (ft)[2]

- 1
- 1.5
- 2
- 4
- 7
- 8
- 10
- 14
- 19

1 inch = 200 feet

1:2,400

N
W E
S

200 100 0 200 Feet

Notes:
[1]Waste pile removal depth was variable but generally extends to bedrock. A separate cut and fill analysis is being conducted in CAD 3D to assess waste pile volume.
[2]Removal extent is based on correlated and laboratory Ra-226 and uranium data exceeding removal action goals.

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
ft	Foot
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material

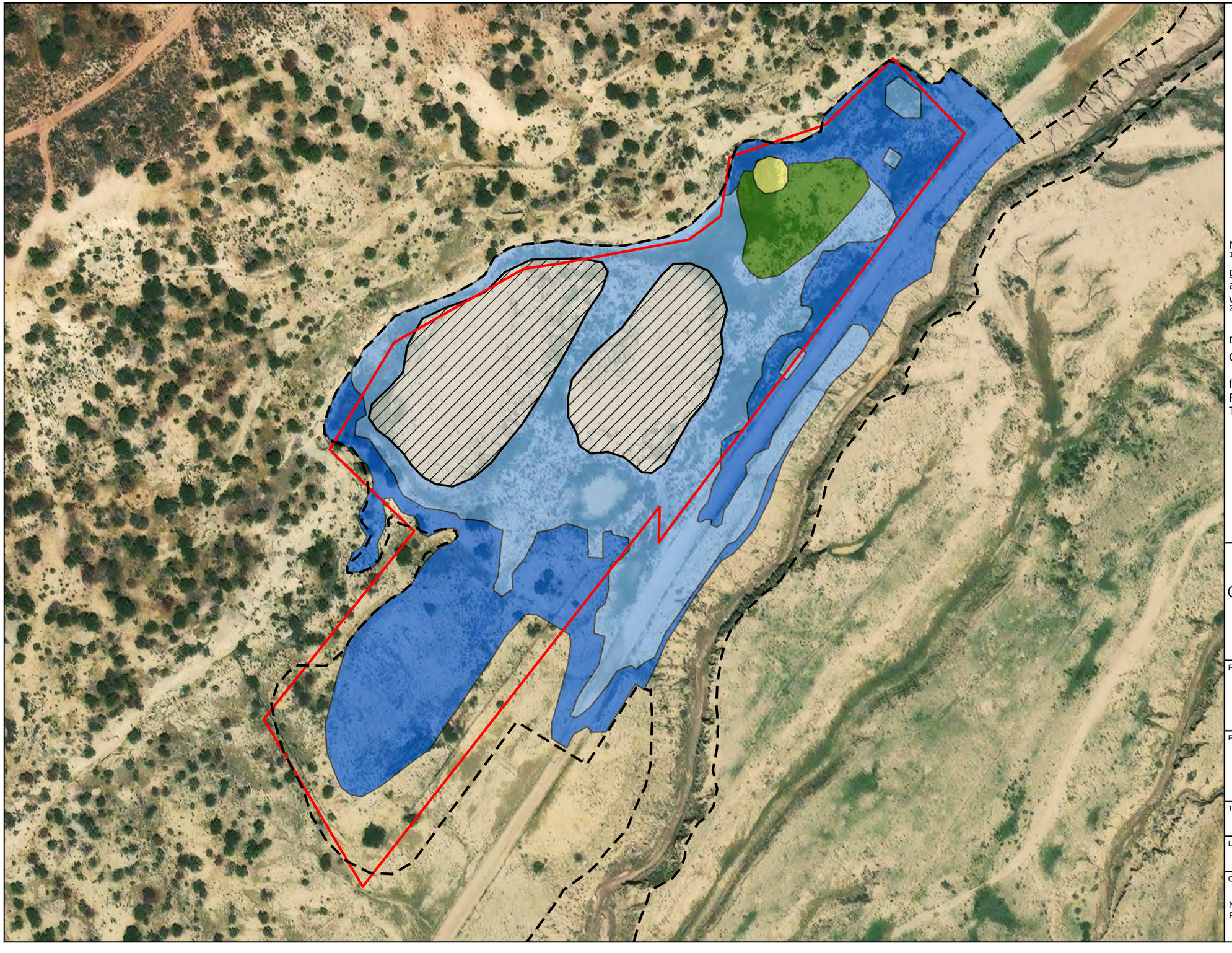
CR-1 SURFACE AND SUBSURFACE REMOVAL ACTION EXTENT

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **28**



Mine Lease Boundary

TENORM Boundary

Waste Pile Removal Action Extent[1]

Removal Action Extent Depth (ft)[2]

1

1.5

2.5

5

Notes:

[1]Waste pile removal depth is variable but generally extends to bedrock. A separate cut and fill analysis is being conducted in CAD 3D to assess waste pile volume.

[2]Removal extent is based on correlated and laboratory Ra-226 and uranium data exceeding removal action goals.

CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
ft	Foot
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material

1 inch = 140 feet

1:1,680

N

W E

S

140 70 0 140 Feet

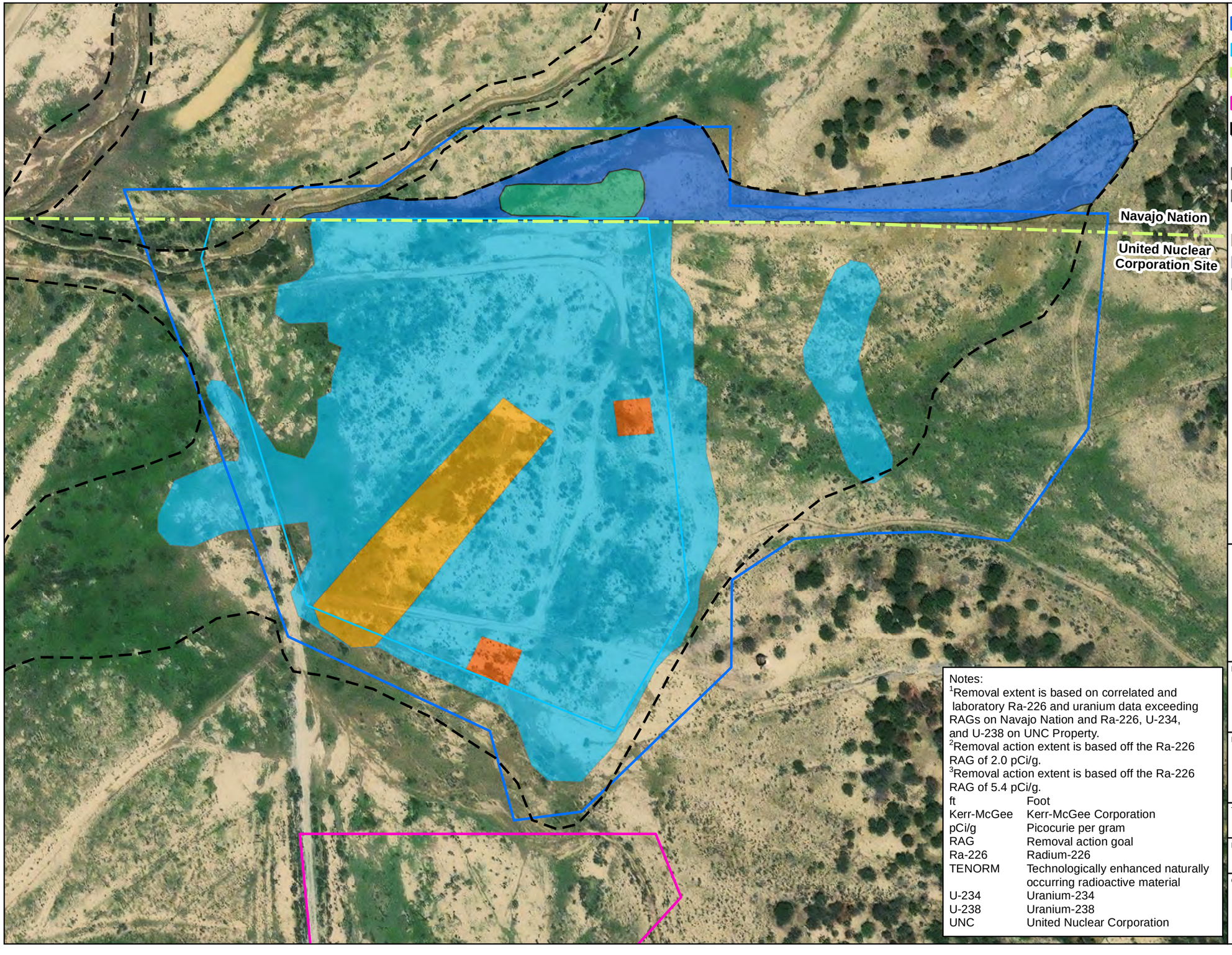
CR-1E SURFACE AND SUBSURFACE REMOVAL ACTION EXTENT

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **29**



Kerr-McGee Ponds Investigation Boundary
Kerr-McGee Ponds Fenceline
UNC Site Boundary
Contamination Associated with a UNC Site Further to the Southeast
TENORM Boundary

Navajo Nation Removal Action Extent Depth (ft)[1,2]

1
2

UNC Removal Action Extent Depth (ft)[1,3]

1
4
6

1 inch = 140 feet

1:1,680

N
W E
S

140 70 0 140 Feet

Notes:
[1]Removal extent is based on correlated and laboratory Ra-226 and uranium data exceeding RAGs on Navajo Nation and Ra-226, U-234, and U-238 on UNC Property.
[2]Removal action extent is based off the Ra-226 RAG of 2.0 pCi/g.
[3]Removal action extent is based off the Ra-226 RAG of 5.4 pCi/g.

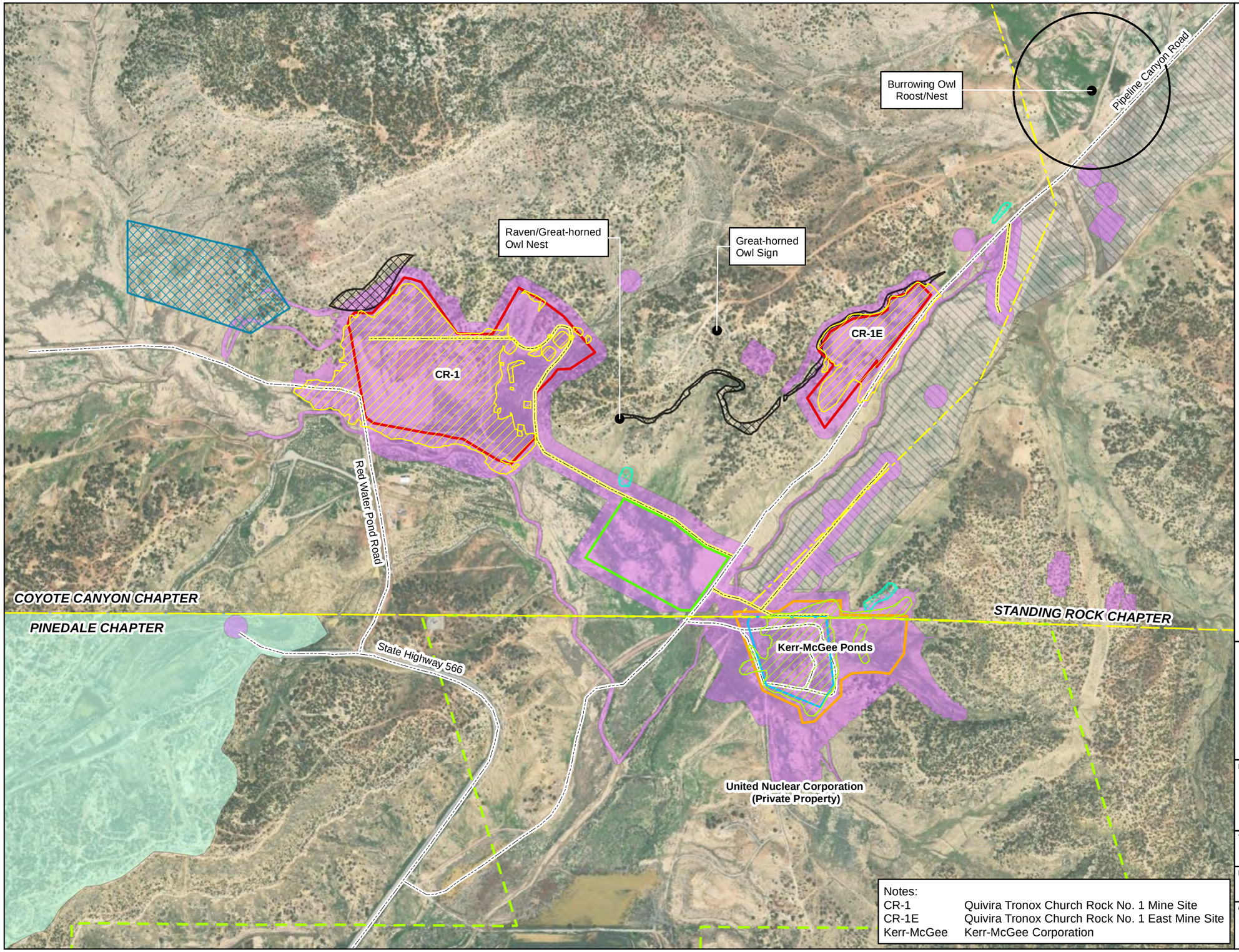
ft	Foot
Kerr-McGee	Kerr-McGee Corporation
pCi/g	Picocurie per gram
RAG	Removal action goal
Ra-226	Radium-226
TENORM	Technologically enhanced naturally occurring radioactive material
U-234	Uranium-234
U-238	Uranium-238
UNC	United Nuclear Corporation

KERR-MCGEE PONDS SURFACE AND SUBSURFACE REMOVAL ACTION EXTENT

Prepared For: U.S. EPA Region 9

Prepared By:
TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **30**



- Biological Observation
- Proposed Access Road
- Existing Road
- Mine Lease Boundary
- United Nuclear Corporation Site Boundary (Private Property)
- Northeast Church Rock Mine Boundary
- Navajo Nation Chapter Boundary
- Proposed Soil Borrow Area
- Proposed Laydown Area
- Kerr-McGee Ponds Fenceline
- Kerr-McGee Ponds Investigation Boundary
- Proposed CR-1 and CR-1E Removal Action Extent
- Kerr-McGee Ponds Proposed Removal Action Extent
- Biological Exclusion Zone - 660 feet
- Sensitive habitat with strong potential for Naturita milk-vetch to occur
- Habitation Area Exclusion Area
- Cultural Exclusion Area
- Cultural Resource Field Cleared Areas

1 inch = 800 feet

1:9,600

N W E S

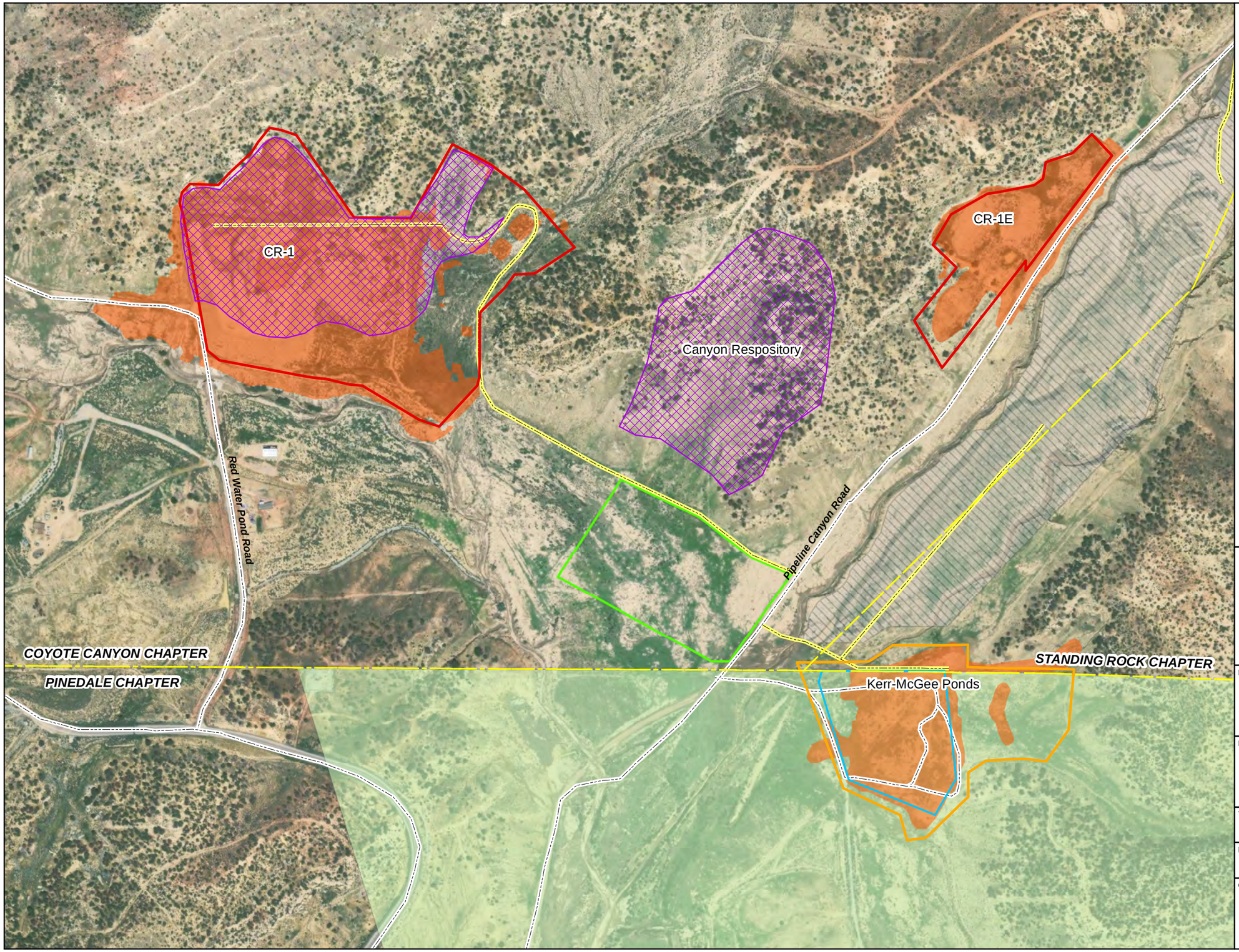
0 400 800 1,600 Feet

Notes:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
Kerr-McGee	Kerr-McGee Corporation

PROPOSED LAYDOWN AREA, ACCESS ROADS, AND EXCLUSION AREAS

Prepared For: U.S. EPA Region 9	Prepared By: TETRA TECH, 1999 Harrison Street, Suite 500, Oakland, CA 94612
Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Tansverse	Figure No.: 31



- Mine Lease Boundary
- United Nuclear Corporation Site Boundary (Private Property)
- Navajo Nation Chapter Boundary
- Kerr-McGee Ponds Fenceline
- Proposed Laydown Area
- Kerr-McGee Ponds Investigation Boundary
- Potential Soil Borrow Area to Be Used for Waste Cap and Site Restoration
- Proposed Access Road
- Existing Road
- Removal Action Extent
- Proposed On-site Consolidation Area[1]

Notes:
[1]Only one on-site consolidation area will be used.

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
Kerr-McGee	Kerr-McGee Corporation

1 inch = 500 feet

1:6,000

N W E S

500 250 0 500 Feet

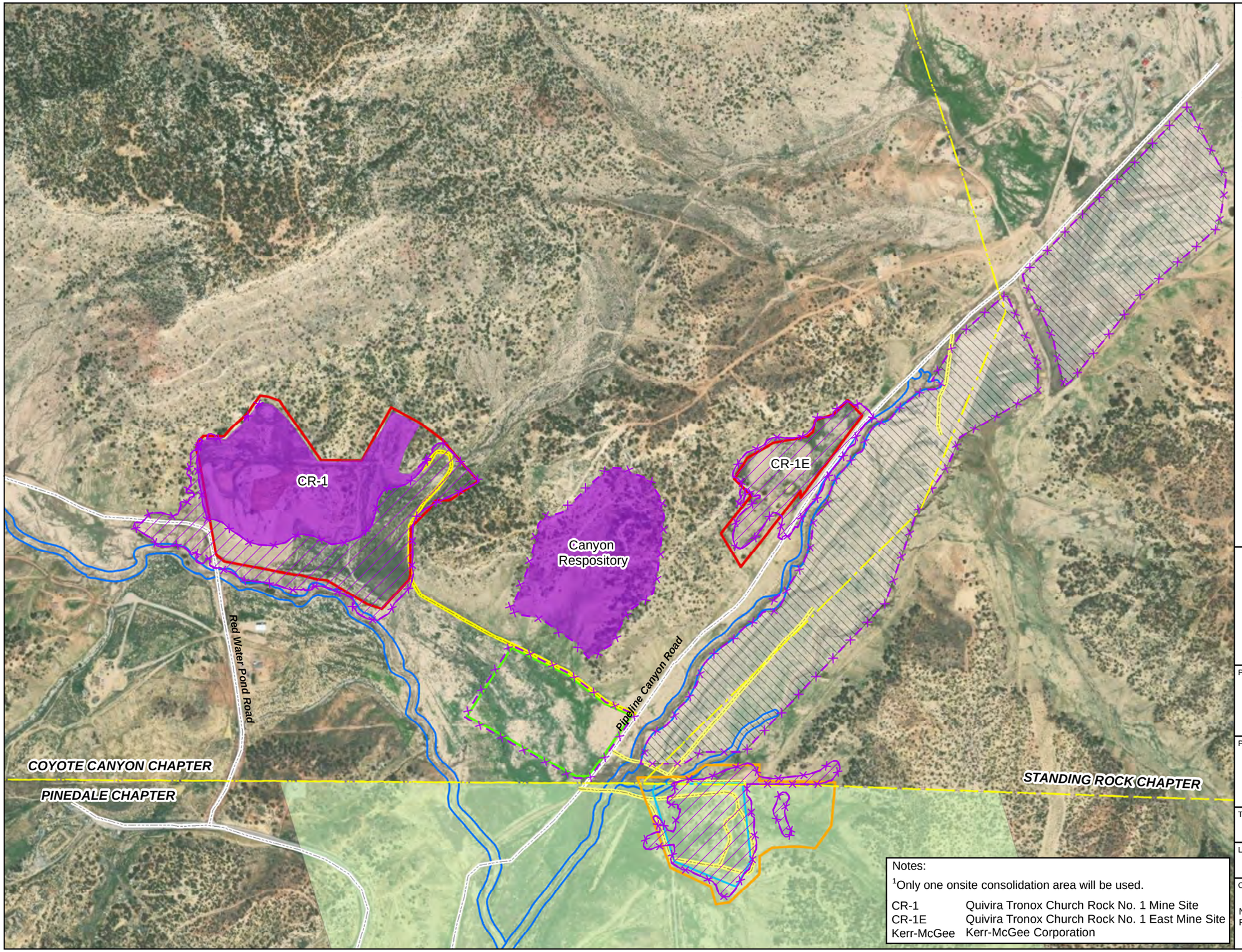
ALTERNATIVE 2
WASTE EXCAVATION, TRANSFER, AND ONSITE CONSOLIDATION

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/6/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **32**



Drainage
Remove Access Road and Restore Surface
Existing Road
Permanent Fencing with Gate to Allow Rotational Grazing
Temporary Fencing
Kerr-McGee Ponds Investigation Boundary
Kerr-McGee Ponds Fenceline
Mine Lease Boundary
United Nuclear Corporation Site Boundary (Private Property)
Navajo Nation Chapter Boundary
Arroyo
Restore Borrow Areas
Restore Laydown Area
Potential Onsite Repository[1]
Site Restoration Area

1 inch = 700 feet

1:8,400

N
W E
S

700 350 0 700 Feet

Notes:

[1]Only one onsite consolidation area will be used.

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
Kerr-McGee	Kerr-McGee Corporation

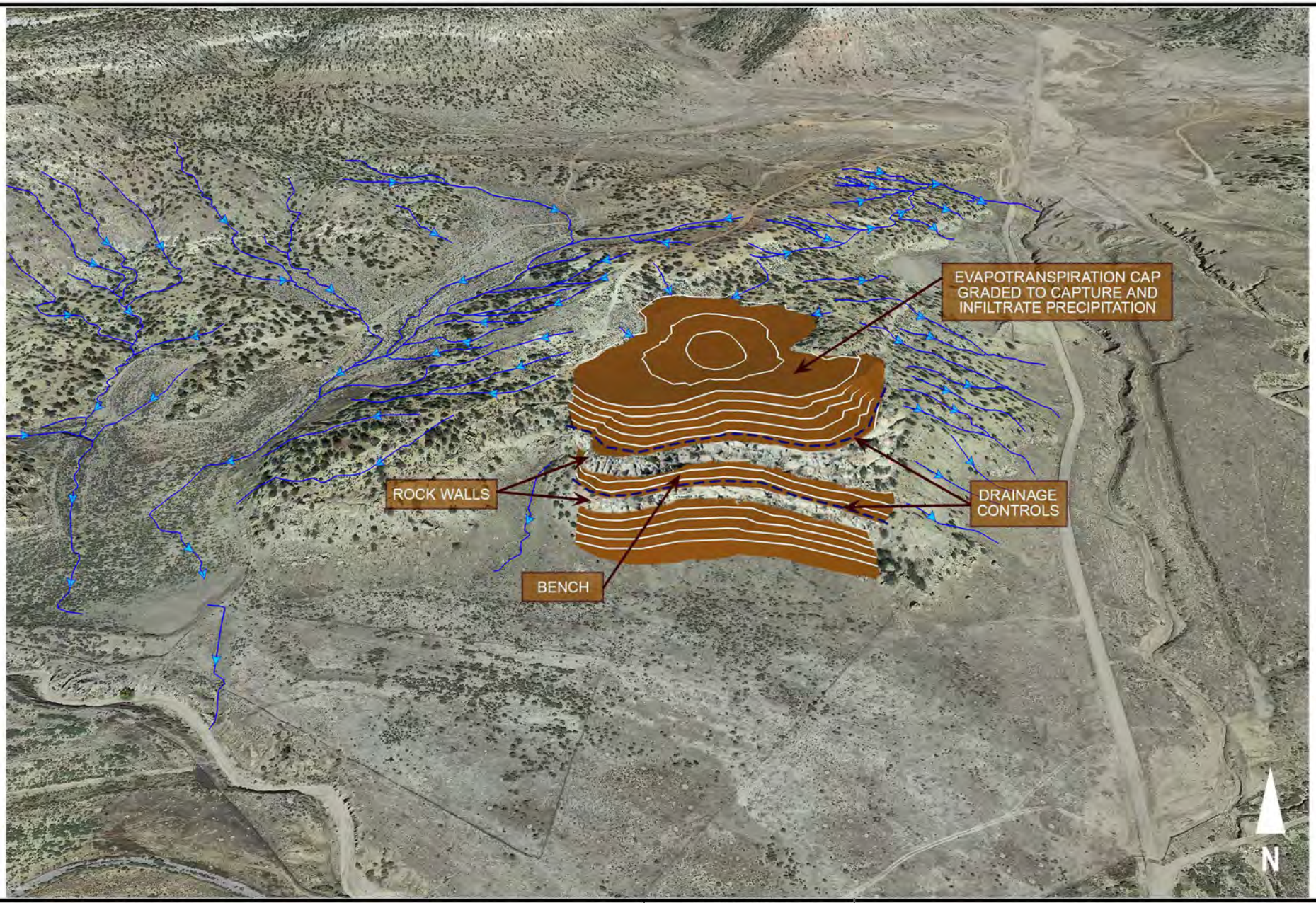
ALTERNATIVE 2 WASTE CAPPING AND SITE RESTORATION

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/14/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **33**



LEGEND

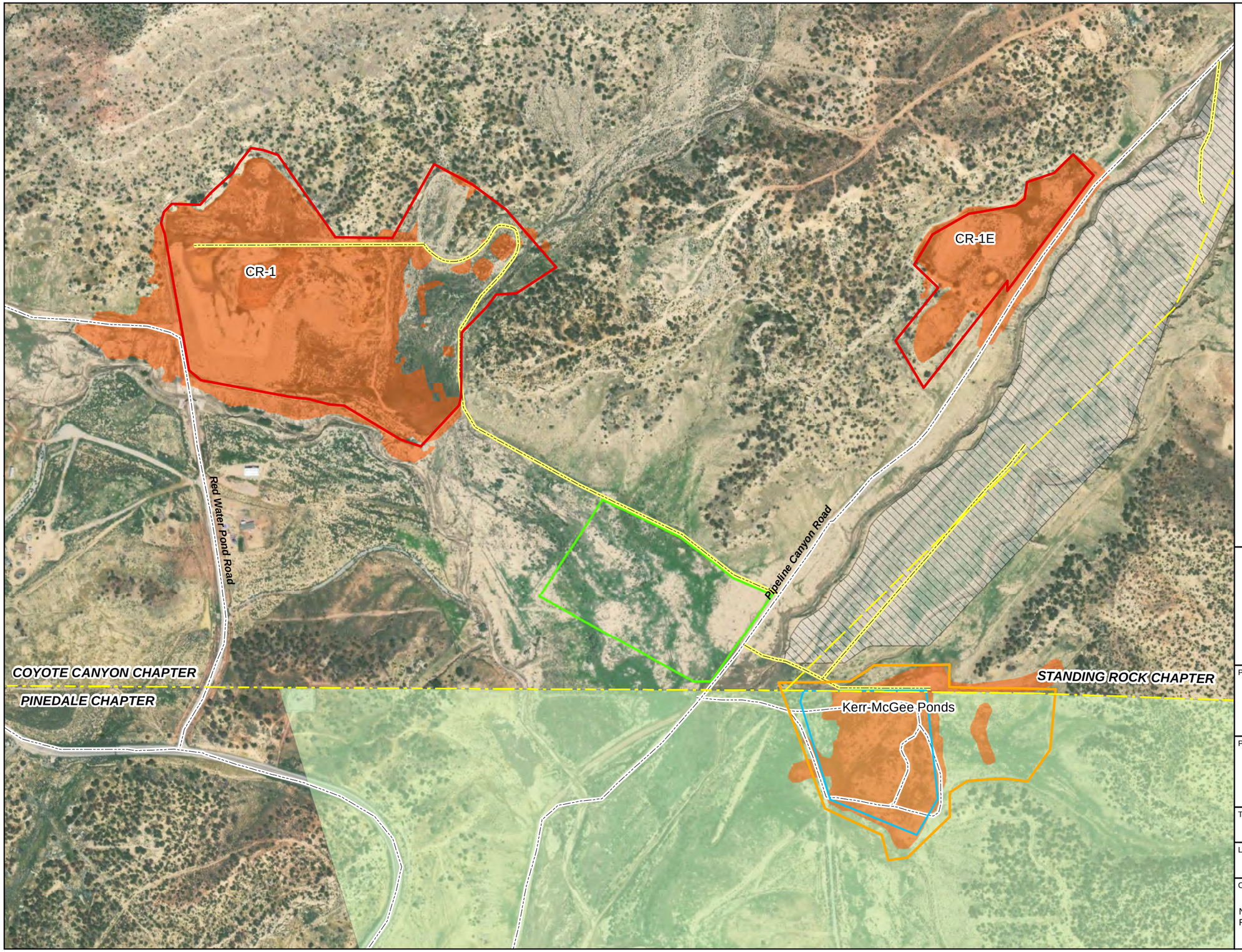
- EVAPOTRANSPIRATION CAP AND CONTOURS
- RUNOFF FLOW PATH
- DRAINAGE CONTROL DITCHES

Prepared for: U.S. EPA Region 9

Prepared by: TETRA TECH

ALTERNATIVE 2
TYPICAL WASTE CONSOLIDATION AREA FEATURES

Task Order No.:	Contract No.:	Figure No.:
TO 0001	68HE0923D0002	34
Location.: QUIVIRA MINES	Date: 02/21/24	



- Proposed Access Road
- Existing Road
- Mine Lease Boundary
- United Nuclear Corporation Site Boundary (Private Property)
- Kerr-McGee Ponds Fenceline
- Navajo Nation Chapter Boundary
- Proposed Laydown Area
- Potential Soil Borrow Area to Be Used for Site Restoration
- Kerr-McGee Ponds Investigation Boundary
- Area To Be Excavated and Disposed Of Off-Navajo Nation

Notes:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
Kerr-McGee	Kerr-McGee Corporation

1 inch = 500 feet

1:6,000

N W E S

500 250 0 500 Feet

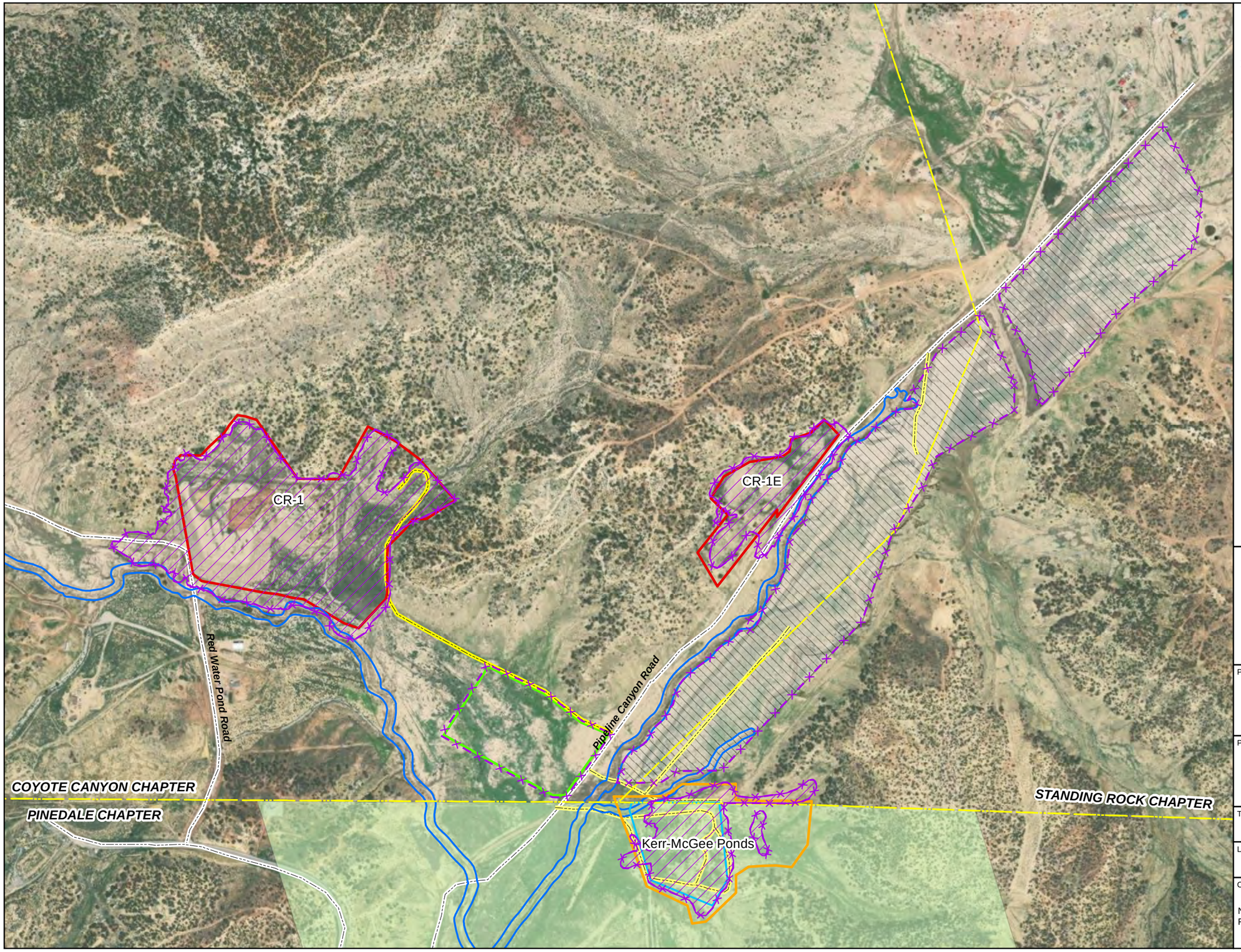
ALTERNATIVES 3 AND 4 WASTE EXCAVATION AND OFFSITE DISPOSAL

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: 35



- Remove Access Road and Restore Surface
- Existing Road
- Temporary Fencing
- Mine Lease Boundary
- Kerr-McGee Ponds Investigation Boundary
- Kerr-McGee Ponds Fenceline
- United Nuclear Corporation Site Boundary
- Navajo Nation Chapter Boundary
- Arroyo
- Restore Borrow Area
- Restore Laydown Area
- Site Restoration Area

Notes:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
Kerr-McGee	Kerr-McGee Corporation

1 inch = 700 feet

1:8,400

N W E S

700 350 0 700 Feet

ALTERNATIVES 3 AND 4 SITE RESTORATION

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **36**

Coordinate System: NAD 1983 StatePlane New Mexico West FIPS 3003 FeetTransverse Mercator



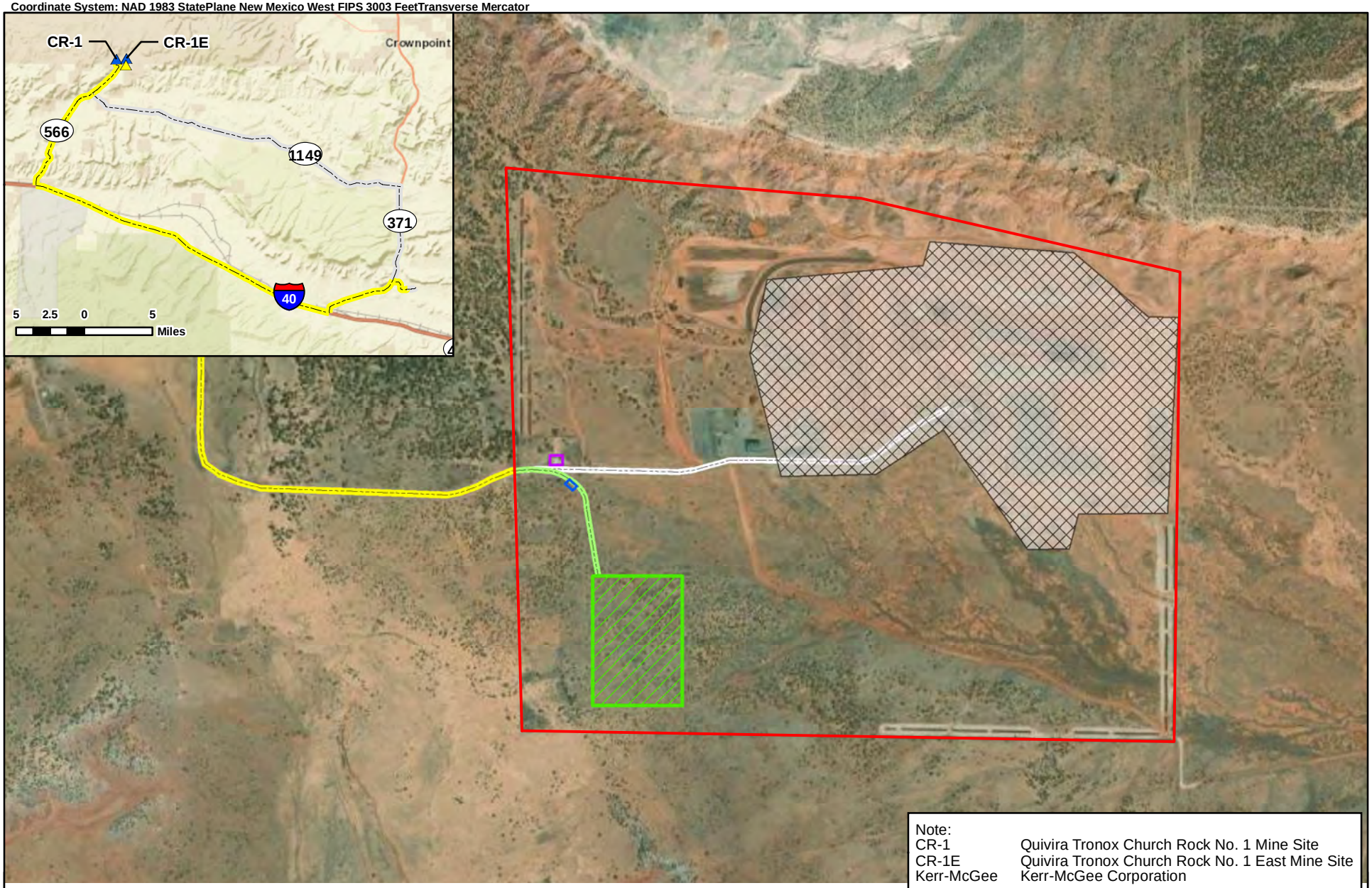
Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

ALTERNATIVE 3 HAUL ROUTES FROM QUIVIRA MINES TO RED ROCK DISPOSAL FACILITY

Task Order No.:	Contract No.:	Figure No.:
0001	68HE0923D0002	37
Location: MCKINLEY COUNTY, NEW MEXICO	Date: 3/4/2024	

Coordinate System: NAD 1983 StatePlane New Mexico West FIPS 3003 FeetTransverse Mercator



Note:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
Kerr-McGee	Kerr-McGee Corporation

- Office
- Scale House
- Proposed Red Rocks Mine Waste Disposal Area
- Existing Red Rocks Landfill Facility
- Facility Boundary
- CR-1 and CR-1E
- Kerr-McGee Ponds
- Red Rocks Disposal Facility

Haul Route Type

- Paved
- Recommended Route
- Existing Haul Road
- New Haul Road

Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH, 1999 Harrison Street, Suite 500, Oakland, CA 94612

ALTERNATIVE 3 OFFSITE DISPOSAL AT PROPOSED RED ROCKS FACILITY

Task Order No.: 0001	Contract No.: 68HE0923D0002	Figure No.: 38
Location: MCKINLEY COUNTY, NEW MEXICO	Date: 3/4/2024	

Coordinate System: NAD 1983 StatePlane New Mexico West FIPS 3003 FeetTransverse Mercator



Haul Route Type

- Paved
- Unpaved
- Recommended Route

- CR-1 and CR-1E
- Kerr-McGee Ponds
- Landfill

Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

ALTERNATIVE 4 HAUL ROUTE FROM QUIVIRA MINES TO DEER TRAIL, COLORADO, DISPOSAL FACILITY

Task Order No.:	Contract No.:	Figure No.:
0001	68HE0923D0002	39
Location: MCKINLEY COUNTY, NEW MEXICO	Date: 3/4/2024	

Coordinate System: NAD 1983 StatePlane New Mexico West FIPS 3003 FeetTransverse Mercator



Notes:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
Kerr-McGee	Kerr-McGee Corporation

Haul Route Type

- Paved
- Unpaved
- Preferred Route

- CR-1 and CR-1E
- Kerr-McGee Ponds
- Landfill

Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH, 1999 Harrison Street, Suite 500, Oakland, CA 94612

HAUL ROUTE FROM QUIVIRA MINES TO WASTE CONTROL SPECIALISTS, ANDREWS, TEXAS, DISPOSAL FACILITY

Task Order No.:	Contract No.:	Figure No.:
0001	68HE0923D0002	40

Location: MCKINLEY COUNTY, NEW MEXICO

Date: 3/4/2024

TABLES

Table 1. Mine Features and Dimensions for Quivira Mines

Feature	Reclamation Status	Reclamation Description	Dimensions
Quivira Church Rock No. 1 Mine (CR-1)			
Shaft	Reclaimed	Sediments and waste rock were placed in shaft, grizzlies were placed over all openings, and the shaft was capped with a 4-foot concrete cap.	14 feet in diameter
Adit	Reclaimed	Infilled with rock and closed.	Undocumented
Waste Rock and Former Ponds 1 to 3	Reclaimed	Sediments were excavated and placed in shaft.	15.4 acres
Former Industrial Area North	Reclaimed	Mine equipment and buildings were removed and foundations destroyed.	4.7 acres
Former Industrial Area Central	Reclaimed	Mine equipment and buildings were removed and foundations destroyed.	1.5 acres
Former Industrial Area East	Reclaimed	Mine equipment and buildings were removed and foundations destroyed.	0.7 acre
Former Ponds 4 and 5	Reclaimed	Sediments were excavated and placed in shaft.	3.6 acres
Former Pond 6	Reclaimed	Sediments were excavated and placed in shaft.	2.6 acres
Step-Out Areas	Unreclaimed	No reclamation completed.	8.5 acres
RWPR Waste	Reclaimed	Excavated and consolidated on CR-1 with soil cover.	1.2 acres 17,374 cubic yards
Vent Hole / Bridge Abutment Waste	Reclaimed	Excavated and consolidated on CR-1 with soil cover.	4.7 acres 10,293 cubic yards

Table 1. Mine Features and Dimensions for Quivira Mines

Feature	Reclamation Status	Reclamation Description	Dimensions
Quivira Church Rock No. 1 East Mine (CR-1E)			
Shaft	Reclaimed	Sediments and waste rock were placed in shaft, grizzlies were placed over all openings, and the shaft was capped with a 4-foot concrete cap.	12 feet in diameter
Adit 1	Reclaimed	Infilled with rock; partially open.	Undocumented
Adit 2	Reclaimed	Infilled with rock; partially open.	Undocumented
Waste Rock and Former Pond	Reclaimed	Waste rock consolidated into two piles. Pond sediment was excavated and placed in shaft.	5 acres
Former Industrial Area North	Reclaimed	Mine equipment and buildings were removed and foundations destroyed.	1.8 acres
Former Industrial Area South	Reclaimed	Mine equipment and buildings were removed and foundations destroyed.	0.3 acre
Step-Out Areas	Unreclaimed	No reclamation completed.	2.9 acres
Kerr-McGee Corporation Ponds			
Former Ponds	Reclaimed	Unlined pond berms were knocked down.	0.47 acre
Former Stockpile Area	Reclaimed	Proto-ore stockpile was removed.	1.1 acres 31,060 cubic yards
Equipment Storage Area	Reclaimed	Equipment was removed.	3.73 acres

Note:
RWPR Red Water Pond Road

Table 2. Comparison of Quivira Surface Soil with Bartlett Barren Member of Crevasse Canyon Formation (BSA-2) Background Surface Soil

COC	Church Rock No. 1 Mine Soil (0-6 inch bgs)			BSA-2 Soil (0-6 inch bgs)			Two-Population Statistical Tests				Final Conclusion for Background Screen
	Sample Size		Detection Frequency (Percent)	Sample Size		Detection Frequency (Percent)	Gehan[a]	Tarone-Ware[a]	Wilcoxon-Mann-Whitney[b]	Quantile[c]	
	Detected	Total		Detected	Total		Site > Background?	Site > Background?	Site > Background?	Site > Background?	Site > Background?
Radium-226	150	150	100%	36	36	100%	--	--	Yes	--	**Yes**
Arsenic	30	30	100%	36	36	100%	--	--	No	No	No
Chromium	30	30	100%	36	36	100%	--	--	No	No	No
Manganese	30	30	100%	36	36	100%	--	--	No	No	No
Thallium	30	30	100%	36	36	100%	--	--	No	No	No
Uranium	86	86	100%	36	36	100%	--	--	Yes	--	**Yes**
COC	Church Rock No. 1 East Mine Soil (0-6 inch bgs)			BSA-2 Soil (0-6 inch bgs)			Two-Population Statistical Tests				Final Conclusion for Background Screen
	Sample Size		Detection Frequency (Percent)	Sample Size		Detection Frequency (Percent)	Gehan[a]	Tarone-Ware[a]	Wilcoxon-Mann-Whitney[b]	Quantile[c]	
	Detected	Total		Detected	Total		Site > Background?	Site > Background?	Site > Background?	Site > Background?	Site > Background?
Radium-226	67	67	100%	36	36	100%	--	--	Yes	--	**Yes**
Arsenic	15	15	100%	36	36	100%	--	--	No	No	No
Chromium	15	15	100%	36	36	100%	--	--	Yes	--	**Yes**
Manganese	15	15	100%	36	36	100%	--	--	No	No	No
Thallium	15	15	100%	36	36	100%	--	--	No	No	No
Uranium	15	15	100%	36	36	100%	--	--	Yes	--	**Yes**

Table 2. Comparison of Quivira Surface Soil with Bartlett Barren Member of Crevasse Canyon Formation (BSA-2) Background Surface Soil

COC	Kerr-McGee Ponds on the Navajo Nation Soil (0-6 inch bgs)			BSA-2 Soil (0-6 inch bgs)			Two-Population Statistical Tests				Final Conclusion for Background Screen
	Sample Size		Detection Frequency (Percent)	Sample Size		Detection Frequency (Percent)	Gehan[a]	Tarone-Ware[a]	Wilcoxon-Mann-Whitney[b]	Quantile[c]	
	Detected	Total		Detected	Total		Site > Background?	Site > Background?	Site > Background?	Site > Background?	Site > Background?
Radium-226	5	5	100%	36	36	100%	--	--	Yes	--	**Yes**
Arsenic	5	5	100%	36	36	100%	--	--	No	No	No
Chromium	5	5	100%	36	36	100%	--	--	Yes	--	**Yes**
Manganese	3	3	100%	36	36	100%	--	--	No	No	No
Thallium	3	3	100%	36	36	100%	--	--	No	No	No
Uranium	5	5	100%	36	36	100%	--	--	Yes	--	**Yes**

COC	Kerr-McGee Ponds on UNC Property Soil (0-6 inch bgs)			BSA-2 Soil (0-6 inch bgs)			Two-Population Statistical Tests				Final Conclusion for Background Screen
	Sample Size		Detection Frequency (Percent)	Sample Size		Detection Frequency (Percent)	Gehan[a]	Tarone-Ware[a]	Wilcoxon-Mann-Whitney[b]	Quantile[c]	
	Detected	Total		Detected	Total		Site > Background?	Site > Background?	Site > Background?	Site > Background?	Site > Background?
Radium-226	54	54	100%	36	36	100%	--	--	Yes	--	**Yes**

COC	Arroyos on the Navajo Nation Soil (0-6 inch bgs)			BSA-2 Soil (0-6 inch bgs)			Two-Population Statistical Tests				Final Conclusion for Background Screen
	Sample Size		Detection Frequency (Percent)	Sample Size		Detection Frequency (Percent)	Gehan[a]	Tarone-Ware[a]	Wilcoxon-Mann-Whitney[b]	Quantile[c]	
	Detected	Total		Detected	Total		Site > Background?	Site > Background?	Site > Background?	Site > Background?	Site > Background?
Radium-226	90	90	100%	36	36	100%	--	--	No	No	No
Arsenic	3	3	100%	36	36	100%	--	--	No	No	No
Manganese	1	1	100%	36	36	100%	--	--	--	--	No

Table 2. Comparison of Quivira Surface Soil with Bartlett Barren Member of Crevasse Canyon Formation (BSA-2) Background Surface Soil

COEC	Site-Wide Soil (0-6 inch bgs)			BSA-2 Soil (0-6 inch bgs)			Two-Population Statistical Tests				Final Conclusion for Background Screen
	Sample Size		Detection Frequency (Percent)	Sample Size		Detection Frequency (Percent)	Gehan[a]	Tarone-Ware[a]	Wilcoxon-Mann-Whitney[b]	Quantile[c]	
	Detected	Total		Detected	Total		Site > Background?	Site > Background?	Site > Background?	Site > Background?	Site > Background?
Uranium-238	10	10	100%	5	36	14%	Yes	Yes	--	--	**Yes**
Uranium-234	10	10	100%	3	3	100%	--	--	No	Yes	**Yes**
Radium-226	379	379	100%	36	36	100%	--	--	Yes	--	**Yes**
Arsenic	108	108	100%	36	36	100%	--	--	Yes	--	**Yes**
Barium	108	108	100%	36	36	100%	--	--	Yes	--	**Yes**
Chromium	108	108	100%	36	36	100%	--	--	Yes	--	**Yes**
Lead	108	108	100%	36	36	100%	--	--	No	No	No
Manganese	85	85	100%	36	36	100%	--	--	No	No	No
Selenium	118	118	100%	36	36	100%	--	--	Yes	--	**Yes**
Thallium	84	85	99%	36	36	100%	No	No	--	No	No
Uranium	164	164	100%	36	36	100%	--	--	Yes	--	**Yes**
Vanadium	108	108	100%	36	36	100%	--	--	Yes	--	**Yes**
Zinc	85	85	100%	36	36	100%	--	--	No	No	No

Notes:

Bold indicates site soil concentrations are greater than background concentrations.

[a] Gehan and Tarone-Ware are tests of central tendency and only used when multiple nondetect results are present in the dataset (USEPA 2022).

[b] Wilcoxon-Mann-Whitney is a test of central tendency and can only be used when all data are detected or a single detection limit is identified for the nondetected results.

[c] Quantile is a test performed to confirm the conclusion that the upper tails of site concentrations are less than those for background. Quantile tests were not performed in cases where the two-population tests for central tendency indicated that the site concentrations are greater than background. Quantile tests were performed using ProUCL Version 4.1.01 (USEPA 2010b).

--	Not applicable	COEC	Contaminant of ecological concern
bgs	Below ground surface	Kerr-McGee	Kerr-McGee Corporation
BSA	Background study area	UNC	United Nuclear Corporation
COC	Contaminant of concern	USEPA	U.S. Environmental Protection Agency

References:

U.S. Environmental Protection Agency (USEPA). 2010b. “ProUCL Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observation." Version 4.1.01. Prepared by A. Singh and A.K. Singh. EPA/600/R-07/041. May.

USEPA. 2022. “ProUCL Technical Guide: Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations.” Version 5.2.0. June 14.

Table 3. Risk Management Summary

Exposure Unit	Land Use / Receptor	Soil Interval	Candidate COC or COEC													
			Uranium-238	Uranium-234	Radium-226 in SE	Arsenic	Barium	Chromium	Cobalt	Iron	Lead	Manganese	Selenium	Thallium	Uranium	Vanadium	Zinc
CR-1	Kee'da'whíí tééh (Full-time Navajo Resident)	Surface	--	--	**COC**	< BG	--	< BG	< BG	< BG	--	< BG	--	< BG	**COC**	--	--
		Subsurface	--	--	**COC**	< BG	--	< BG	< BG	< BG	--	< BG	--	< BG	**COC**	--	--
CR-1E	Kee'da'whíí tééh (Full-time Navajo Resident)	Surface	--	--	**COC**	< BG	--	Cr(III) not a COPC	< BG	< BG	--	< BG	--	< BG	**COC**	--	--
		Subsurface	--	--	**COC**	< BG	--	Cr(III) not a COPC	< BG	< BG	--	< BG	--	< BG	**COC**	--	--
Kerr-McGee Ponds on the Navajo Nation	Kee'da'whíí tééh (Full-time Navajo Resident)	Surface	--	--	**COC**	< BG	--	Cr(III) not a COPC	< BG	< BG	--	< BG	--	< BG	**COC**	--	--
		Subsurface	--	--	**COC**	< BG	--	Cr(III) not a COPC	< BG	< BG	--	< BG	--	< BG	**COC**	--	--
Kerr-McGee Ponds on UNC Property	UNC Outdoor Worker	Surface	--	--	**COC**	--	--	--	--	--	--	--	--	--	--	--	--
		Subsurface	--	--	**COC**	--	--	--	--	--	--	--	--	--	--	--	--
Arroyos on the Navajo Nation	Kọọ eí doo nahaazáh dah (Difficult Access Open Space User)	Surface	--	--	< BG	< BG	--	--	--	--	--	< BG	--	--	--	--	--
		Subsurface	--	--	< BG	< BG	--	--	--	--	--	< BG	--	--	--	--	--
Arroyos on UNC Property	UNC Outdoor Worker	Surface	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Subsurface	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Site-Wide	Plants, Invertebrates, Birds, Mammals	Surface	--	--	EPC < PERG	EPC < PERG	Co-Loc	Cr(III) not a COPEC	--	--	< BG	< BG	EPC < PERG	< BG	EPC < PERG	Co-Loc	< BG
		Subsurface	EPC < PERG	EPC < PERG	EPC < PERG	--	Co-Loc	Cr(III) not a COPEC	--	--	--	< BG	EPC < PERG	< BG	EPC < PERG	--	--

Notes:

Bold indicates an identified final COC recommended for removal action; no COECs were recommended for removal.

--	Contaminant is not a candidate COC or COEC in the exposure unit and depth interval.		
BG	Background	Cr(III)	Trivalent chromium
COC	Contaminant of concern	EPC	Exposure point concentration
COEC	Contaminant of ecological concern	Kerr- McGee	Kerr-McGee Corporation
Co-Loc	Co-located with radium-226 preliminary removal action extent	PERG	Preliminary ecological removal goal
COPC	Contaminant of potential concern	PRG	Preliminary removal goal
COPEC	Contaminant of potential ecological concern	SE	Secular equilibrium
CR-1	Quivira Church Rock No. 1 Mine	UNC	United Nuclear Corporation
CR-1E	Quivira Church Rock No. 1 East Mine		

Table 4. Quivira Mines Selection of Soil Removal Action Goal for Each COC and COEC

COC / COEC	Units	Human Health PRG[1]	NAUM PERG[2]	BTV[3]	RAG[4]	Basis for RAG
Quivira Church Rock No. 1 Mine – Kee'da'whíí tééh (Full-Time Navajo Resident)						
Surface Soil (0-6 inches bgs) and Subsurface Soil (0-72 inches bgs)						
Radium-226 [5]	pCi/g	0.050	--	2.0	2.0	BTV
Uranium	mg/kg	3.2	--	2.4	3.2	HH PRG
Quivira Church Rock No. 1 East Mine – Kee'da'whíí tééh (Full-Time Navajo Resident)						
Surface Soil (0-6 inches bgs) and Subsurface Soil (0-72 inches bgs)						
Radium-226 [5]	pCi/g	0.050	--	2.0	2.0	BTV
Uranium	mg/kg	3.2	--	2.4	3.2	HH PRG
Kerr-McGee Ponds on the Navajo Nation – Kee'da'whíí tééh (Full-Time Navajo Resident)						
Surface Soil (0-6 inches bgs) and Subsurface Soil (0-72 inches bgs)						
Radium-226 [5]	pCi/g	0.050	--	2.0	2.0	BTV
Kerr-McGee Ponds on United Nuclear Corporation Property – UNC Outdoor Worker						
Surface Soil (0-6 inches bgs)						
Radium-226 [5]	pCi/g	5.4	--	2.0	5.4	HH PRG
Subsurface Soil (6-72 inches bgs)						
Radium-226 [5]	pCi/g	5.4	--	2.0	5.4	HH PRG
Arroyos on the Navajo Nation – Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space User)						
Surface Soil (0-6 inches bgs) and Subsurface Soil (0-72 inches bgs)						
No COCs or COECs Identified						
Arroyos on United Nuclear Corporation Property – UNC Outdoor Worker						
Surface Soil (0-6 inches bgs) and Subsurface Soil (0-36 inches bgs)						
No COCs or COECs Identified						

Notes:

[1] The human health PRG is based on the RME receptor assumed at each EU and calculated using the NAUM Risk Calculator (USEPA 2024b).

[2] No COECs were identified; no removal action is recommended to address ecological risk.

[3] The BTVs for soil are UTL95-95s from the Bartlett Barren Member (Tetra Tech, Inc. 2023b).

[4] The RAG is the lesser of the human health PRG and NAUM PERG, when applicable, unless either is less than the BTV. If the BTV is greater than the human health PRG or NAUM PERG, the final RAG is to address material that is distinguishable from background.

[5] Assumption of secular equilibrium for radium-226 is protective for the calculation of risk-based screening levels. Adjusted toxicity values are used to incorporate all toxicity for the entire uranium-238 decay chain in the development of the PRG. Site data for radium-226 are used to evaluate the extent of radionuclides above RAGs.

--	Not a COEC	pCi/g	Picocurie per gram
bgs	Below ground surface	PERG	Preliminary ecological removal goal
BTV	Background threshold value	PRG	Preliminary removal goal
COC	Contaminant of concern	RAG	Removal action goal
COEC	Contaminant of ecological concern	RME	Reasonable maximum exposure
EU	Exposure unit	UNC	United Nuclear Corporation
HH	Human health	UTL95-95	95% upper tolerance limit with 95% coverage
mg/kg	Milligram per kilogram		
NAUM	Navajo abandoned uranium mine	USEPA	U.S. Environmental Protection Agency

Table 4. Quivira Mines Selection of Soil Removal Action Goal for Each COC and COEC

References:

Tetra Tech, Inc. 2023b. “Quivira Mines Data Gaps Investigation Transmittal Memorandum.” Response, Assessment, and Evaluation Services. Contract No. EP-S9-17-03. September.

U.S. Environmental Protection Agency (USEPA). 2024b. “Navajo Abandoned Uranium Mine Risk Calculator." Version 1.03. March.

Table 5. General Response Actions, Technologies, and Process Options

General Response Actions	Response Action Technology	Process Options
No Action	None	Not Applicable
Institutional Controls	Land Use Controls	Chapter Land Use Plans
		Homesite Lease Approval
	Access Restrictions	Deed Restrictions
		Environmental Control Easements
Engineering Controls	Physical Barriers	Fencing/Barrier
	Surface Controls	Consolidation, Grading, Revegetation, and Erosion Protection
		Soil Binder
	Segregation	Soil Sorting
	Backfilling of Mine Workings	Backfilling of Cuts, Benches, and Pits
		Backfilling of Underground Voids
	Containment	Earthen Cover
		Earthen Cover with Upper HDPE or Geosynthetic Clay Liner
	Regional Disposal	On-Navajo Nation Regional Repository
		Off-Navajo Nation Regional Repository
	Off-Navajo Nation Disposal	Non-RCRA, Class A LLRW, or RCRA C Hazardous Waste Disposal Facility with State License to Receive Radioactive Material
Excavation and Treatment	Physical/Chemical Treatment	Soil Washing
		Acid Extraction
		Ablation
		Milling/Reprocessing
		Solidification
		Stabilization
	Thermal Treatment	Vitrification
In-Place Treatment	Physical/Chemical Treatment	Solidification
		Stabilization
	Thermal Treatment	Vitrification
	Vegetative Treatment	Phytoextraction/Phytostabilization

Notes:
HDPE High-density polyethylene
LLRW Low-level radioactive waste
RCRA Resource Conservation and Recovery Act

Table 6. Applicable or Relevant and Appropriate Requirements and To Be Considered Requirements for Quivira Mines

Table 6a and Table 6b list the federal and Navajo Nation location- and action-specific applicable or relevant and appropriate requirements (ARAR) and "To Be Considered" (TBC) requirements, respectively, that have been identified for all the alternative response actions described in the engineering evaluation/cost analysis (EE/CA) for the Quivira Tronox Mine Site (Quivira Mines). The U.S. Environmental Protection Agency (USEPA) did not identify chemical-specific ARARs or TBCs because potential federal, State of New Mexico, and Navajo Nation 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 (Table 6b). Identification and evaluation of ARARs is an iterative process that continues throughout the response process. As site conditions, contaminants, and response alternatives at the Quivira Mines are better understood, the ARARs and TBCs and their relevance to the removal action may change. ARARs and TBCs are finalized in the action memorandum for the selected response action.

Cleanup standards were derived through the USEPA risk assessment process in accordance with the following USEPA guidance.

- "Clarification of the Role of Applicable, or Relevant and Appropriate Requirements in Establishing Preliminary Remediation Goals under CERCLA" (USEPA 1997a)
- "Establishment of Cleanup Levels for CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] Sites with Radioactive Contamination" (USEPA 1997b)
- "Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites" (USEPA 1998)
- "Radiation Risk Assessment at CERCLA Sites: Q&A" (USEPA 2014)

The following Navajo Nation laws, regulations, and guidance 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 Quivira Mines where these requirements may be applicable.

- Navajo Nation CERCLA, 4 *Navajo Nation Code* (N.N.C.) Sections (§§) 2101-2805 – The Navajo Nation CERCLA requirements must be complied with during implementation of the response action if petroleum contamination is discovered at the Quivira Mines because Navajo Nation CERCLA Section (§) 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 (NNSTA), 4 N.N.C. §§ 1501-1577 – If any permanent storage tanks are found at a site, including both underground and aboveground storage tanks and tanks holding not only petroleum but any hazardous substances, NNSTA § 1542(C)(1) requires removal of the tanks. (The

guidance for temporary/mobile storage tanks brought on site is included in Table 6b 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, are not ARARs, these regulations give preference to Navajo Nation businesses and individuals when hiring employees and contractors to perform the response actions anticipated by this EE/CA.
- Navajo Nation Diné Radioactive Materials Transportation Act (RMTA), 18 N.N.C. §§ 1304-1307 – 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 the Navajo Nation, as well as license fees, bonding requirements, route restrictions, and curfews.

The EE/CAs for which the ARARs tables below were prepared do not address groundwater and, therefore, ARARs for groundwater are not included. If any groundwater contamination is found at the Quivira Mines, the related ARARs will be addressed at that time.

References:

U.S. Environmental Protection Agency (USEPA). 1997a. "Clarification of the Role of Applicable, or Relevant and Appropriate Requirements in Establishing Preliminary Remediation Goals under CERCLA." Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-23. August.

USEPA. 1997b. "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination." OSWER Directive No. 9200.4-18. August.

USEPA. 1998. "Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites." OSWER Directive No. 9200.4-25. February.

USEPA. 2014. "Radiation Risk Assessment at CERCLA Sites: Q&A." OSWER Directive No. 9200.4-40. May.

Table 6a. 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 U.S.C. §§ 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 (Section 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 intentionally excavated or removed within the 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 U.S.C. §§ 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)	Federal agencies are required to consider the effects of federally funded (in whole or in part) activity on any historic property or objects and minimize harm to any National Historic Landmark. Federal agencies may be required to identify historic properties or objects, determine whether proposed activity will have an adverse effect on historic properties or objects, and develop alternatives or modifications to the proposed action that could avoid, minimize, or mitigate adverse effects through the National Historic Preservation Act's Section 106 process.	**Applicable** Substantive requirements are applicable if a 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 U.S.C. §§ 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 a federal agency action may cause irreparable loss or destruction to significant scientific, prehistorical, historical, or archaeological data.

Table 6a. Location-Specific ARARs and TBC Information

Media	Requirement	Requirement Synopsis	Prerequisites, Status, and Rationale
Cultural Resources	**FEDERAL** **Archaeological Resources Protection Act of 1979** **16 U.S.C. §§ 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 within the area to be disturbed.
Cultural Resources	**FEDERAL** **American Indian Religious Freedom Act** **42 U.S.C. § 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 the area to be disturbed.
Biological Resources	**FEDERAL** **Migratory Bird Treaty Act** **16 U.S.C. § 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. Protected migratory birds species 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 U.S.C. §§ 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 are applicable if bald or golden eagles or their nests are identified at or near the site.

Table 6a. Location-Specific ARARs and TBC Information

Media	Requirement	Requirement Synopsis	Prerequisites, Status, and Rationale
Biological Resources	**FEDERAL** **Endangered Species Act** **16 U.S.C. §§ 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 or result in the destruction or alteration of such species' habitats. Endangered and threatened species are listed at 50 CFR Part 17, Subpart B.	**Applicable** Substantive requirements are applicable if endangered or threatened species are identified at the site.
Cultural Resources	**NAVAJO NATION** **Navajo Nation Cultural Resources Protection Act** **11 N.N.C. §§ 1003(S); 1021; and 1031**	Prohibits alteration, damage, excavation, defacement, destruction, or removal of cultural properties.	**Applicable** Substantive requirements are applicable to activities at the AUM sites where cultural resources may be encountered.
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 the Navajo Nation, including the handling of inadvertent discovery.	**TBC** TBC for activities on AUM sites where cultural resources may be encountered.

Table 6a. Location-Specific ARARs and TBC Information

Media	Requirement	Requirement Synopsis	Prerequisites, Status, and Rationale
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** NNHHPD performs these functions pursuant to a contract with BIA under which NNHHPD 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**
Biological Resources	**NAVAJO NATION** **Navajo Nation Endangered Species Act** **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 the area to be disturbed on AUM sites.

Table 6a. Location-Specific ARARs and TBC Information

Notes:

§	Section
§§	Sections
ARAR	Applicable or relevant and appropriate requirement
AUM	Abandoned uranium mine
BIA	Bureau of Indian Affairs
CFR	*Code of Federal Regulations*
DOI	U.S. Department of the Interior
N.N.C.	*Navajo Nation Code*
NNESA	Navajo Nation Endangered Species Act
NNHHPD	Navajo Nation Heritage and Historic Preservation Department
TBC	To be considered
U.S.C.	*United States Code*

Table 6b. 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 millirems per year.	**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 picocuries per square meter per second.	**Relevant and Appropriate** These requirements are applicable to nonoperational 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 2, which consists of onsite containment of the contaminated soil and uranium waste rock.
Water	**FEDERAL** **Clean Water Act** **33 U.S.C. § 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 of Navajo Nation Surface Water Quality Standards 2015).

Table 6b. Action-Specific ARARs and TBC Information

Media	Requirement	Requirement Synopsis	Prerequisites, Status, and Rationale
Water	**FEDERAL** **Clean Water Act** **33 U.S.C. § 1342(p)** NPDES 2022 Construction General Permit for Stormwater Discharges from Construction Activities Part 2. Technology-Based Effluent Limitations. Section 2.2. Erosion and Sediment Control Requirements, Subsection 2.2.1.	Requires implementation of erosion and sediment controls to minimize the discharge of pollutants in stormwater from construction activities. Natural buffers or equivalent erosion and sediment controls must be provided and maintained for discharges to receiving waters within 50 feet of the site's earth disturbances. For any discharges to receiving waters within 50 feet of the site's earth disturbances, one of the following alternatives must be complied with: i. Provide and maintain a 50-foot undisturbed natural buffer 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 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.	**Applicable** For operators of construction activities if weather events necessitating stormwater runoff controls occur during onsite excavation, waste consolidation, and repository construction.
Water	**FEDERAL** **Clean Water Act** **33 U.S.C. § 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 WOTUS other than incidental fallback. Should dredge and fill material be discharged to a WOTUS, the chemical, biological, and physical impacts to the WOTUS must be tested and evaluated. Any adverse effects shall be minimized by treating the material before 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 Table 206.1 of Navajo Nation Surface Water Quality Standards 2015).

Table 6b. Action-Specific ARARs and TBC Information

Media	Requirement	Requirement Synopsis	Prerequisites, Status, and Rationale
Water	**FEDERAL** **Clean Water Act** **33 U.S.C. § 1344** **CWA § 404** Nationwide Permit 38 – Clean Up of Hazardous and Toxic Waste	Onsite CERCLA actions conducted by a federal agency that involve the discharge of dredged or fill material into WOTUS must comply with the substantive requirements of the Nationwide Permit 38 general conditions, as appropriate, and any regional or case-specific conditions recommended by the U.S. Army Corps of Engineers 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 Table 206.1 of Navajo Nation Surface Water Quality Standards 2015).
Repository	**FEDERAL** **Uranium Mill Tailings Radiation Control Act** **42 U.S.C. §§ 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 2, which consists of onsite containment of the contaminated soil and uranium waste rock.

Table 6b. Action-Specific ARARs and TBC Information

Media	Requirement	Requirement Synopsis	Prerequisites, Status, and Rationale
Repository	**FEDERAL** **Uranium Mill Tailings Radiation Control Act** **42 U.S.C. §§ 7918 and 2022** 10 CFR Part 40, Appendix A. Criterions 1, 4, 6(1), 6(3), 6(5) and 6(7)	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. 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.	**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 in Alternative 2, 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 that 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 2, which consists of onsite containment of contaminated soil and uranium waste rock.
All	**NEW MEXICO** **NMAC § 20.3.13.1317**	Requires the protection of the general population from the release of radioactivity.	**Relevant and Appropriate** This regulation is the same as 40 CFR § 192. This requirement is not applicable to the site but is relevant and appropriate.

Table 6b. Action-Specific ARARs and TBC Information

Media	Requirement	Requirement Synopsis	Prerequisites, Status, and Rationale
All	**NEW MEXICO** **NMAC § 20.3.4**	Establishes standards for protection against radiation.	**Relevant and Appropriate** This regulation is the same as 10 CFR § 20. This requirement is not applicable to the site but is relevant and appropriate.
Soil	**NEW MEXICO** **NMAC §§ 19.10.5.507 and 19.10.5.508**	Establishes performance and reclamation standards and requirements for noncoal mining operations.	**Relevant and Appropriate** This regulation provides revegetation requirements for existing noncoal mining operations, as well as other reclamation requirements.
Soil and Water	**NEW MEXICO** **New Mexico Soil and Water Conservation District Act** New Mexico Statutes Annotated 73-20-25	Establishes state authority to control and prevent soil erosion, prevent floodwater and sediment damage to soil, and conserve natural resources.	**TBC** This regulation will be a TBC to the extent that it does not conflict with CERCLA, the National Contingency Plan, 40 CFR Part 300, or other federal requirements.
Soil	**NEW MEXICO** **Joint Guidance for the Cleanup and Reclamation of Existing Uranium Mining Operations in New Mexico (March 2016)**	This guidance is used to assist mine site responsible parties in addressing soil radiation at existing uranium mines as part of reclamation activities.	**TBC** This guidance will be a TBC to the extent that it does not conflict with CERCLA, the National Contingency Plan, 40 CFR Part 300, or other federal requirements.
Soil	**NEW MEXICO** **Guidance for Soil Suitability, Revegetation and Self-Sustaining Ecosystem (1996)**	Used to implement and evaluate vegetation success and soil cover material properties and reclamation.	**TBC** This guidance will be a TBC for restoration of excavated or covered waste.

Table 6b. Action-Specific ARARs and TBC Information

Media	Requirement	Requirement Synopsis	Prerequisites, Status, and Rationale
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 (2022)	The Navajo people have an obligation under the Navajo Nation 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 the Navajo Nation Fundamental Law and how the principles 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 CERCLA, the National Contingency Plan, 40 CFR Part 300, or other federal requirements.
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)	Regulates storage of petroleum and other regulated substances in underground tanks and ASTs. 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 before 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).

Notes:

§	Section
§§	Sections
ARAR	Applicable or relevant and appropriate requirement
AST	Aboveground storage tank
AUM	Abandoned uranium mine
BMP	Best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CWA	Clean Water Act
DOE	U.S. Department of Energy
NMAC	*New Mexico Administrative Code*
N.N.C.	*Navajo Nation Code*
NNCWA	Navajo Nation Clean Water Act
NNEPA	Navajo Nation Environmental Protection Agency
NNSTA	Navajo Nation Underground and Aboveground Storage Tank Act
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
TBC	To be considered
UMTRCA	Uranium Mill Tailings Radiation Control Act
U.S.C.	*United States Code*
WOTUS	Waters of the U.S.

APPENDIX A

QUIVIRA MINES SITE IMAGES

The following photos were taken during visits to the Quivira Church Rock 1 Mine (CR-1), Church Rock 1 East Mine (CR-1E), and Kerr-McGee Corporation (Kerr-McGee) Ponds in January 2020 and April, May, and June 2022.



Photograph 1

Date: 5/16/22

Location:

CR-1, facing south.

Description:

Red Water Pond Road Bridge at Unnamed Arroyo.



Photograph 2

Date: 5/16/22

Location:

CR-1, facing north.

Description:

View of CR-1 main gate at Red Water Pond Road.



Photograph 3

Date: 4/12/22

Location:

CR-1 at Red Water Pond Road, facing northwest.

Description:
Culvert draining CR-1 access road.



Photograph 4

Date: 4/12/22

Location:

CR-1, facing south.

Description:
Overview of the main waste rock pile, Red Water Pond Road, Unnamed Arroyo, and access to site.



Photograph 5

Date: 4/12/22

Location:

CR-1, facing southeast.

Description:
Overview of the top of the main waste rock pile and smaller waste pile from the time-critical removal action area.



Photograph 6

Date: 4/12/22

Location:

CR-1, facing east.

Description:
Overview of the top of the main waste rock pile and industrial area.



Photograph 7

Date: 4/12/22

Location:

CR-1, facing east.

Description:
Close-up view of the industrial area behind the waste pile.



Photograph 8

Date:1/24/20

Location:

CR-1, facing southwest.

Description:
View of the top of the waste pile and adjacent community.



Photograph 9

Date: 1/24/20

Location:

CR-1, facing east.

Description:
View across the top of the waste pile with the lower ponds area at upper right.



Photograph 10

Date: 1/24/20

Location:

CR-1, facing north.

Description:
View of the top of the waste pile with the industrial area beyond.



Photograph 11

Date: 4/12/22

Location:

CR-1, facing east.

Description:

Toe of the south side of CR-1 waste rock pile.



Photograph 12

Date: 4/12/22

Location:

CR-1, facing west.

Description:

Toe of the south side of CR-1 waste rock pile.



Photograph 13

Date: 1/24/20

Location:

CR-1, facing northeast.

Description:
Rills and erosion on the main waste pile.



Photograph 14

Date: 5/09/22

Location:

CR-1, facing east.

Description:
Ponds access road filled with vegetation.



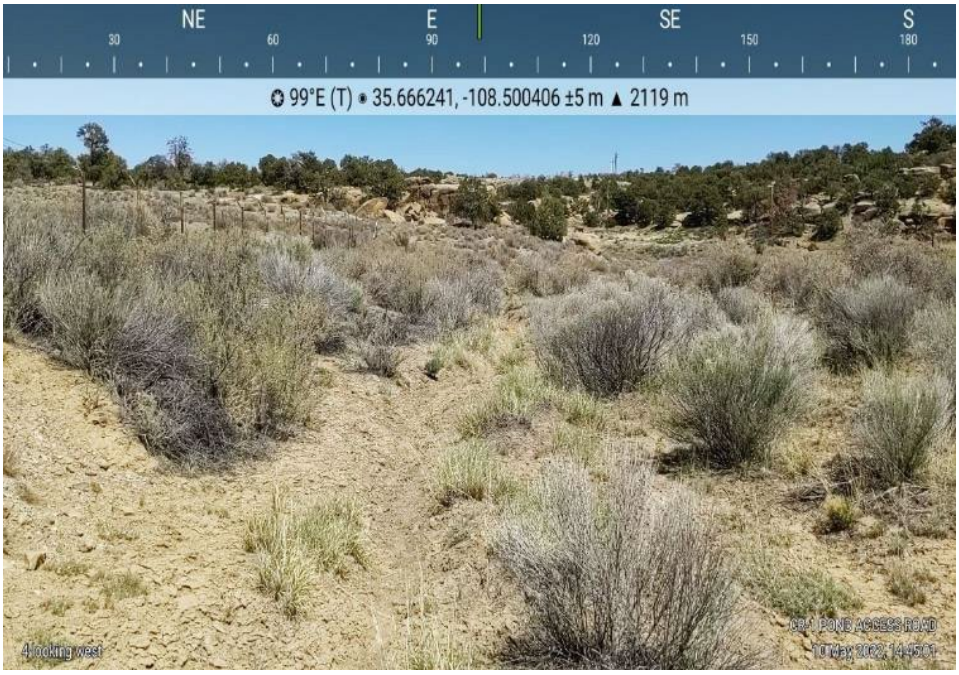
Photograph 15

Date: 6/01/22

Location:

CR-1, facing east.

Description:
Ponds access road after being cleared and graded.



Photograph 16

Date: 5/10/22

Location:

CR-1, facing east.

Description:
Overlooking the upper ponds area.



Photograph 17

Date: 5/9/22

Location:

CR-1, facing southeast.

Description:
Overlooking the upper ponds area.



Photograph 18

Date: 5/09/22

Location:

CR-1, facing south.

Description:
Overlooking the lower ponds area.



Photograph 19

Date: 5/09/22

Location:

CR-1, facing north.

Description:
Overview of the lower ponds area with an outcrop and waste pile in the upper left.



Photograph 20

Date: 1/24/20

Location:

CR-1, facing west.

Description:
Facing the main waste pile from the ponds area.



Photograph 21

Date: 1/24/20

Location:

CR-1 lower pond area, facing west.

Description:
Overview of the lower pond area and proximity of residences.



Photograph 22

Date: 1/24/20

Location:

CR-1 Unnamed Arroyo adjacent to lower pond area, facing northwest.

Description:
Overview of the waste pile in background, pond area in middle, and arroyo in foreground.



Photograph 23

Date: 1/24/20

Location:

CR-1 lower pond area, facing north.

Description:
Erosion and runoff from the lower pond area.



Photograph 24

Date: 4/13/22

Location:
Unnamed Arroyo adjacent to CR-1 lower pond area, facing east.

Description:
Erosion and runoff from the lower pond area entering the arroyo.



Photograph 25

Date: 4/13/22

Location:

CR-1 northeast of the waste pile and pond area, facing southwest.

Description:
Gap in the site fence. Note the juniper trees growing in the undisturbed area of the site.



Photograph 26

Date: 1/24/20

Location:

CR-1E, facing west.

Description:
Western end of CR-1E along the utility pipeline alignment.



Photograph 27

Date: 1/24/20

Location:

CR-1E, facing south.

Description:
Western end of CR-1E looking across the road toward the Pipeline Canyon Arroyo.



Photograph 28

Date: 1/24/20

Location:

CR-1E, facing east.

Description:
Eastern end of CR-1Ethe site.



Photograph 29

Date: 1/24/20

Location:

CR-1E, facing southeast.

Description:
View from the northern edge of site near the adit with waste rock to middle left.



Photograph 30

Date: 1/24/20

Location:

CR-1E, facing northeast.

Description:
Overview of eastern end of CR-1E site.



Photograph 31

Date: 4/12/22

Location:
Pipeline Canyon Arroyo adjacent to CR-1E.

Description:
Pipe from CR-1E discharging to arroyo. Heavy erosion is visible below the culvert leading into the arroyo.



Photograph 32

Date: 4/12/22

Location:
Pipeline Canyon Arroyo, facing east.

Description:
Debris inside of the arroyo adjacent to CR-1E.



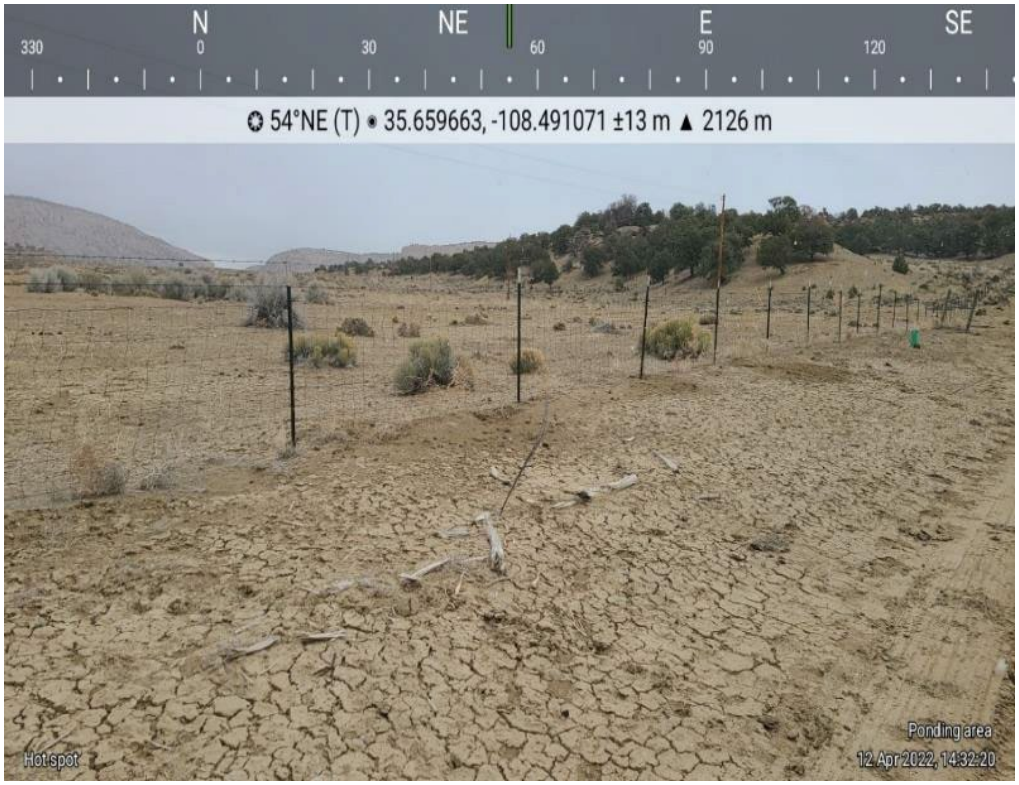
Photograph 33

Date: 4/12/22

Location:

CR-1E Pipeline Canyon Arroyo, facing southeast.

Description:
The arroyo adjacent to CR-1E.



Photograph 34

Date: 4/12/22

Location:

Kerr-McGee Ponds, facing northeast.

Description:
Property boundary and access road along the northern edge of Kerr-McGee Ponds area.



Photograph 35

Date: 4/11/22

Location:

Kerr-McGee Ponds, facing southeast.

Description:
Cattle on Kerr-McGee Ponds area.



Photograph 36

Date: 7/18/17

Location:

Kerr-McGee Ponds, facing down.

Description:
Location of surface sample KMP-23. Note the typical brush cover of the site.



Photograph 37

Date: 7/18/17

Location:

Kerr-McGee Ponds, facing south.

Description:
Location of a subsurface sample. Note the heavy brush cover in this area of the site.



Photograph 38

Date: 7/18/17

Location:
Arroyo upstream of Kerr-McGee Ponds, facing northeast.

Description:
Collecting surface soil sample KMP-12 in unnamed arroyo north of the United Nuclear Corporation property line.



Photograph 39

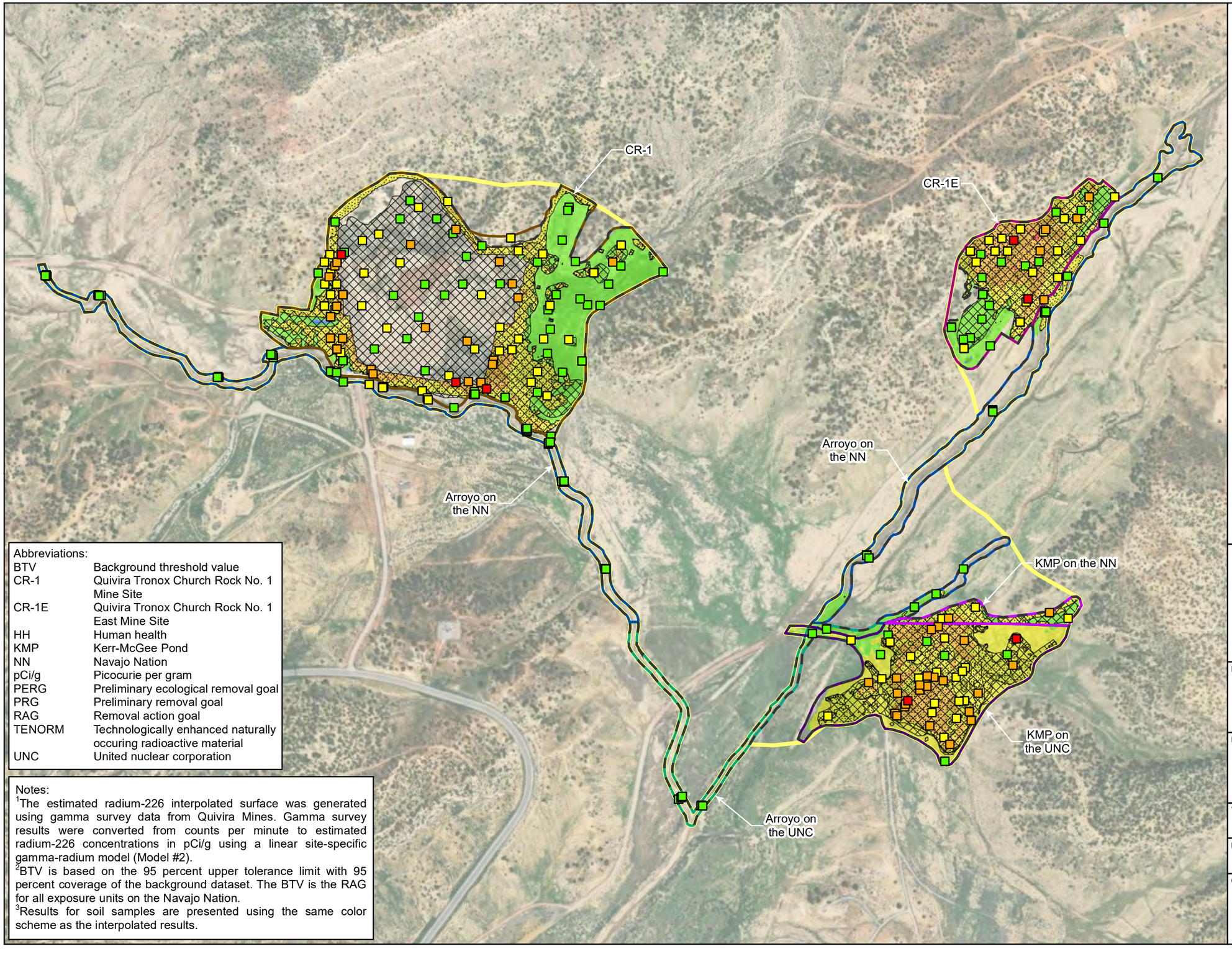
Date: 7/18/17

Location: Arroyo upstream of Kerr-McGee Ponds, facing southwest.

Description: Collecting sample KMP-11 in unnamed arroyo north of the United Nuclear Corporation property line.

APPENDIX B

CONTAMINANT DISTRIBUTION



Estimated Radium-226 (pCi/g)[1]

≤ 0.050	≤ HH PRG (Resident)
0.050 - 2.0	HH PRG (Resident) - RAG (BTV)[2]
2.0 - 5.4	RAG (BTV) - RAG (HH PRG UNC Worker)
5.4 - 40	RAG (HH PRG UNC Worker) - PERG
> 40	> PERG

Soil Sample Locations[3]

- Surface Soil (0-6 inches bgs)
- TENORM
- Radium-226 Removal Action Extent
- Removal Action Extent

Exposure Units

- CR-1
- CR-1E
- KMP on the NN
- KMP on the UNC
- Arroyo on the NN
- Arroyo on the UNC
- Site-wide (Ecological Risk)

1 inch = 600 feet

1:7,200

N W E S

600 300 0 600 Feet

Abbreviations:

BTV	Background threshold value
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
HH	Human health
KMP	Kerr-McGee Pond
NN	Navajo Nation
pCi/g	Picocurie per gram
PERG	Preliminary ecological removal goal
PRG	Preliminary removal goal
RAG	Removal action goal
TENORM	Technologically enhanced naturally occuring radioactive material
UNC	United nuclear corporation

Notes:

[1]The estimated radium-226 interpolated surface was generated using gamma survey data from Quivira Mines. Gamma survey results were converted from counts per minute to estimated radium-226 concentrations in pCi/g using a linear site-specific gamma-radium model (Model #2).

[2]BTV is based on the 95 percent upper tolerance limit with 95 percent coverage of the background dataset. The BTV is the RAG for all exposure units on the Navajo Nation.

[3]Results for soil samples are presented using the same color scheme as the interpolated results.

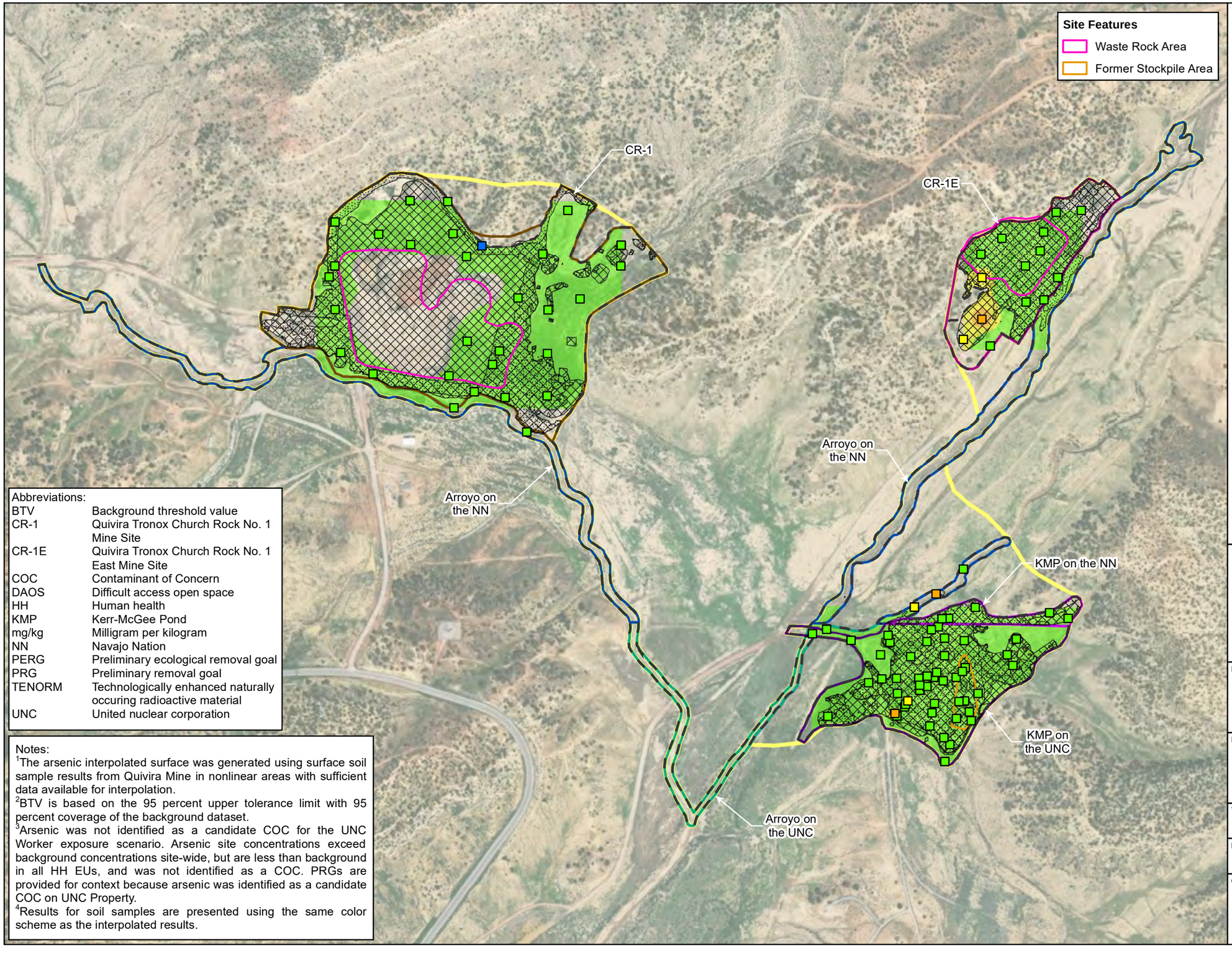
ESTIMATED RADIUM-226 AND RADIUM-226 RESULTS WITHIN THE TENORM BOUNDARY

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/4/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **B-1**



Site Features
- Waste Rock Area
- Former Stockpile Area

Interpolated Arsenic (mg/kg)[1]

≤ 2.5	≤ HH PRG (Resident)[2]
2.5 - 7.5	HH PRG (Resident) - HH PRG (DAOS)
7.5 - 8.9	HH PRG (DAOS) - BTV[2]
8.9 - 68	BTV - PERG
68 - 750	PERG - HH PRG (UNC Worker)[3]

Soil Sample Locations[4]
- Surface Soil (0-6 inches bgs)
- Radium-226 Removal Action Extent
- Removal Action Extent
- TENORM

Exposure Units
- CR-1
- CR-1E
- KMP on the NN
- KMP on the UNC
- Arroyo on the NN
- Arroyo on the UNC
- Site-wide (Ecological Risk)

1 inch = 600 feet

1:7,200

N W E S

600 300 0 600 Feet

Abbreviations:

BTV	Background threshold value
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
COC	Contaminant of Concern
DAOS	Difficult access open space
HH	Human health
KMP	Kerr-McGee Pond
mg/kg	Milligram per kilogram
NN	Navajo Nation
PERG	Preliminary ecological removal goal
PRG	Preliminary removal goal
TENORM	Technologically enhanced naturally occuring radioactive material
UNC	United nuclear corporation

Notes:
[1]The arsenic interpolated surface was generated using surface soil sample results from Quivira Mine in nonlinear areas with sufficient data available for interpolation.
[2]BTV is based on the 95 percent upper tolerance limit with 95 percent coverage of the background dataset.
[3]Arsenic was not identified as a candidate COC for the UNC Worker exposure scenario. Arsenic site concentrations exceed background concentrations site-wide, but are less than background in all HH EUs, and was not identified as a COC. PRGs are provided for context because arsenic was identified as a candidate COC on UNC Property.
[4]Results for soil samples are presented using the same color scheme as the interpolated results.

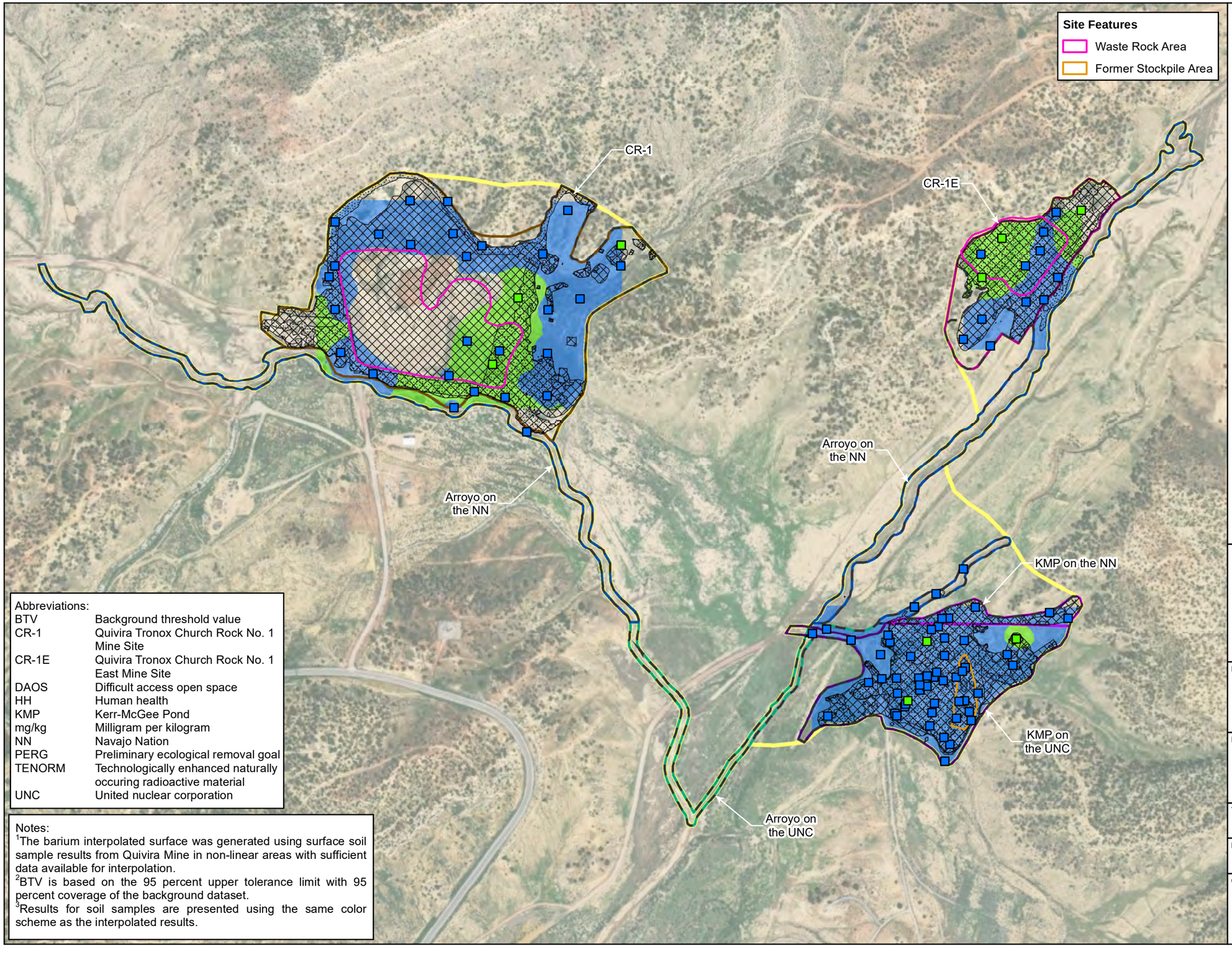
ARSENIC RESULTS WITHIN THE TENORM BOUNDARY

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/6/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **B-2**



Site Features
- Waste Rock Area
- Former Stockpile Area

Interpolated Barium (mg/kg)[1]
- ≤ 111 — ≤ BTV[2]
- 111 - 1,400 — BTV - PERG
- 1,400 - 2,800 — PERG - 2 x PERG
- > 2,800 — > 2 x PERG

Soil Sample Locations[3]
- Surface Soil (0-6 inches bgs)
- Radium-226 Removal Action Extent
- Removal Action Extent
- TENORM

Exposure Units
- CR-1
- CR-1E
- KMP on the NN
- KMP on the UNC
- Arroyo on the NN
- Arroyo on the UNC
- Site-wide (Ecological Risk)

1 inch = 600 feet

1:7,200

N W E S

600 300 0 600 Feet

Abbreviations:

BTV	Background threshold value
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
DAOS	Difficult access open space
HH	Human health
KMP	Kerr-McGee Pond
mg/kg	Milligram per kilogram
NN	Navajo Nation
PERG	Preliminary ecological removal goal
TENORM	Technologically enhanced naturally occuring radioactive material
UNC	United nuclear corporation

Notes:
[1]The barium interpolated surface was generated using surface soil sample results from Quivira Mine in non-linear areas with sufficient data available for interpolation.
[2]BTV is based on the 95 percent upper tolerance limit with 95 percent coverage of the background dataset.
[3]Results for soil samples are presented using the same color scheme as the interpolated results.

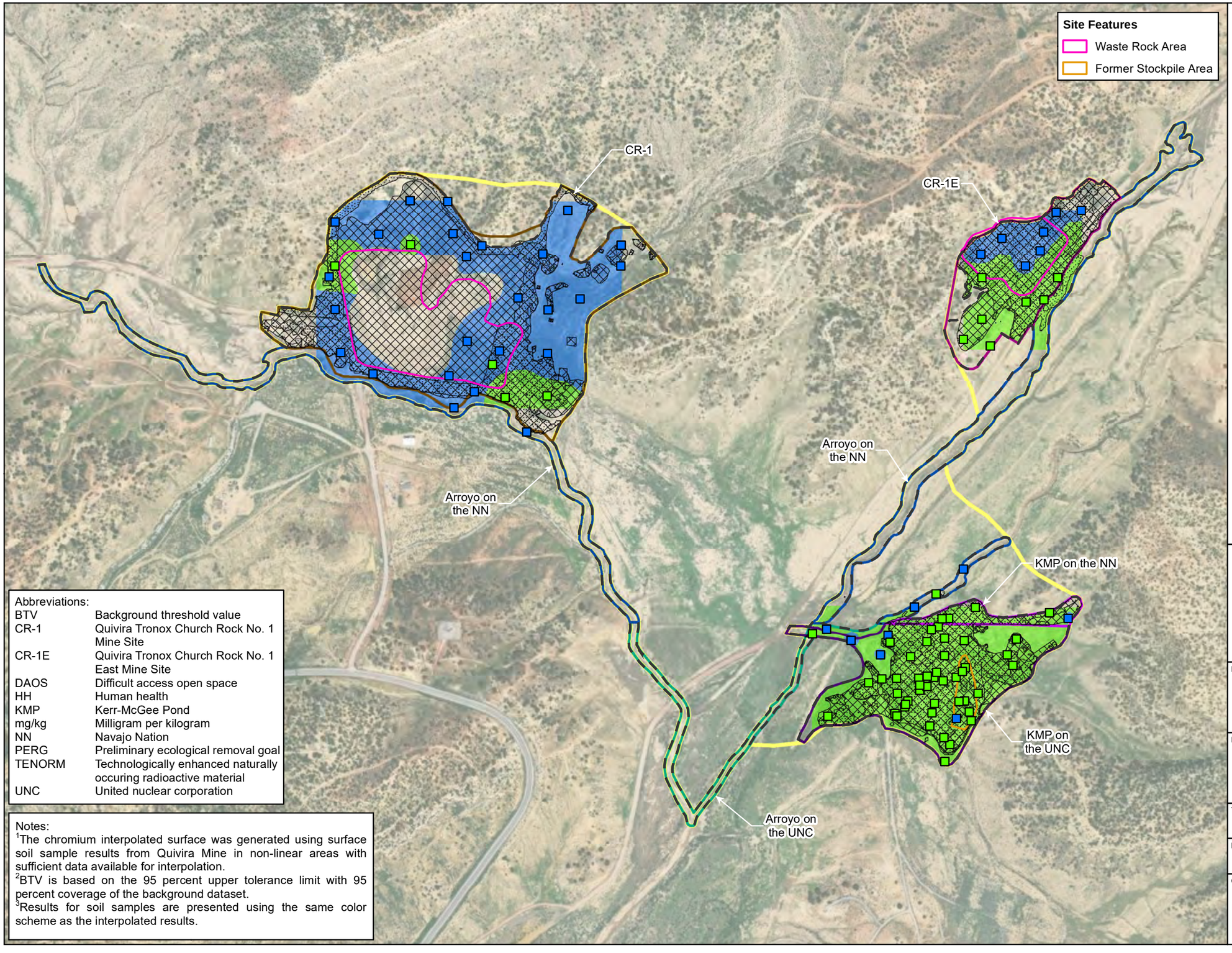
BARIUM RESULTS WITHIN THE TENORM BOUNDARY

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/6/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **B-3**



Site Features
- Waste Rock Area
- Former Stockpile Area

Interpolated Chromium (mg/kg)[1]
- ≤ 6.3 — ≤ BTV[2]
- 6.3- 250 — BTV - PERG
- 250 - 500 — PERG - 2 x PERG
- > 500 — > 2 x PERG

Soil Sample Locations[3]
- Surface Soil (0-6 inches bgs)
- Radium-226 Removal Action Extent
- Removal Action Extent
- TENORM

Exposure Units
- CR-1
- CR-1E
- KMP on the NN
- KMP on the UNC
- Arroyo on the NN
- Arroyo on the UNC
- Site-wide (Ecological Risk)

1 inch = 600 feet

1:7,200

N W E S

600 300 0 600 Feet

Abbreviations:

BTV	Background threshold value
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
DAOS	Difficult access open space
HH	Human health
KMP	Kerr-McGee Pond
mg/kg	Milligram per kilogram
NN	Navajo Nation
PERG	Preliminary ecological removal goal
TENORM	Technologically enhanced naturally occuring radioactive material
UNC	United nuclear corporation

Notes:
[1]The chromium interpolated surface was generated using surface soil sample results from Quivira Mine in non-linear areas with sufficient data available for interpolation.
[2]BTV is based on the 95 percent upper tolerance limit with 95 percent coverage of the background dataset.
[3]Results for soil samples are presented using the same color scheme as the interpolated results.

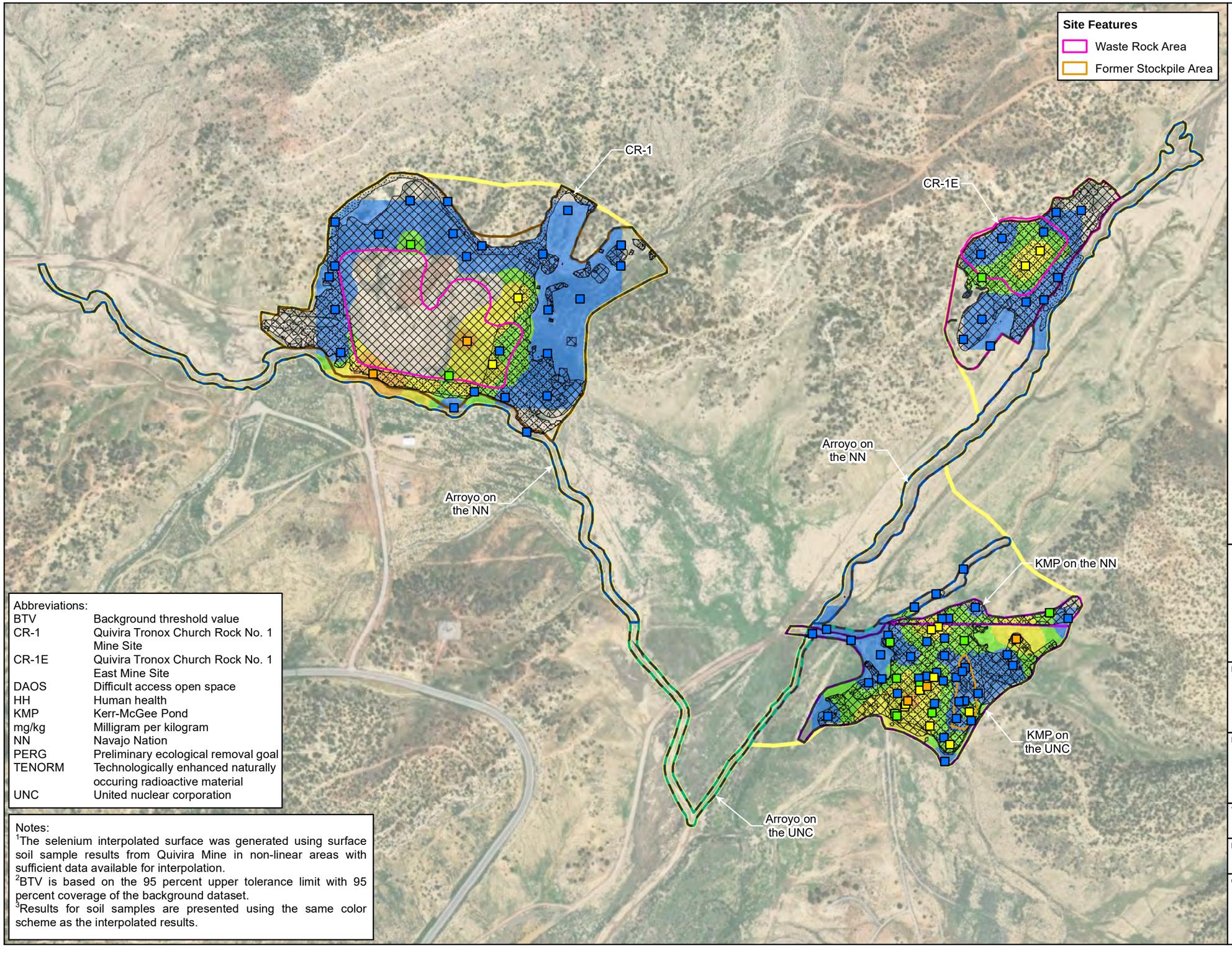
CHROMIUM RESULTS WITHIN THE TENORM BOUNDARY

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/6/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **B-4**



Interpolated Selenium (mg/kg)[1]

≤ 2.5	≤ BTV[2]
2.5 - 3.4	BTV - PERG
3.4 - 6.8	PERG - 2 x PERG
> 6.8	> 2 x PERG

Soil Sample Locations[3]

- Surface Soil (0-6 inches bgs)
- Radium-226 Removal Action Extent
- Removal Action Extent
- TENORM

Exposure Units

- CR-1
- CR-1E
- KMP on the NN
- KMP on the UNC
- Arroyo on the NN
- Arroyo on the UNC
- Site-wide (Ecological Risk)

1 inch = 600 feet

1:7,200

N W E S

600 300 0 600 Feet

Abbreviations:

BTV	Background threshold value
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
DAOS	Difficult access open space
HH	Human health
KMP	Kerr-McGee Pond
mg/kg	Milligram per kilogram
NN	Navajo Nation
PERG	Preliminary ecological removal goal
TENORM	Technologically enhanced naturally occuring radioactive material
UNC	United nuclear corporation

Notes:

[1]The selenium interpolated surface was generated using surface soil sample results from Quivira Mine in non-linear areas with sufficient data available for interpolation.

[2]BTV is based on the 95 percent upper tolerance limit with 95 percent coverage of the background dataset.

[3]Results for soil samples are presented using the same color scheme as the interpolated results.

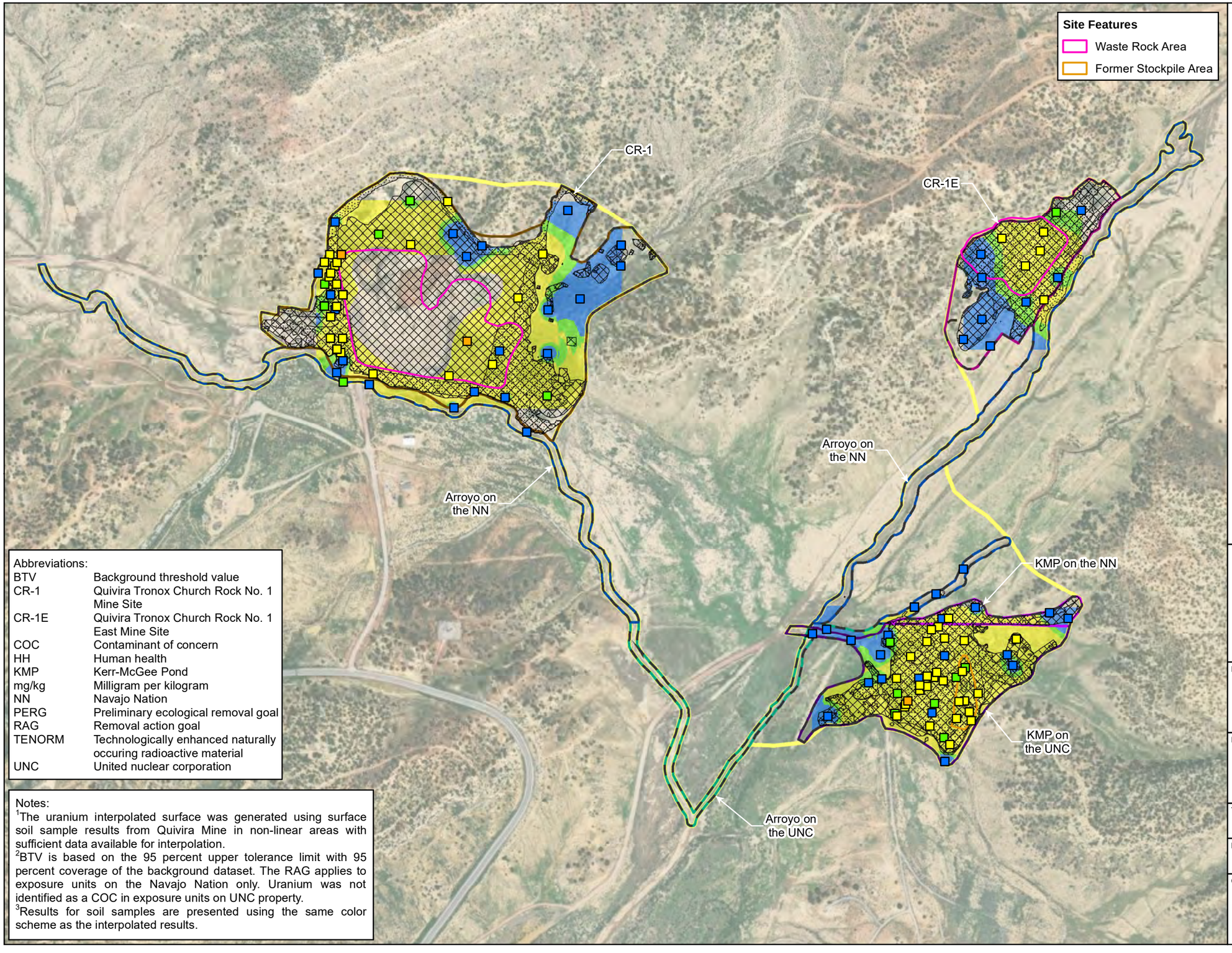
SELENIUM RESULTS WITHIN THE TENORM BOUNDARY

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/6/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **B-5**



Site Features
- Waste Rock Area
- Former Stockpile Area

Interpolated Uranium(mg/kg)[1]
- ≤ 2.4 — ≤ BTV[2]
- 2.4 - 3.2 — BTV - RAG (HH PRG Resident)[2]
- 3.2 - 250 — RAG (HH PRG Resident) - PERG
- > 250 — > PERG

Soil Sample Locations[3]
- Surface Soil (0-6 inches bgs)
- Radium-226 Removal Action Extent
- Removal Action Extent
- TENORM

Exposure Units
- CR-1
- CR-1E
- KMP on the NN
- KMP on the UNC
- Arroyo on the NN
- Arroyo on the UNC
- Site-wide (Ecological Risk)

1 inch = 600 feet

1:7,200

N W E S

600 300 0 600 Feet

Abbreviations:

BTV	Background threshold value
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
COC	Contaminant of concern
HH	Human health
KMP	Kerr-McGee Pond
mg/kg	Milligram per kilogram
NN	Navajo Nation
PERG	Preliminary ecological removal goal
RAG	Removal action goal
TENORM	Technologically enhanced naturally occuring radioactive material
UNC	United nuclear corporation

Notes:
[1]The uranium interpolated surface was generated using surface soil sample results from Quivira Mine in non-linear areas with sufficient data available for interpolation.
[2]BTV is based on the 95 percent upper tolerance limit with 95 percent coverage of the background dataset. The RAG applies to exposure units on the Navajo Nation only. Uranium was not identified as a COC in exposure units on UNC property.
[3]Results for soil samples are presented using the same color scheme as the interpolated results.

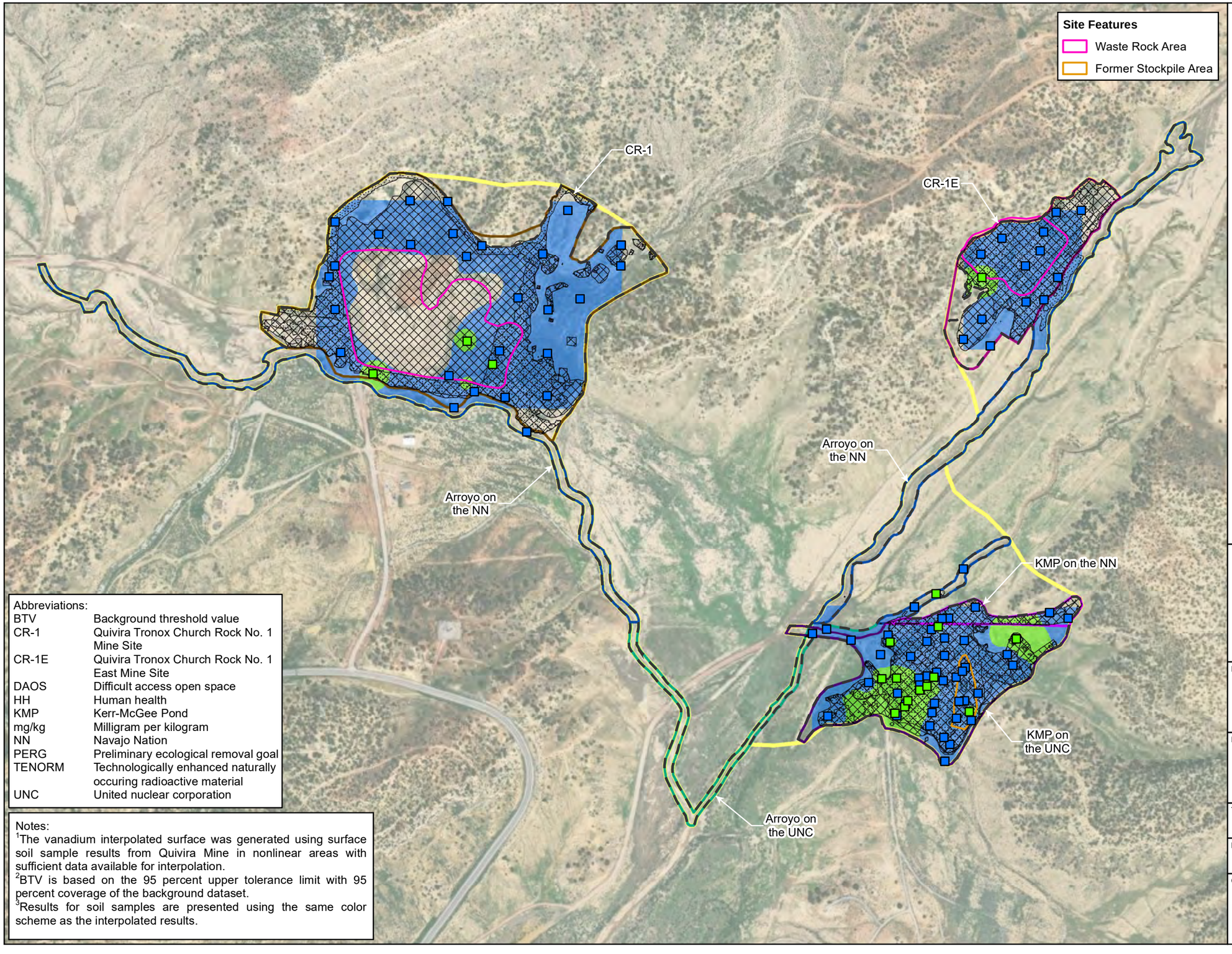
URANIUM RESULTS WITHIN THE TENORM BOUNDARY

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/6/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **B-6**



Site Features
- Waste Rock Area
- Former Stockpile Area

Estimated Vanadium (mg/kg)[1]

≤ 18	≤ BTV[2]
18 - 80	BTV - PERG
80 - 160	PERG - 2 x PERG
> 160	> 2 x PERG

Soil Sample Locations[3]
- Surface Soil (0-6 inches bgs)
- Radium-226 Removal Action Extent
- Removal Action Extent
- TENORM

Exposure Units
- CR-1
- CR-1E
- KMP on the NN
- KMP on the UNC
- Arroyo on the NN
- Arroyo on the UNC
- Site-wide (Ecological Risk)

1 inch = 600 feet

1:7,200

N W E S

600 300 0 600 Feet

VANADIUM RESULTS WITHIN THE TENORM BOUNDARY

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/6/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **B-7**

Abbreviations:

BTV	Background threshold value
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
DAOS	Difficult access open space
HH	Human health
KMP	Kerr-McGee Pond
mg/kg	Milligram per kilogram
NN	Navajo Nation
PERG	Preliminary ecological removal goal
TENORM	Technologically enhanced naturally occuring radioactive material
UNC	United nuclear corporation

Notes:
[1]The vanadium interpolated surface was generated using surface soil sample results from Quivira Mine in nonlinear areas with sufficient data available for interpolation.
[2]BTV is based on the 95 percent upper tolerance limit with 95 percent coverage of the background dataset.
[3]Results for soil samples are presented using the same color scheme as the interpolated results.

APPENDIX C

RISK ASSESSMENT

Quivira Mines
Coyote Canyon, Pinedale, and Standing Rock Chapters, Navajo Nation, New Mexico

Final
Appendix C
Risk Assessment

Response, Assessment, and Evaluation Services 2

Contract No. 68HE0923D0002

Task Order 001

March 2024

Submitted to

U.S. Environmental Protection Agency

Submitted by

Tetra Tech, Inc.

1999 Harrison Street, Suite 500

Oakland, CA 94612



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ACRONYMS AND ABBREVIATIONS

°F	Degree Fahrenheit
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of concern
COEC	Contaminant of ecological concern
COPC	Contaminant of potential concern
COPEC	Contaminant of potential ecological concern
CR-1	Quivira Church Rock Mine No. 1
CR-1E	Quivira Church Rock Mine No. 1 East
CSM	Conceptual site model
Eco-SSL	Ecological soil screening level
EE/CA	Engineering evaluation/cost analysis
EPC	Exposure point concentration
ERA	Ecological risk assessment
ERICA	Environmental Risks from Ionizing Contaminants: Assessment and Management
ESA	Endangered Species Act
ESL	Ecological screening level
EU	Exposure unit
HHRA	Human health risk assessment
HI	Hazard index
HQ	Hazard quotient
IUR	Inhalation unit risk
Kerr-McGee	Kerr-McGee Corporation
LANL	Los Alamos National Laboratory
LOEC	Lowest observed effect concentration
mg/kg-day	Milligram per kilogram per day
N3B	Newport News Nuclear BWXT-Los Alamos, LLC
NAUM	Navajo abandoned uranium mine
NESL	Navajo Endangered Species List
NNEPA	Navajo Nation Environmental Protection Agency
NNDFW	Navajo Nation Department of Fish and Wildlife
NOEC	No observed effect concentration
NORM	Naturally occurring radioactive material

ACRONYMS AND ABBREVIATIONS (CONTINUED)

ODL	Other Diné Lifeways
ORNL	Oak Ridge National Laboratory
OSWER	Office of Solid Waste and Emergency Response
Quivira Mines	Quivira Mines Site
RfC	Reference concentration
RfD	Reference dose
RME	Reasonable maximum exposure
RSL	Regional screening level
SE	Secular equilibrium
SF	Slope factor
SLERA	Screening-level ecological risk assessment
TENORM	Technologically enhanced naturally occurring radioactive material
Tetra Tech	Tetra Tech, Inc.
TCR	Target cancer risk
U_3O_8	Triuranium octoxide
UCL95	95 percent upper confidence limit
UNC	United Nuclear Corporation
USEPA	U.S. Environmental Protection Agency
Weston	Weston Solutions, Inc.

1.0 BACKGROUND AND ENVIRONMENTAL SETTING

The purpose of the risk assessment is to estimate current and future human health risk under appropriate reasonable maximum exposure (RME) scenarios and ecological risk focused on the known ecosystems for the region. The results of the risk assessment are used to assist in removal action decisions at the Quivira Mines Site (Quivira Mines). This Navajo abandoned uranium mine (NAUM) risk assessment was performed using "Guidance on Conducting Non-Time-Critical Removal Actions under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)" (U.S. Environmental Protection Agency [USEPA] 1993) and, thus, does not include or require all elements of a baseline risk assessment (USEPA 1993, 2001). The human health risk assessment (HHRA) identifies human health contaminants of concern (COC) recommended for removal in each exposure unit (EU) while the ecological risk assessment (ERA) identifies contaminants of ecological concern (COEC) recommended for removal in each EU. The results of the risk assessment are used to determine removal action goals and serve as lines of evidence in determining the extent of soil removal necessary at the Quivira Mines to meet the removal action goals. See the NAUM risk assessment methodology (USEPA 2024b) report for additional information for conducting standardized risk assessments at NAUM sites.

The Navajo Nation contains areas of naturally high levels of uranium. Starting in the 1940s, large amounts of uranium were mined on the Navajo Nation. Mining has brought more uranium to the surface of the earth, making exposure to people more likely. Uranium is a naturally occurring radioactive material (NORM), and the effects of mining can lead to technologically enhanced naturally occurring radioactive material (TENORM).

Examples of TENORM at the Quivira Mines include waste rock piles, waste in former settling and dewatering ponds, contaminated former industrial areas, contaminated onsite access roads, areas contaminated by eroding waste and windblown dust, and adjacent arroyos receiving contaminated runoff.

1.1 MINE HISTORY AND LOCATION

The Quivira Mines are located on the Navajo Nation approximately 20 miles northeast of Gallup, New Mexico (Figure C-1). The Quivira Mines include two former mine leases: Quivira Church Rock Mine No. 1 (CR-1) and Quivira Church Rock Mine No. 1 East (CR-1E), both in Coyote Canyon and Standing Rock Chapters of the Navajo Nation. The two former mines are about 0.5 mile apart from each other, with CR-1 located along Red Water Pond Road north of New Mexico State Road 566 and CR-1E located east of and along Indian Route 7049 (Pipeline Canyon Road) (see Figure 1 of the main engineering evaluation/cost analysis [EE/CA] report).

Aboveground operations encompass 42 acres at CR-1 and 10.5 acres at CR-1E, each including a former industrial area, waste rock area, and former pond area (see Figure 2 and Figure 3 of the main EE/CA report).

Atomic Energy Commission records indicate that during operation between 1974 and 1986, an estimated 1.3 million tons of ore from CR-1 and CR-1E was shipped to and processed at the Quivira Mining Corporation's Ambrosia Lake Mill, approximately 50 miles to the east and north of Grants, New Mexico. A total of 3,139,784 pounds of uranium (triuranium octoxide [U_3O_8])

were produced from CR-1 and 1,447,463 pounds of U_3O_8 were produced from CR-1E (Weston Solutions, Inc. [Weston] 2010).

The Quivira Mines were very large underground uranium mines located approximately 1,500 to 1,800 feet below ground surface (bgs). The mines were wet and required ongoing dewatering during operations. Water pumped from the mine workings was discharged to settling ponds that emptied to Unnamed Arroyo #2 and Pipeline Canyon Arroyo (Figure C-1).

The Kerr-McGee Corporation (Kerr-McGee) Ponds covers an area of approximately 9 acres and includes four sediment dewatering ponds and a proto ore storage area on United Nuclear Corporation (UNC) land previously leased from the State of New Mexico (see Figure 4 of the main EE/CA report). The former Kerr-McGee Ponds are approximately 2,000 feet south of CR-1E within the Pinedale Chapter of the Navajo Nation. Pond sediment and proto ore was received from CR-1 and CR-1E mines. The various work areas were reportedly closed when the State of New Mexico transferred the land at the mill to UNC.

See Section 2.1 of the main EE/CA report for additional information on the history and location of the Quivira Mines.

1.2 GEOLOGY, HYDROGEOLOGY, AND HYDROLOGY

The following subsections describe the geology, hydrogeology, and hydrology of the Quivira Mines. For more information, see Section 2.1.5 of the main EE/CA report.

1.2.1 Geology

The Quivira Mines lie within the Colorado Plateau physiographic province at the juncture of the San Juan Basin, Zuni Uplift, and Defiance Uplift. Underlying the Quivira Mines is the Crevasse Canyon Formation that consists of unsaturated mudstones, sandstone, and coal beds. Beneath the Crevasse Canyon Formation are the Gallup and Mancos Shale Formations. The Mancos Shale, with a thickness of 500 to 800 feet, acts largely as an aquitard. Beneath the Mancos Shale Formation are the Dakota and Morrison Formations. The primary uranium ore body is found in the Westwater Canyon Sandstone Member of the Morrison Formation.

Surface geology (see Figure 5 of the main EE/CA report) differs in each area of the Quivira Mines:

- CR-1 surface geology consists of the Dalton and Bartlett Barren Members of the Crevasse Canyon Formation and the Mulatto Tongue of Mancos Shale on the northern slopes and Quaternary alluvium on the southern slopes.
- CR-1E surface geology consists of the Dalton Member of the Crevasse Canyon Formation on the northern hillslopes and the Mulatto Tongue of Mancos Shale and Quaternary alluvium on the site terrace.
- The former Kerr-McGee Ponds is on fluvially deposited Quaternary alluvium that overlies the Mulatto Tongue of Mancos Shale, which is expressed on south-adjacent hillslopes.

No mineralization occurs in the surface geologies; however, areas of elevated activity are present north of CR-1. Soil types throughout the Quivira Mines are shown on Figure 6 of the main EE/CA report. Additional information on site geology is provided in Section 2.1.5.1 of the main EE/CA report.

The waste rock material within the stockpiles at CR-1 and CR-1E is a fine-grained material. In general, the soil stratigraphy at the base of both the Unnamed Arroyo #2 and the Pipeline Arroyo is consistent with the fine- to medium-grained soils encountered at the lease areas of CR-1 and CR-1E.

1.2.2 Hydrogeology

The main uranium-bearing rock unit (Morrison Formation) includes the water-bearing Westwater Canyon Member. Based on data provided by UNC for the Northeast Church Rock Mine, the depth to groundwater in the Westwater Canyon Sandstone Member is 1,500 to 1,800 feet (Weston 2010).

Rainfall and surface water infiltration do not directly impact groundwater in the Westwater Canyon Member as a result of a combination of arid climate, depth to groundwater, and the number and thickness of intervening confining layers. In addition, no drinking water wells are completed in the Westwater Canyon Member near the Quivira Mines. Therefore, groundwater is not considered in the risk assessment. If any work is considered necessary to address groundwater in the future, that work will be part of a separate action. The scope of this EE/CA is to present alternatives for surface and near-surface soil remedies only. Additional information on site hydrogeology is provided in Section 2.1.5.2 of the main EE/CA report.

1.2.3 Hydrology

Most precipitation at the Quivira Mines occurs from July to October as monsoon thunderstorms. The annual evaporation rate is nearly five times the precipitation rate; consequently, most streams in the area are ephemeral or have flowing water only during storms or rapid snowmelt. The dry conditions and high-intensity rains cause quick saturation of the surface soils, preventing precipitation from penetrating deeper. As a result, intense rainfall drives surface flow into canyon washes, generating short-term and fast-moving streams. These streams produce arroyos that cut through the sedimentary bedrock in the canyons and erode sediments that are transported downstream to be deposited as alluvium.

A series of arroyos exist throughout the Quivira Mines and surrounding areas. Unnamed Arroyo #2 runs along the southern boundary of CR-1 while the Pipeline Canyon Arroyo is immediately southeast of CR-1E (Figure C-1). The width of Unnamed Arroyo #2 typically ranges from 15 to 35 feet with sidewalls 10 to 15 feet high. The width of the Pipeline Canyon Arroyo typically ranges from 15 to 25 feet with sidewalls 10 to 25 feet high. Additional information on site hydrogeology is provided in Section 2.1.5.3 of the main EE/CA report.

1.3 LAND USE

The Quivira Mines are in a sparsely vegetated area of shrubs, grasses, and forbs mixed with pinyon-juniper forests. In some places, the underbrush is predominately sagebrush (*Artemisia tridentata ssp. Tridentata*), while in others, heavily grazed areas of bare ground are prevalent. More than 50 Navajo families live in the Red Water Pond Road area of the Coyote Canyon Chapter and the Pipeline Canyon Road area of the Standing Rock Chapter (Red Water Pond Road Community Association and Southwest Research and Information Center 2012). Figure 8 of the main EE/CA report shows the approximate locations of the Red Water Pond Road and Pipeline Canyon Road community areas. The nearest residences are approximately 700 feet south of CR-1 and 800 feet north of CR-1E. No public or commercial buildings are within 0.5 mile of the Quivira Mines.

Current surrounding land use includes agricultural grazing (for livestock such as sheep, cattle, and horses). Navajo families may collect pinyon nuts, herbs, and plants from the surrounding area for food, medicinal, and ceremonial purposes.

The Quivira Mines, as well as the former Kerr-McGee Ponds and arroyos on the Navajo Nation, are currently undeveloped. Activities that occur near or on the site that may expose people to soil contaminants include walking or hiking, livestock grazing, and foraging for plants or herbs. Future development may also expose residents to impacted soil. Radionuclides and other chemicals in the soil may be absorbed by plants and consumed by livestock, wildlife, and people. Persons traversing the site may be exposed to contaminated dust by inhalation of particulate matter. Whole body (external) radiation may be experienced by nearby people on or near the Quivira Mines. The portion of the former Kerr-McGee Ponds on UNC property has a few buildings and trailers within the property boundary.

While the Quivira Mines site is fenced and the current use of the immediately surrounding areas is open space, a residential land use scenario was developed to incorporate an unrestricted tribal use scenario that may include future residential and cultural and ceremonial uses of the resources at the Quivira Mines. This receptor is appropriate because the nearby land use is residential and no land use restrictions are in place to prevent the site from being used for future residential use.

1.4 ECOLOGICAL SETTING

The Quivira Mines are in a remote area with a revegetated, previously disturbed mine area potentially providing habitat for ecological receptors. Wildlife inhabiting the Quivira Mines may directly ingest radionuclides and chemicals, which may then be transported to the organs or other sites within the wildlife receptor.

The Quivira Mines are primarily within an Area 3 wildlife sensitive area as identified by the Navajo Nation Department of Fish and Wildlife (NNDFW). Area 3 wildlife sensitive areas are classified as a less sensitive area containing a low and fragmented concentration of endangered and rare plant, animal, and game species on the Navajo Nation (NNDFW 2022). Therefore, development can proceed as recommended by NNDFW with few exceptions. A small portion of the Quivira Mines on the northwest side is within an Area 1 wildlife sensitive area. Area 1 wildlife sensitive areas are classified as highly sensitive areas containing the best

habitat and highest concentrations of endangered and rare plant, animal, and game species on the Navajo Nation. NNDFW recommends no development in Area 1 wildlife sensitive areas with few exceptions.

Tetra Tech, Inc. (Tetra Tech) (2022a) conducted a biological assessment for the Quivira Mines area that included a desktop survey of habitats to assess the impacts that investigative and future removal activities may have on affected Endangered Species Act (ESA)-listed species, critical habitats, migratory birds protected by the Migratory Bird Treaty Act, and NNDFW-listed sensitive species that may occur within 0.5 mile of the site. Plants were also included in the desktop survey.

Tetra Tech (2022b) also conducted a field survey at the Quivira Mines area before investigation activities in May 2022 and observed no rare plant species, plant species of management interest, or federally listed or sensitive species.

1.4.1 Climate

The Navajo Nation lies in a semi-arid climate with a high annual net pan evaporation rate of 54 inches per year. The nearby city of Gallup receives an average annual rainfall of 11 inches. Wind for 11 months of the year typically originates from the southwest, and in the month of August, originates predominantly from the south. The winter average temperature is 29 degrees Fahrenheit (°F) with an average temperature in summer of 68 °F. Extreme heat in the summer (100 °F) and cold in the winter (-34 °F) can occur. Additional information on site climate is provided in Section 2.1.8 of the main EE/CA report.

1.4.2 Vegetation

A vegetation survey was completed in 2011 as part of the removal site evaluation report for the Quivira Mines area (SENES Consultants Limited 2011). The survey identified good plant diversity with a mixture of native shrubs, grasses, and forbs although cover values varied based on grazing pressure. Tetra Tech (2022b) performed a rare plant survey in 2022 to assess the potential for investigation activities to affect ESA-listed species, critical habitats, and NNDFW-listed sensitive species.

The habitat in the Quivira Mines area consists of upland communities of intermountain basins semi-desert grassland, intermountain basins greasewood flat, and intermountain basins semi-desert shrub steppe bordered by Colorado Plateau pinyon-juniper woodlands. The field survey identified the dominant species throughout the project footprint as sagebrush, globemallow (*Sphaeralcea ambigua*), rabbitbrush (*Ericameria nauseosa*), filaree storksbill (*Erodium cicutarium*), cheatgrass (*Bromus tectorum*), Indian ricegrass (*Achnatherum hymenoides*), needle and thread grass (*Hesperostipa comata*), greasewood (*Sarcobatus vermiculatus*), two-needle pinyon (*Pinus edulis*), and Utah juniper (*Juniperus osteosperma*). No plant species of management interest or rare plant species were observed during the surveys.

1.4.3 Wildlife

Tetra Tech (2022b) performed a nesting bird survey in 2022 for the Quivira Mines area to assess the potential for investigation activities to affect ESA-listed species, critical habitats, migratory birds protected by the Migratory Bird Treaty Act, and NNDFW-listed sensitive species. All suitable nesting areas were surveyed during the field survey, and no active raptor species nests were identified. However, one common raven (*Corvus corax*) nest was located between CR-1 and CR-1E. Avian and wildlife species observed at the Quivira Mines were the common raven, house finch (*Haemorphous mexicanus*), rock wren (*Salpinctes obsoletus*), Gunnison prairie dog (*Cynomys gunnisoni*), western fence lizard (*Sceloporus occidentalis*), and bullsnake (*Pituophis catenifer sayi*).

1.4.4 Special Status Species

Tetra Tech (2022a) conducted a biological assessment for the Quivira Mines that reviewed the most recent species lists for the area provided by the U.S. Fish and Wildlife Service and NNDFW. All potential species in the area that are federally threatened, endangered, candidates for listing, or included on the Navajo Endangered Species List (NESL) were evaluated for potential to occur at the site. The biological assessment concluded that no federally listed species have the potential to occur in the Quivira Mines area and that no critical habitats for any ESA-listed species are within the area. The biological assessment concluded that the current proposed action for the Quivira Mines, which includes surface and subsurface soil sampling, trenching, detention basin cleanout, and well construction, will have no effect on the Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), yellow-billed cuckoo (*Coccyzus americanus* ssp. *Occidentalis*), Zuni bluehead sucker (*Catostomus discobolus yarrowi*), or Zuni fleabane (*Erigeron rhizomatus*), and have no effect on these species' designated critical habitats. A separate assessment may be required for construction activities that will occur over a longer time frame during any removal action.

The Tetra Tech (2022a) biological assessment identified three NESL species with the potential to occur in the Quivira Mines area: golden eagle (*Aquila chrysaetos*), mountain plover (*Charadrius montanus*), and Naturita milk-vetch (*Astragalus naturitensis*); however, these species do not require an effects determination. The biological assessment identified conservation measures for NESL species to protect the continued existence of the above-listed species in the Quivira Mines area during the proposed removal action.

2.0 DATA USED IN THE RISK ASSESSMENT

Data compilation and management tasks conducted for the Quivira Mines risk assessment included the selection of useable data, evaluation of sample depth intervals, and selection of depth intervals to be evaluated. At this time, gamma data are not considered definitive data and, therefore, were not used in the risk assessment. However, gamma data were used to delineate TENORM boundaries and to establish the footprint for risk assessment and will be used for future removal decisions.

The compiled investigation data for the constituents of interest (COI) were reviewed to ensure that the appropriate data were used for the evaluation of each EU. Essential nutrients such as calcium, magnesium, potassium, and sodium are not retained as COIs. Separation of data into the depth intervals to be evaluated, and calculation of the exposure point concentration (EPC) and other statistical values.

Figure C-2 provides an overview of the locations of the available soil samples used in the risk assessment for the Quivira Mines.

2.1 AVAILABLE DATA

Evaluation of potential human and ecological exposures at the Quivira Mines is limited to radionuclides and metals in soil. Soil samples were collected from 0 up to 72 inches bgs. Table C-1 provides the summary of all available sample results for the Quivira Mines risk assessment. Table C-2 provides the summary of soil samples available for each Quivira Mines EU. No speciation data are available for chromium; therefore, chromium is assumed to be 100 percent hexavalent chromium. Attachment C-1 presents the complete dataset for all available soil samples used in the Quivira Mines risk assessment.

A data useability assessment is conducted to confirm that the useability of the laboratory data is consistent with USEPA guidance (1992b). Data validation of all results used in the risk assessment should be performed per the guidelines for data review (USEPA 2004, 2020). Data validation reports should be reviewed, and the following key data validation flags should be considered in the data reduction process:

- Estimated values (flagged with “J” qualifiers) should be treated as detected concentrations.
- Rejected data (flagged with “R” qualifiers) should not be included in the risk assessment datasets because of deficiencies in meeting quality control criteria.
- Results with final validation qualifiers containing a “U” or “UJ” are nondetect values included as part of the risk assessment datasets. The method reporting limit should be used as the value for nondetect results.

2.2 DATA REDUCTION METHODS

The metals and radiological data were queried to select the best result for each unique combination of sample media, location ID, sample date, and sample depth for which duplicate data exist. These procedures conservatively select one result for original and field duplicate pairs. For duplicate samples, the maximum detected concentration of the original and field duplicate result was selected as the result for use in the risk assessment. If both the original and field duplicate result are nondetect, the result associated with the lower reporting limit was used. The complete dataset used in the risk assessment is provided in Attachment C-1.

2.3 EXPOSURE UNITS

An EU is an area where receptors (a person or animal) may reasonably be assumed to move at random and where contact across the EU is equally likely over the course of an exposure duration. The Quivira Mines EUs were developed by identifying areas of contiguous TENORM contamination and anticipated land use. Areas of NORM, such as natural mineralized outcrops and nonimpacted areas in the northeastern portion of the site, although not included in the TENORM boundary, were also included within the risk assessment boundary because a receptor would also be exposed to the NORM areas when at the site. See Section 2.0 of the main EE/CA report for descriptions of the previous investigations and extent of contamination at the Quivira Mines.

Based on the site evaluation and summarized in Table C-2, the following EUs were identified at the Quivira Mines. The ecological risk assessment evaluation is conducted on a site-wide basis.

- **CR-1** – The former CR-1 mine is located on the Navajo Nation and is 53 acres. Several residences are located nearby with the nearest residence approximately 700 feet from the former mine. Therefore, the Kee'da'whíí téél (full-time Navajo resident) was selected as the RME receptor for the CR-1 EU.
- **CR-1E** – The former CR-1E mine is located on the Navajo Nation and is 14 acres. Several residences are located nearby with the nearest residence approximately 800 feet from the former mine. Therefore, the Kee'da'whíí téél (full-time Navajo resident) was selected as the RME receptor for the CR-1E EU.
- **Former Kerr-McGee Ponds on the Navajo Nation** – A 2-acre portion of the former Kerr-McGee Ponds is located on the Navajo Nation. Several residences are located nearby with the nearest residence approximately 3,000 feet from the Kerr-McGee Ponds. Therefore, the Kee'da'whíí téél (full-time Navajo resident) was selected as the RME receptor for the CR-1E EU.
- **Former Kerr-McGee Ponds on UNC Property** – A 19-acre portion of the former Kerr-McGee Ponds is on privately-owned land and fenced property. Therefore, the UNC outdoor worker was selected as the RME receptor for the Kerr-McGee Ponds on UNC property.
- **Arroyos on the Navajo Nation** – A 16-acre portion of the impacted arroyos is on the Navajo Nation. The impacted arroyos are deep with steep sides and, thus, difficult

to access. Therefore, the Kǫǫ eí doo nahaazáh dah (difficult access open space) was selected as the RME receptor for the affected arroyos on the Navajo Nation.

- **Arroyos on UNC Property** – A 3-acre portion of the impacted arroyos is on privately-owned land and fenced property. Therefore, the UNC outdoor worker was selected as the RME receptor for the affected arroyos on UNC property.
- **Site-Wide** – A 137-acre area that encompasses all the human health EUs for evaluation of the ecological receptors at the Quivira Mines.

The existing or anticipated future land use for an area is key in determining the potential receptors evaluated in the HHRA conducted for a site. Local chapters determine how areas within their jurisdiction can and cannot be used.

This HHRA only evaluates the RME receptors at an EU. For the EUs on the Navajo Nation, except for the arroyos, the Navajo-specific receptor of Kee'da'whíí téél (full-time Navajo resident) was identified as the RME receptor. The arroyos are deep with very steep sides and difficult to access; thus, for the arroyos on the Navajo Nation, the Navajo-specific receptor of Kǫǫ eí doo nahaazáh dah (difficult access open space) was identified as the RME receptor. For the EUs on UNC property, the site-specific UNC outdoor worker was identified as the RME receptor. Figure C-3 through Figure C-9 provide the locations of samples used in the risk assessment for each EU.

2.4 EXPOSURE POINT CONCENTRATIONS

To calculate concentrations in environmental media (for example, surface soil) to which people and ecological receptors might be exposed, representative statistics are calculated from the datasets for each EU. The available soil data for the site were divided by the EUs identified in Section 2.3 Soil samples are further divided by sample depth to correspond to the surface and subsurface soil intervals evaluated in the risk assessment. Surface soil samples are those collected from 0 to 6 inches bgs while subsurface soil samples are those collected from 0 up to 72 inches bgs. As described in the NAUM risk assessment methodology (USEPA 2024b), these soil depths were selected to incorporate the use of more of the available data from the NAUM sites. A depth of 72 inches was selected for potential human health exposures because deeper soil could become exposed in the future by erosion. In addition, plants in desert settings commonly have roots to 72 inches bgs. Thus, uptake to plants from contamination at depth is a complete exposure pathway for both the HHRA and ERA. Furthermore, burrowing animals are evaluated in the ERA; 72 inches bgs is an appropriate exposure depth for evaluating these ecological receptors, which may be hunted by members of the Navajo Nation.

The process provided in Appendix D of the NAUM risk assessment methodology (USEPA 2024b) report was used to calculate the EPC for each COPC. The approach and calculations for EPCs follow USEPA (1989, 1992c, 2000a, 2002, 2015) guidance. The 95 percent upper confidence limit (UCL95) of the mean values were calculated for each COPC using ProUCL 5.2 (USEPA 2022b). A minimum of 10 samples and 4 detected results are required for a given contaminant to calculate the UCL95 that can be used as the EPC. If the dataset was smaller than 10 samples or the number of detections was less than 4, the maximum detected concentration should be used as the EPC. In cases where the UCL95 exceeds the maximum detected

concentration, the maximum detected concentration was used as the soil EPC. If a nonradioactive COPC was not detected in a sample when entering data into ProUCL, the sample reporting limit was used as the numerical value for that sample for EPC calculations.

2.5 EVALUATION OF SECULAR EQUILIBRIUM

A site-specific secular equilibrium (SE) evaluation was conducted on the Quivira Mines dataset. A range of equilibrium conditions were observed; however, the overall conclusion is that uranium-238 is not in SE with thorium-230 or radium-226. Thus, uranium-238, uranium-234, and thorium-230 will be included in the risk calculations along with radium-226 in SE. The assumption that radium-226 in SE is health protective (USEPA 2024b).

3.0 HUMAN HEALTH RISK ASSESSMENT

The HHRA evaluates whether site-related contaminants detected in soil pose unacceptable risks to potential current and future people at a site under conditions at the time of the EE/CA (unremediated conditions) (USEPA 1989). The HHRA results will serve, along with other factors (such as the ERA and the three National Contingency Plan and EE/CA criteria of feasibility, implementability, and cost), as a basis for risk management decisions. The HHRA is intended to provide input for risk management decision-making for a site while maintaining a conservative approach protective of the people. The methodology for the HHRA is based on the NAUM risk assessment methodology (USEPA 2024b). Table C-1 through Table C-7 present data and analysis associated with the HHRA.

3.1 DATA EVALUATION AND IDENTIFICATION OF CONTAMINANTS OF POTENTIAL CONCERN

All samples collected between 0 and 72 inches below ground surface (bgs) and analyzed by a certified laboratory were used to screen for contaminants of potential concern (COPC) for the HHRA. Samples at the Quivira Mines were analyzed for metals and radionuclides. The maximum detected concentrations of contaminants were screened using the Kee‘da‘whíí tééh (full-time Navajo resident) soil screening levels using a target cancer risk (TCR) of 1 in 1 million ($1x10^{-6}$) and a noncancer target hazard quotient of 0.1 provided in the NAUM risk assessment methodology (USEPA 2024b) report. These conservative screening levels were used to ensure contaminants that could substantially contribute to cumulative cancer risk are retained in the risk calculations and that the contaminants affecting the same target organ are accounted for in the noncancer hazard calculations. For contaminants with both cancer and noncancer health effects, the lower of the two screening levels was used for screening.

Any contaminant with a maximum detected concentration exceeding its COPC screening level is retained as a COPC for the HHRA risk calculations. Table C-1 provides the COPC screening for the available Quivira Mines data. Based on the screening, the following contaminants were identified as COPCs and are included in the risk estimates in the HHRA: uranium-238, uranium-234, thorium-230, radium-226, aluminum, arsenic, barium, cadmium, cobalt, copper, iron, manganese, molybdenum, selenium, thallium, uranium, and vanadium.

3.2 EXPOSURE ASSESSMENT

The exposure assessment is the process of measuring or estimating intensity, frequency, and duration of human exposure to a contaminant in the environment. The exposure assessment considers land use assumptions, discusses the mechanisms by which people might contact COPCs in environmental media, and characterizes exposure factors (for example, time on site). The intake assumptions are combined with the estimated concentration for each COPC at each EU, called the EPC (see Section 2.4), to quantitatively estimate the contaminant exposure for the receptors at a given EU. The EPCs used in the HHRA, grouped by EU and soil depth interval, are presented in Table C-4. In accordance with USEPA (1989) guidance, an exposure assessment consists of three steps:

1. Characterization of the exposure setting (physical environment and potential receptors)

2. Identification of exposure pathways (constituent sources, exposure points, and exposure routes)
3. Quantification of pathway-specific exposures (receptor intake calculations using the EPC and exposure assumptions)

3.2.1 Conceptual Site Model

The risk assessment CSM describes the exposure setting and identifies potentially complete exposure pathways by which receptors (people, plants, and animals) could come in contact with site-related contamination. The CSM is used throughout the site investigation and removal processes to (1) provide a framework for addressing potential risks, (2) evaluate the need for additional data acquisition activities, and (3) evaluate health risks and the need for corrective measures. As defined in Volume 1, Part A, of the "Risk Assessment Guidance for Superfund" (USEPA 1989), the following four elements are necessary to form a complete exposure pathway:

- A source or release from a source
- A mechanism of release and transport
- A point of contact for potential receptors
- An exposure route

If any one of the four elements are missing, the exposure pathway is incomplete. In general, only potentially complete exposure pathways are evaluated in the HHRA.

The removal actions at NAUM sites are focused on removing soil as the source of contamination. Removal of contaminated soil should remove the source of contamination to surface water and groundwater. For the HHRA, exposure to surface water or groundwater is considered to be minimal as water is supplied on the Navajo Nation. At the Quivira Mines, the presence of surface water is ephemeral. Thus, water exposure is not evaluated in the Quivira Mines risk assessment; data collection was focused on the characterization of soil and sediment only.

Soil and sediment data from 0 up to 72 inches bgs were used to evaluate potential risks to people. Drainages at the site are dry for most of the year, and, therefore, sediment results were evaluated as soil. See Section 2.4 of the main EE/CA report for further discussion on the sources and extent of contamination. The site-specific CSM for the Quivira Mines is presented on Figure C-10.

3.2.2 Human Health Receptors, Exposure Pathways, and Exposure Parameters

The areas of concern for soil contamination at the Quivira Mines include the CR-1 and CR-1E lease areas and specific step-out areas indicated by elevated radium-226 soil sampling results or scan and static survey results. The arroyos adjacent to the mines, and former pond areas downstream of the mines and arroyos, were also identified as areas of potential contamination

because of dewatering activities during mine operations. The following receptors were assumed to present in the areas of potential contamination:

- Kee'da'whíí téél (full-time Navajo resident) at the mines and the portion of the former Kerr-McGee Ponds on the Navajo Nation that are easy to access and relatively flat except where waste rock piles are present
- Kǫǫ eí doo nahaazáh dah (difficult access open space) for the arroyos on the Navajo Nation impacted by the mines (these areas include arroyos that are difficult to get to because of challenging features such as steep sidewalls)
- UNC outdoor worker for the portions of the former Kerr-McGee Ponds and arroyos on private property

Consistent with Superfund methodology, the risks and hazards related to removal activities at the site are anticipated to be managed within acceptable levels using engineering controls and personal protective equipment. Therefore, potential exposures to abandoned uranium mine workers will not be evaluated in the risk assessment, but worker protections should be included for removal actions at the site.

The CSM (Figure C-10) describes the exposure setting and identifies potentially complete exposure pathways by which people could come contact site-related contamination.

Consistent with the NAUM risk assessment methodology (USEPA 2024b), the HHRA only evaluates the RME individual at an EU. Exhibit C-1 presents the RME receptor selected at each EU and a description of the exposure scenario.

Exhibit C-1. Receptors Evaluated at Each Exposure Unit

Exposure Unit	Receptor Name	Receptor Description
CR-1, CR-1E, and the portion of Kerr-McGee Ponds on the Navajo Nation	Kee'da'whíí téél (Full-Time Navajo Resident)	Members of the Navajo Nation (adult and child) that live full time at a site. Includes 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, and eggs) and hunted animals (meat), as well as plant exposures (ingestion, dermal, and inhalation) from Diné lifeways practices including medicinal and ceremonial exposures.
Arroyos on the Navajo Nation	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)	A member of the Navajo Nation (adult and child) that enters the arroyo 1 hour per day for 30 days a year to collect plants, herd animals, or hunt. Includes 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 and milk) and hunted animals (meat), as well as plant exposures (ingestion, dermal, and inhalation) from Diné lifeways practices including medicinal and ceremonial exposures.

Exhibit C-1. Receptors Evaluated at Each Exposure Unit (Continued)

Exposure Unit	Receptor Name	Receptor Description
Kerr-McGee Ponds and Arroyos on UNC Property	UNC Outdoor Worker	An adult worker that is assumed to be present on site for 8 hours per day, 2 days per week for 50 weeks per year. Exposure pathways evaluated include external exposure to radiation, incidental ingestion of soil, dermal exposure to soil (metals only), and inhalation of soil (or dust).

Notes:
CR-1 Quivira Church Rock Mine No. 1
CR-1E Quivira Church Rock Mine No. 1 East
Kerr-McGee Kerr-McGee Corporation
UNC United Nuclear Corporation

The following list provides the RME scenarios evaluated at the Quivira Mines and the potentially complete human exposure pathways. The specific exposure inputs for these receptors evaluated in the HHRA are provided in Table C-3.

- **Kee'da'whíí téél (Full-Time Navajo Resident – Adult and Child):**
  - Potential exposure to gamma radiation via external exposure
  - Potential exposure to site-related contaminants in soil through incidental ingestion, dermal contact, and inhalation
  - Potential exposure to site-related contaminants in homegrown produce through ingestion
  - Potential exposure to site-related contaminants in gathered plants via ingestion or inhalation or both and potential exposure to metals on gathered plants via dermal contact (the plant exposure pathway includes use of plants for medicinal and ceremonial purposes)
  - Potential exposure to site-related contaminants in animal products (raised and hunted) via ingestion
- **Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space – Adult and Child):**
  - Potential exposure to gamma radiation via external exposure
  - Potential exposure to site-related contaminants in soil through incidental ingestion, dermal contact, and inhalation
  - Potential exposure to site-related contaminants in gathered plants via ingestion or inhalation or both and potential exposure to metals present in gathered plants via dermal contact (the plant exposure pathway includes use of plants for medicinal and ceremonial purposes)
  - Potential exposure to site-related contaminants in animal products (raised and hunted) via ingestion

- **UNC Outdoor Worker (Adult):**
  - Potential exposure to gamma radiation via external exposure
  - Potential exposure to site-related contaminants in soil through incidental ingestion, dermal contact, and inhalation

3.2.3 Exposure Parameters

Exposure inputs for the Navajo receptors are the Navajo Nation Environmental Protection Agency (NNEPA) inputs for the receptors evaluated at the NAUM sites. The Navajo receptor exposure parameters are provided in Table C-3. The rationale for the exposure inputs provided by NNEPA are included as Attachment 1 of the NAUM risk assessment methodology (USEPA 2024b) report. Appendix B of the NAUM risk assessment methodology report provides discussion of the non-standard exposure pathways evaluated in the Navajo-specific exposure scenarios, including selection of input parameters for plant and animal consumption pathways.

The UNC outdoor worker scenario was developed with USEPA Region 9 for application to EUs on properties owned by UNC. The input parameters for the UNC outdoor worker are provided in Table C-3.

3.3 TOXICITY ASSESSMENT

The toxicity assessment describes the relationship between a dose of a contaminant and the potential likelihood of an adverse health effect. The purpose of the toxicity assessment is to quantitatively estimate the inherent toxicity of COPCs for use in risk characterization. Potential effects of contaminants are separated into two categories: cancer and noncancer effects. Some contaminants can cause cancer while others can cause noncancer health effects such as neurological problems, kidney disease, and thyroid disease. Some contaminants, such as arsenic, have both cancer and noncancer health effects. Potential health risks for radionuclide COPCs are evaluated only for cancer risks while metals COPCs are evaluated for both cancer risk and noncancer hazards as appropriate. No speciation data are available for chromium; therefore, chromium is assumed to be 100 percent hexavalent chromium.

3.3.1 Carcinogenic Effects

For carcinogens, such as radionuclides, USEPA assumes that no dose is low enough to not cause an adverse health effect and that the risk increases as the dose increases.

Potential carcinogenic effects resulting from human exposure to contaminants are estimated quantitatively using cancer slope factors (SF), which represent the theoretical increased risk per milligram of constituent intake per kilogram body weight per day (inverse of milligram per kilogram per day, which is presented as $[mg/kg\text{-}day]^{-1}$). Oral SFs are toxicity values for evaluating the probability of an individual developing cancer from oral exposure to contaminant levels over a lifetime. The oral SF is also used in the dermal exposure pathway with an absorption factor applied for the nonradioactive contaminants.

The inhalation unit risk (IUR) factor is defined as the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to a chemical at a concentration of 1 microgram per cubic meter in air. SFs or IUR factors are used to estimate a theoretical upper-bound lifetime probability of an individual developing cancer as a result of exposure to a potential carcinogen.

3.3.2 Noncarcinogenic Effects

Potential noncarcinogenic effects resulting from human exposure to contaminants are generally estimated quantitatively using chronic reference doses (RfD) and chronic reference concentrations (RfC). The RfD, expressed in units of daily dose (in milligrams per kilogram per day), is an estimate of the daily maximum level of exposure to human populations (including sensitive sub-populations) that is likely to be without an appreciable risk of deleterious effects (USEPA 1989). The oral RfD is also used in the dermal exposure pathway with an absorption factor applied. USEPA has derived RfCs for inhalation exposures for some contaminants. An inhalation RfC is similar to an RfD. If the concentration of a contaminant in air to which a human is exposed is lower than the RfC, no appreciable risk for noncancer health effects results from that exposure.

3.3.3 Sources of Toxicity Values and Other Contaminant-Specific Parameters

USEPA (2003) established a hierarchy of human health toxicity values for Superfund; this hierarchy should be followed for selecting the toxicity values used in the HHRA. This HHRA used the toxicity values used in the NAUM Risk Calculator (USEPA 2024c), which are provided in Table 4 and Table 5 of the NAUM risk assessment methodology (USEPA 2024b) for radionuclides and metals, respectively. This HHRA used the toxicity values used in the NAUM Risk Calculator (USEPA 2024c) and provided in Table 4 and Table 5 of the NAUM risk assessment methodology (USEPA 2024b) report for radionuclides and metals, respectively.

3.4 RISK CHARACTERIZATION

In general, risk characterization proceeds by combining the results of the exposure and toxicity assessments. In standard Superfund HHRAs, exposures are calculated by use of medium-specific EPCs and a series of pathway-specific exposure parameters. These exposures are then multiplied or divided by analyte-specific toxicity values (for example, SFs, unit risk factors, RfDs, and RfCs) to generate receptor- and exposure pathway-specific risks and hazards.

3.4.1 Estimates of Cancer Risk and Noncancer Hazard

Human health exposure factors were calculated for each applicable receptor and COPCs for all the potentially complete soil-related exposure pathways. For metal COPCs with both carcinogenic and noncarcinogenic toxicity, intake factors were calculated for both cancer and noncancer for each relevant exposure pathway. The methods, assumptions, and inputs for the calculation of the intake factors for each Navajo-specific scenario is provided in the NAUM risk assessment methodology (USEPA 2024b) report. Table C-5.1 through Table C-5.6 present the calculated cumulative cancer risk and noncancer hazard for each COPC for each EU by soil depth interval. That is, the risk is summed for all the exposure pathways relevant to each receptor.

Table C-6 provides a summary of the cumulative risk by exposure pathway for each EU. This HHRA only evaluates the RME receptor at an EU and these results are used for risk management decisions for the site; however, cumulative site-wide cancer risks and noncancer hazards for a receptor who is exposed to multiple Quivira Mines EUs is calculated and presented in the uncertainty section (Section 3.4.2).

The intake factors used in the HHRA were calculated using the NAUM Risk Calculator (USEPA 2024c). The USEPA's RSL Calculator considers only direct soil exposures (for example, soil ingestion, dermal contact, and inhalation of fugitive dust). The NAUM Risk Calculator generates exposure pathway-specific cancer risks and noncancer hazards, including animal product and produce consumption pathways, and exposure pathways specific to the Navajo, as well as external exposure to radiation and direct exposure to radiation in soil through incidental ingestion and inhalation. The complete set of equations and inputs for calculating exposure inputs for Navajo receptors is provided in the NAUM risk assessment methodology (USEPA 2024b) report.

The cumulative cancer risk for the age-adjusted adult and child receptors and noncancer hazards for the adult and child receptors for each EU and soil depth interval are provided in Table C-7 and summarized in Exhibit C-2.

Exhibit C-2. Cancer Risks and Noncancer Hazards

Exposure Unit	Soil Interval	Cancer Risk	Adult Noncancer Hazard	Child Noncancer Hazard
CR-1	Surface Soil	**$1x10^{-2}$**	**8**	**10**
	Subsurface Soil	**$3x10^{-2}$**	**8**	**10**
CR-1E	Surface Soil	**$2x10^{-2}$**	**8**	**10**
	Subsurface Soil	**$8x10^{-2}$**	**10**	**20**
Kerr-McGee Ponds on the Navajo Nation	Surface Soil	**$2x10^{-2}$**	**9**	**10**
	Subsurface Soil	**$2x10^{-2}$**	**9**	**10**
Kerr-McGee Ponds on UNC Property	Surface Soil	**$2x10^{-4}$**	0.05	--
	Subsurface Soil	**$2x10^{-4}$**	0.08	--
Arroyos on the Navajo Nation	Surface Soil	**$6x10^{-4}$**	**5**	0.5
	Subsurface Soil	**$6x10^{-4}$**	**8**	0.7
Arroyos on UNC Property	Surface Soil	$2x10^{-5}$	0.03	--
	Subsurface Soil	$2x10^{-5}$	0.03	--

Notes:
Bolded values exceed the target cancer risk (1×10^{-4}) or target hazard quotient (1).
-- Not applicable
CR-1 Quivira Church Rock Mine No. 1
CR-1E Quivira Church Rock Mine No. 1 East
Kerr-McGee Kerr-McGee Corporation
UNC United Nuclear Corporation

Candidate COCs are identified based on the cancer risk exceeding the TCR of $1x10^{-4}$ or a noncancer hazard of 1 for the RME receptor at the EU. COPCs with a cancer risk within the USEPA risk range of greater than 1×10^{-6} to 1×10^{-4} are indicated on Table C-7. Target organ analyses were not performed for any scenario-media combination because no instances arose

where the target organ hazard index exceeded 1 and no individual COPC had a hazard exceeding 1. Exhibit C-3 presents the candidate COCs for each EU as identified in Table C-7.

Exhibit C-3. Candidate COCs Identified Based on Cancer Risks and Noncancer Hazards

Exposure Unit	Soil Interval	Cancer Risk	Noncancer Hazard
CR-1	Surface Soil	Radium-226 in SE Arsenic Chromium[1]	Cobalt Iron Manganese Thallium Uranium
	Subsurface Soil	Radium-226 in SE Arsenic Chromium[1]	Cobalt Iron Manganese Thallium Uranium
CR-1E	Surface Soil	Radium-226 in SE Arsenic Chromium[1]	Arsenic Cobalt Iron Manganese Thallium Uranium
	Subsurface Soil	Radium-226 in SE Arsenic Chromium[1]	Arsenic Cobalt Iron Manganese Thallium Uranium
Kerr-McGee Ponds on the Navajo Nation	Surface Soil	Radium-226 in SE Arsenic Chromium[1]	Cobalt Iron Manganese Thallium Uranium
	Subsurface Soil	Radium-226 in SE Arsenic Chromium[1]	Cobalt Iron Manganese Thallium Uranium
Kerr-McGee Ponds on UNC Property	Surface Soil	Radium-226 in SE	--
	Subsurface Soil	Radium-226 in SE	--
Arroyos on the Navajo Nation	Surface Soil	Radium-226 in SE Arsenic	Manganese
	Subsurface Soil	Radium-226 in SE Arsenic	Manganese
Arroyos on UNC Property	Surface Soil	--	--
	Subsurface Soil	--	--

Notes:

[1] No speciation data are available for chromium; therefore, chromium is assumed to be 100 percent hexavalent chromium.

-- No contaminants of concern for the exposure unit based on human health risk assessment results.

CR-1 Quivira Church Rock Mine No. 1

CR-1E Quivira Church Rock Mine No. 1 East

Kerr-McGee Kerr-McGee Corporation

SE Secular equilibrium

UNC United Nuclear Corporation

3.4.2 Uncertainty Associated with the Human Health Risk Assessment

Uncertainties are inherent in the process of quantitative risk assessments based on the use of environmental sampling results, assumptions regarding exposure, and the quantitative representation of contaminant toxicity. Analysis of the critical areas of uncertainty in a risk assessment provides a better understanding of the quantitative results through the identification of the uncertainties that most significantly affect the results.

USEPA (1989) guidance stresses the importance of providing an in-depth analysis of uncertainties so that risk managers are better informed when evaluating risk assessment conclusions. Potentially significant sources of uncertainty for this risk assessment are discussed in the following subsections. The NAUM risk assessment methodology (USEPA 2024b) provides more general HHRA uncertainty discussions for topics applicable to all NAUM sites.

3.4.2.1 Uncertainty in the Conceptual Site Model

The CSM for the Quivira Mines incorporates several assumptions regarding the completeness and reasonableness of the exposure scenarios presumed at the site. The primary assumptions seem evidently valid. Examples include:

- Potential future use of areas for Kee‘da‘whíí téél (full-time Navajo resident) within CR-1, CR-1E, the former Kerr-McGee Ponds, and the arroyos on the Navajo Nation — Many examples of nearby full-time residences on the Navajo Nation are available.
- Potential future use of UNC areas — These areas will remain as industrial use with a site-specific onsite worker receptor.
- The NAUM Risk Calculator used to calculate the risk-based screening levels incorporates numerous Navajo-specific exposure pathways. Therefore, any potential to underestimate total exposure by a Kee‘da‘whíí téél (full-time Navajo resident) receptor is expected to be small to moderate.
- Risk-based screening levels for the site-specific UNC outdoor worker were calculated using standard exposure parameters with a reduced number of days on site per year (2 days per week for 50 weeks per year for a total of 100 days per year on site). The total exposure by an onsite worker is expected to be overestimated by this evaluation as any UNC outdoor worker would be dividing time spent at the multiple UNC sites in the area and limited maintenance is necessary at the former Kerr-McGee Ponds and portion of the arroyos on UNC property.

3.4.2.2 Uncertainty in Sample Design and Exposure Point Concentrations

The sampling collection for the site was not based on a random sampling design. Instead, sampling was biased toward known areas of contamination based on the results of gamma surveys and X-ray fluorescence samples. Thus, while some areas do not have the same level of sampling coverage as others, those areas are not likely to have high levels of contamination based on the site survey techniques employed before collection of discrete samples for laboratory analysis. The uncertainty associated with the sample collection is moderate, but the samples used

in the risk assessment are likely to overestimate the actual site risk because of the biased nature of the samples collected at the site.

Risks and hazards were calculated using maximum detected concentrations as EPCs for contaminants with fewer than 10 results for the two arroyo EUs. Use of maximum detected concentrations as EPCs likely overestimated risks.

3.4.2.3 Uncertainty in Reasonable Maximum Exposure Receptor Selection and Exposure Parameters

The most significant site-specific uncertainty associated with the HHRA is the selection of the RME receptor for each EU. EUs used in the NAUM risk assessments and future removal actions within the TENORM area are developed by identifying areas of TENORM with the same expected human health receptors. The RME receptor for each EU was selected based on the criteria provided in the NAUM risk assessment methodology (USEPA 2024b) report and site knowledge. If the receptor selected is less conservative than the actual future land use, the HHRA would not be protective. Likewise, if the future land use is less intensive than the receptor selected (for example, residential is selected, but the actual use is easy access open space), the HHRA would be overly protective. This uncertainty is moderate, and the direction of the uncertainty is more likely to be overprotective because of the conservative selection methodology used to identify the RME receptor for each area.

3.4.2.4 Uncertainty in Use of Hexavalent Chromium Toxicity for Chromium

Hexavalent chromium is not expected to be present in large concentrations at former uranium mining sites because site operations did not concentrate or use hexavalent chromium. The assumption of 100 percent hexavalent chromium overestimates the cancer risk from samples analyzed for total chromium by an unknown amount.

3.4.2.5 Site-Wide Risk Estimates

This HHRA only evaluates the RME receptor at an EU, and the results of the HHRA are used in making risk management decisions for the site. A potential site uncertainty is that a single receptor may visit multiple areas at a site and, thus, be exposed to more than one EU. Kee'da'whíí téél (full-time Navajo resident) was evaluated at three areas; therefore, the risk and hazards from these areas cannot appropriately be added together as that would assume the receptor lives on all three sites simultaneously.

However, a resident living at CR-1 may go into the adjacent arroyo (difficult access open space) to gather plants or hunt. Because of the overlap in the exposure assumptions for plant and animal ingestion and Other Diné Lifeways (ODL) pathways between the Navajo-specific receptors, adding the calculated exposures from the receptors at each EU is not possible without counting the plant, animal, and ODL exposures multiple times. Potential additive scenarios were identified as follows:

- CR-1 full-time Navajo resident and difficult access open space user of arroyos on the Navajo Nation

- CR-1E full-time Navajo resident and difficult access open space user of arroyos on the Navajo Nation
- Former Kerr-McGee Ponds full-time Navajo resident and difficult access open space user of arroyos on the Navajo Nation
- UNC outdoor worker on former Kerr-McGee Ponds and arroyos on UNC property

To calculate the cumulative risk and hazard that account for possible exposures to different EUs without double counting the plant, animal, and ODL exposures pathways, a time-weighted average approach was applied to the combined EUs. However, the actual time a receptor spends in any area is unknown and introduces a potentially large amount of uncertainty. The following bullets discuss the potential additive scenarios identified:

- CR-1 full-time Navajo resident and difficult access open space user of arroyos on the Navajo Nation — The total time on site for this potential scenario would be 99.6 percent of time spent at CR-1 and 0.4 percent of time in the arroyo. Thus, combining these scenarios results in a cancer risk and noncancer hazard essentially equal to the full-time Navajo resident living at CR-1. The cancer risk for surface soil would be $1x10^{-2}$, and the estimated risk for subsurface soil would be $3x10^{-2}$. The noncancer hazard would be 10 for a child and 8 for an adult for both surface and subsurface soil intervals.
- CR-1E full-time Navajo resident and difficult access open space user of arroyos on the Navajo Nation — The total time on site for this potential scenario would be 99.6 percent of time spent at CR-1E and 0.4 percent of time in the arroyo. Thus, combining these scenarios results in a cancer risk and noncancer hazard essentially equal to the full-time Navajo resident living at CR-1E. The cancer risk for surface soil would be $2x10^{-2}$, and the estimated risk for subsurface soil would be $8x10^{-2}$. The noncancer hazard would be 10 for a child and 8 for an adult for surface soil and 20 for a child and 10 for an adult for subsurface soil.
- Former Kerr-McGee Ponds full-time Navajo resident and difficult access open space user of arroyos on the Navajo Nation — The total time on site for this potential scenario would be 99.6 percent of time spent at the former Kerr-McGee Ponds on the Navajo Nation and 0.4 percent of time in the arroyo. Thus, combining these scenarios results in a cancer risk and noncancer hazard essentially equal to the full-time Navajo resident living at the former Kerr-McGee Ponds. The cancer risk is estimated to be $2x10^{-2}$ for both surface and subsurface soil intervals. The noncancer hazard is 10 for a child and 9 for an adult for both surface and subsurface soil intervals.
- UNC outdoor worker on former Kerr-McGee Ponds and arroyos on UNC property — These scenarios do not have overlapping exposures and so the cancer risk and noncancer hazards can be added from these two areas for an individual worker receptor who is exposed to both areas. The total risk from both areas is $3x10^{-4}$ for surface soil and $2x10^{-4}$ for subsurface soil. The total noncancer hazard would be 0.07 for both surface and subsurface soil intervals.

The actual exposure to any EU at the Quivira Mines is likely overestimated by the scenarios used to evaluate the EUs. Combining the exposures likely compounds the uncertainty and still overestimates the exposure and resulting risk and hazard at the site.

4.0 ECOLOGICAL RISK ASSESSMENT

An ERA is the process for evaluating how likely the environment will be impacted as a result of exposure to one or more environmental stressors, such as radionuclides or chemicals. The objective of the ERA is to evaluate whether ecological receptors may be adversely affected by exposure to site-related contaminants. The ERA is intended to provide input for risk management decision-making at each site while maintaining a conservative approach protective of ecological populations and communities. This ERA follows the guidelines in the NAUM risk assessment methodology (USEPA 2024b).

As described in USEPA (1993) EE/CA guidance, a risk assessment is used to help justify a removal action, identify what current or potential exposures should be prevented, and focus on the specific problem that the removal action is intended to address. NAUM ERAs include a screening-level ecological risk assessment (SLERA) and SLERA refinement. The SLERA includes Steps 1 and 2 of USEPA's eight-step ERA process (USEPA 1997) and is intended to provide a conservative estimate using maximum site concentrations of potential ecological risks and compensate for uncertainty in a precautionary manner by incorporating conservative assumptions. The SLERA refinement includes a refinement of Steps 1 and 2 and is intended to provide additional information for risk managers. Candidate COECs are identified based on the results of the SLERA refinement for soil. Table C-2 and Table C-8 through Table C-12 present data and analysis associated with the ERA.

Consistent with standard risk assessment practice and USEPA (1992b, 1998, 2022a) guidance, the ERA is presented in three major phases:

- Problem formulation
- Analysis of exposure and effects
- Risk characterization

4.1 PROBLEM FORMULATION

The problem formulation phase is a planning and scoping process that establishes the goals, breadth, and focus of the risk assessment. The product of the problem formation is a CSM that identifies the environmental values to be protected (assessment endpoints), data needed, and analyses to be used. The components of the problem formulation include:

- Ecological habitat and biological resources
- Stressors and COI selection
- Potentially complete exposure pathways
- Assessment endpoints
- Measurement endpoints
- Ecological CSM

The SLERA includes the screening-level problem formulation (Step 1), exposure estimation, effects evaluation, and screening-level risk calculation (Step 2) of the USEPA risk assessment process. The maximum detected concentration across the site is used as the EPC in the SLERA, which is compared with the minimum no observed effect concentration (NOEC) for all ecological receptors. The product of the SLERA is a list of contaminants of potential ecological concern (COPEC) in affected media that are recommended for further ecological assessment.

The SLERA refinement provides additional information for risk managers. For plants and invertebrates, the SLERA refinement includes a point-by-point comparison of individual sample results to plant and invertebrate NOECs. For free-ranging birds and mammals, the SLERA refinement uses an estimate of the average concentration as the EPC to represent exposure to free-ranging birds and mammals and includes a comparison of the EPC with the minimum NOEC for birds and mammals.

At the conclusion of the SLERA refinement, the candidate COECs are identified. For plants and invertebrates, analytes with any individual sample results exceeding the plant and invertebrate NOEC will be identified as candidate COECs, and for birds and mammals, analytes with a refined hazard quotient (HQ) equal to or greater than 1.0 will be identified as candidate COECs. These analytes are called candidate COECs (rather than COECs) because the analytes have not yet undergone a background evaluation, which will be completed in the EE/CA. The background evaluation should not be performed as part of the risk assessment.

4.1.1 Ecological Habitat and Biological Resources

The ecological habitat and biological resources at the Quivira Mines are described in Section 1.4. The Quivira Mines are primarily within an Area 3 wildlife sensitive area.

4.1.2 Stressors and Contaminants of Potential Ecological Concern Selection

All detected inorganic chemicals and radionuclides in soil were considered COIs in this SLERA. Essential nutrients that are not priority pollutants, such as calcium, magnesium, potassium, and sodium, were not retained as COIs. No speciation data are available for chromium; therefore, chromium is assumed to be 100 percent hexavalent chromium. See Section 2.4 of the main EE/CA report for further discussion on the sources and extent of contamination. Samples collected within soil (0 to 72 inches bgs) were used in the risk assessment as described in Section 2.1.

4.1.3 Potentially Complete Exposure Pathways

A contaminant must be able to travel from the source to the representative receptor and must be taken up by the receptor through one or more exposure routes for an exposure pathway to be considered complete. Complete exposure pathways present the greatest potential risk of adverse effects for receptors of concern at a site. Potential exposure pathways that may result in receptor contact with contaminants in the environment include soils, sediment, surface water, groundwater, air, and food-chain transfer. Soil and sediment are the primary exposure media of concern at this site. Potential exposure pathways are diagrammed in the CSM (Figure C-10).

Discussion of the exposure pathways for ecological receptors at NAUM sites is provided in the NAUM risk assessment methodology (USEPA 2024b).

Soil exposures are evaluated in the SLERA for the Quivira Mines. The removal actions at the Quivira Mines are focused on removing waste and soil as the removal of both should remove the source of contamination to surface water and groundwater. Exposure to surface water or groundwater is assumed to be minimal because the presence of surface water at the Quivira Mines is intermittent and groundwater is too deep for ecological receptors to access.

4.1.4 Assessment Endpoints

USEPA (1997) defines assessment endpoints as explicit expressions of the actual environmental values (for example, ecological resources) that are to be protected. Assessment endpoints are environmental characteristics that, if impaired, would indicate a need for action by risk managers.

The assessment endpoints identified for evaluation in the ERA were based on the ecological habitat, stressors and COPECs, and potentially complete exposure pathways identified in Section 4.1.3 and depicted on the CSM (Figure C-10). Each assessment endpoint is intended to protect the local populations of the identified resources. The assessment endpoints used to evaluate the potential ecological risk to receptors typical of the area at the Quivira Mines were:

- Protection of terrestrial plants
- Protection of terrestrial invertebrates
- Protection of herbivorous birds
- Protection of insectivorous birds
- Protection of carnivorous birds
- Protection of herbivorous mammals
- Protection of insectivorous mammals
- Protection of carnivorous mammals

4.1.5 Measurement Endpoints

Measurement endpoints related to the assessment endpoints were identified because assessment endpoints are usually not amenable to direct measurement. USEPA (1997) defines a measurement endpoint as a measurable ecological characteristic that is related to the valued characteristic chosen as the assessment endpoint and is a measure of biological effects (such as mortality, reproduction, or growth). Measurement endpoints for soil and sediment for both radionuclides and metals are described below.

For radionuclides in soil, ecological screening levels (ESL) for the NAUM program were developed by Tetra Tech (see Appendix F of the NAUM risk assessment methodology [USEPA 2024b] report). An ecological radiation dose assessment was performed for radionuclides in the uranium-238 decay chain using the dose assessment model Environmental Risks from Ionizing

Contaminants: Assessment and Management (ERICA). The ERICA model is scientifically robust, follows approaches recommended by the International Commission on Radiation Protection for radiation protection of the environment, and provides dose assessment for uranium-238 and all its decay progeny. Using the ERICA Tool (Brown and others 2008; Larsson 2008), ESLs were calculated for the following radionuclides or groups of radionuclides in soil for terrestrial organisms:

- Uranium-238 in SE (adjusted radium-226) adjusted to account for the entire uranium-238 decay chain
- Radium-226 in SE (adjusted radium-226) adjusted to account for radium-226 and decay products
- Individual radionuclides uranium-238, uranium-234, and thorium-230

ESLs are based on dose rates where no effects have been observed and, therefore, are NOECs. For all radionuclides, the limiting ESLs are for lichen-bryophytes and small burrowing animals at 4 and 6 picocuries per gram, respectively. The ESLs are designed for use for comparison with radium-226 site concentrations. Use of site data for radium-226 reduces the number of analytical methods needed to evaluate risks from radionuclides. Furthermore, radium-226 concentrations can be correlated to gamma survey results, which provides an efficient and reliable way to evaluate the extent of radiation contamination.

For metals for soil, USEPA (2023a) ecological soil screening levels (Eco-SSL) are used as the primary source for NOEC levels. Eco-SSLs are available for the protection of terrestrial plants, invertebrates, birds, and mammals from the three primary feeding groups (herbivores, insectivores, and carnivores). The Eco-SSLs for soil-dwelling invertebrates and plants are based on direct contact with soil by plants and soil-dwelling organisms living in impacted soil. The Eco-SSLs for upper-trophic-level wildlife are based on incidental ingestion of soil and ingestion of food sources that have bioaccumulated contaminants. The no effect Eco-SSL is based on a no-observed-adverse-effect-level-based toxicity reference value that is protective of wildlife populations and sensitive individuals because it represents an exposure that is not associated with an adverse effect. The Eco-SSLs are intended to be conservative screening values that can be used to eliminate contaminants not associated with unacceptable risks (USEPA 2005).

Where a USEPA Eco-SSL is not available for a COPEC and receptor combination (for example, total mercury, thallium, and uranium), a no-observed-adverse-effect-level-based toxicity value from the Los Alamos National Laboratory (LANL) EcoRisk database (Newport News Nuclear BWXT-Los Alamos, LLC [N3B] 2022) is selected as the screening level. The LANL EcoRisk database includes ESLs for plant, invertebrate, avian, and mammalian receptors. Soil invertebrate and plant screening levels were also taken from the Oak Ridge National Laboratory (ORNL) (Efroymson, Will, and Suter II 1997; Efroymson, Will, Suter II, and Wooten 1997) if a screening level was not available as an Eco-SSL or from the LANL EcoRisk database. No Eco-SSL or LANL values for mammals were available for molybdenum; therefore, screening values were taken from ORNL's "Preliminary Remediation Goals for Ecological Endpoints" (Efroymson, Suter II, Sample, and Jones 1997).

The screening levels selected from USEPA Eco-SSLs (USEPA 2023a), LANL ESLs (N3B 2022), and ORNL (Efroymson, Will, and Suter II 1997; Efroymson, Will, Suter II, and Wooten 1997) for metals and developed from ERICA (for radionuclides) for use in the SLERA screening are the lowest NOECs for all receptor groups (that is, the lowest of the plant, invertebrate, bird [herbivorous, insectivorous, and carnivorous], and mammal [herbivorous, insectivorous, and carnivorous] NOECs) for each COPEC. The screening levels are provided in Table C-8.

4.1.6 Conceptual Site Model

The CSM illustrates exposure pathways to be evaluated in the ERA and provides other key information such as contaminant sources, release and transport mechanisms, and the relative importance of exposure pathways to specific receptor groups. The CSM incorporates all components of the problem formulation as discussed above and illustrated on Figure C-10.

4.2 ANALYSIS OF EXPOSURE AND EFFECTS

In the analysis phase, exposure to stressors (metals and radionuclides) and their relationship to ecological effects are evaluated. A determination is made of (1) the degree to which ecological receptors are exposed and (2) whether that level of exposure is likely to cause harmful ecological effects.

4.2.1 Exposure Estimates

For the SLERA, a single site-wide exposure area that included all data collected within the Quivira Mines EUs were used for the evaluation of potential risk to ecological receptors. Exposure estimates for the SLERA for soil are the maximum detected concentrations for COIs in soil compared to the minimum screening levels for all receptors (plants, invertebrates, birds [herbivorous, insectivorous, and carnivorous], and mammals [herbivorous, insectivorous, and carnivorous]). For each detected analyte, the maximum detected concentrations used in the SLERA for each COPEC are presented in Table C-8.

Following the comparison of the maximum detection to the NOEC, a SLERA refinement of exposure was completed by assessing site data within surface and subsurface soils and using the UCL95 (for analytes where sufficient data were available) instead of the maximum concentration to evaluate risk to free-ranging receptors (birds and mammals) for the assessment of wildlife. Surface and subsurface soils include depth intervals of 0 to 6 inches bgs for surface soil and 0 to 72 inches bgs for subsurface soil (see Section 2.1). The EPCs used in the SLERA refinement for birds and mammals for each COPEC were calculated per the procedure in Section 2.4 and are presented in Table C-9. For the SLERA refinement for plants and invertebrates, individual sample concentrations are used in a point-by-point comparison.

4.2.2 Ecological Effects

Ecological effects of potential concern are those that can impact populations by causing adverse effects on development, reproduction, and survival (USEPA 1997). Literature-based effects concentrations (NOECs) as described in Section 4.1.5 were used in the ERA to characterize potential effects from direct contact and uptake through the food web to terrestrial ecological receptors, including vegetation, soil invertebrates, birds, and mammals.

For the SLERA, an HQ was calculated as the ratio of the maximum contaminant concentration to the screening level (NOEC) by COPEC and receptor. HQs greater than or equal to 1.0 indicate potential unacceptable risk to plants, invertebrates, birds, and mammals based on a conservative comparison of the maximum detected concentration to the minimum NOEC-based screening level for all receptors. HQs less than 1.0 indicate little to no potential ecological risk for a given COPEC, and the COPEC is excluded from further consideration (that is, the COPEC was not evaluated in the SLERA refinement). The SLERA HQ was calculated as follows:

$$\text{SLERA HQ} = \frac{\text{Maximum Detected Concentration}}{\text{Screening Level (NOEC or ESL)}}$$

To better understand potential risk to free-ranging receptors, the site-wide EPC (based on the lesser of the UCL95 and maximum detected concentration) will be used as a refinement in the SLERA refinement using NOECs based on birds and mammals. The refined SLERA HQ is calculated as follows:

$$\text{Refined SLERA HQ} = \frac{\text{EPC}}{\text{Screening Level (NOEC or ESL)}}$$

Because plant and soil invertebrates are not mobile, concentration data from each sample location should be compared to the plant and invertebrate NOEC-based screening levels in a separate table.

4.3 RISK CHARACTERIZATION

In the risk characterization phase, potential risk is estimated through integration of exposure and effects, potential risks are considered in the context of uncertainties associated with the SLERA, and risk descriptions are provided.

4.3.1 Screening-Level Ecological Risk Assessment for Contaminants of Potential Ecological Concern

HQs, which represent the ratio of the maximum detected concentration in soil to the screening levels, are presented in Table C-8. Contaminants for which the HQ was greater than or equal to 1.0 were uranium-238, uranium-234, radium-226, arsenic, barium, chromium, lead, manganese, nickel, selenium, thallium, uranium, vanadium, and zinc.

4.3.2 Screening-Level Ecological Risk Assessment Refinement

The SLERA refinement incorporates components of Step 3 of USEPA's eight-step ERA process to refine the soil risk estimates from the SLERA (USEPA 2000b, 2001). The SLERA refinement involves assessing plants and invertebrates on a point-by-point basis and wildlife (birds and mammals) based on a refined EPC.

4.3.2.1 Plants and Soil Invertebrates

Plants and soil invertebrates are not mobile; therefore, comparison of the UCL95 to the NOEC or ESL may not appropriately assess whether potential unacceptable risk to plants and invertebrates exists. Therefore, a comparison on a point-by-point basis using the plant and invertebrate NOECs is required. COPECs are identified as candidate COECs if at least one sample result exceeds the plant or soil invertebrate NOEC or ESL for surface soil or the plant NOEC or ESL for subsurface soil. Table C-10 presents a comparison of individual surface soil sample results to NOECs or ESLs for the plant and invertebrate communities and of individual subsurface soil sample results to NOECs or ESL for the plant communities (invertebrates are not exposed to soil at depths greater than 6 inches bgs). For plants and invertebrates, analytes with any individual sample results exceeding the plant and invertebrate NOEC or ESL are identified as candidate COECs.

Candidate COECs for plants were uranium-238 (subsurface only), uranium-234 (subsurface only), radium-226 in SE, arsenic (surface only), barium, chromium, lead (surface only), manganese, selenium, thallium, and uranium. Candidate COECs for invertebrates were arsenic, barium, chromium, and selenium.

4.3.2.2 Birds and Mammals

For free-ranging wildlife, the EPCs are calculated on a site-wide basis for contaminants with analyte-specific HQs that are equal to or greater than 1.0 in the SLERA. SLERA refinement risk estimates are calculated by dividing EPCs by the minimum NOEC or ESL for birds and mammals for each COPEC in surface soil and by dividing EPCs by the NOEC or ESL for mammals in subsurface soil (birds and non-burrowing mammals are not exposed to soil at depths greater than 6 inches bgs).

Table C-11 and Table C-12 present HQs for birds and mammals, respectively. Candidate COECs for birds and mammals are identified for analytes with HQs greater than 1.0 based on the comparison of the EPC (UCL95) to the minimum screening level (minimum NOEC or ESL for wildlife).

Candidate COECs for birds were lead, selenium, vanadium, and zinc. Candidate COECs for mammals were radium-226 in SE (subsurface soil only) and selenium.

4.3.3 Candidate Contaminants of Ecological Concern

Candidate COECs were identified based on available laboratory and toxicological data for the Quivira Mines. The SLERA results indicate that risk is above a level of concern for the contaminants listed in Exhibit C-4.

Exhibit C-4. Site-Wide Candidate COECs

Receptor	Soil Interval	Candidate COEC												
		Uranium-234[1]	Uranium-238[1]	Radium-226 in SE	Arsenic	Barium	Chromium[2]	Lead	Manganese	Selenium	Thallium	Uranium	Vanadium	Zinc
Plants	Surface Soil	--	--	X	--	X	X	X	X	X	X	X	--	--
	Subsurface Soil	X	X	X	--	X	X	--	X	X	X	X	--	--
Invertebrates	Surface Soil	--	--	--	X	X	X	--	--	X	--	--	--	--
Birds	Surface Soil	--	--	--	--	--	--	X	--	X	--	--	X	X
Mammals	Surface Soil	--	--	--	--	--	--	--	--	X	--	--	--	--
	Subsurface Soil	--	--	X	--	--	--	--	--	X	--	--	--	--

Notes:

[1] Uranium-234 and uranium-238 concentrations exceed the ecological no observed effects concentration for plants in a single subsurface sample (location KMP-SB28 from 60 to 66 inches below ground surface) in the Kerr-McGee Ponds on UNC Property exposure unit. This area is considered a hot spot, and any recommendations for uranium-234 and uranium-238 apply only to this hot spot.

[2] No speciation data are available for chromium; therefore, chromium is assumed to be 100 percent hexavalent chromium.

-- Not a candidate COEC
X Candidate COEC
COEC Contaminant of ecological concern
Kerr-McGee Kerr-McGee Corporation
SE Secular equilibrium
UNC United Nuclear Corporation

4.4 UNCERTAINTY ASSOCIATED WITH THE ECOLOGICAL RISK ASSESSMENT

Uncertainty plays an important role in risk-based decision-making and is, therefore, incorporated explicitly into the risk characterization process. Identifying known sources of uncertainty is a critical component of an ERA because conservative default assumptions incorporated into the ERA protocol are associated with substantial uncertainty. The ERA process is based on assumptions and extrapolations to evaluate potential risk to ecological receptors. These assumptions are intentionally conservative and may result in overestimates of site-specific risk to ensure that no COPECs that pose actual risk are eliminated from the ERA. The primary components of uncertainties include those associated with site data and exposure, the development and use of toxicity values, and interpretation of HQs to estimate potential risk to representative receptors. The NAUM risk assessment methodology (USEPA 2024b) provides more general ERA uncertainty discussions for topics applicable to all NAUM sites.

4.4.1 Exposure Estimates

Because Tetra Tech evaluated the Quivira Mines using limited collected data, all concentrations measured are, therefore, only estimates of concentrations that may occur throughout the site (with associated error). The maximum detected concentration detected in surface and subsurface

soils at the Quivira Mines was assumed to represent the entire site to ensure protectiveness. However, this method creates bias in the data toward the more disturbed or affected environments at the site and is likely to overestimate COPEC exposure concentrations.

Similarly, in the SLERA refinement, an EPC for each COPEC for surface and subsurface soils was used to estimate exposures and ensure protectiveness. The use of the UCL95 concentration may under- or overestimate COPEC concentrations used to characterize conditions throughout the site, depending on their actual site-wide distribution. In addition, portions of the site are bare ground and do not provide habitat or foraging area for some ecological receptors. Bare ground areas are included in the evaluation; however, the nature of the bare ground areas (toxicity, lack of soil, etc.) is unknown.

Site-specific bulk chemistry concentrations were compared with toxicity benchmarks values such as USEPA Eco-SSLs and LANL ESLs as an indicator of the potential for adverse effects. Bulk chemistry results for onsite samples likely overestimate the bioavailable fraction of each COPEC as the results do not consider whether the contaminant is bound to soil particles or other compounds that could prevent uptake by plants and invertebrates, or absorption upon direct contact or ingestion by higher trophic-level receptors.

The ERA assumes that all receptors live and forage solely at the site; however, this assumption is not necessarily true for the avian and larger mammalian receptors, which can forage over larger areas and are not likely to be consistently exposed to COPECs in soil at the estimated site concentrations. Mobile ecological receptors could be exposed to areas beyond the site boundary depending on the foraging and home range of the particular species. The use of media-based screening levels does not account for the size of the site or the foraging area. Nonmobile receptors, such as the plant and soil invertebrate communities, are assessed by sample, and small ranging receptors, such as small mammals, would likely remain within the site boundaries if sufficient food and shelter were available. However, free-ranging wildlife, such as raptors, large herbivores, and top-level predators, would travel beyond the site boundary. Furthermore, use of a site can vary seasonally. Therefore, the actual amount of soil or prey ingested from the site would likely be less than the values used in the risk calculations, resulting in an overestimate of risk. The impact of this uncertainty is species dependent but likely small given that those receptors that would travel beyond the site boundary have large home ranges.

As with any site investigation, uncertainty will be associated with the representativeness of the samples both spatially and temporally. Soil samples were collected from over a period of 12 years by multiple contractors, and sampling methods and analytical methods may not have been consistent. Figure C-3 through Figure C-9 show the sample locations for each EU. Spatial variability is limited because soil samples used in the risk assessment were all collected within the disturbed area of the mines and the Kerr-McGee Ponds. Temporal variability is limited because soil sampling methods were consistent among sampling events and because of the known environmental fate of the COPECs (lack of degradation).

4.4.2 Nondetected Contaminants of Potential Ecological Concern

Little uncertainty is involved with the analytical analysis for soil at the Quivira Mines as all COPECs were detected in soil above their respective detection limits in at least some samples.

4.4.3 Combined Exposures Across Media and Exposure Units

The design of the ecological screening process and use of media-based screening levels assumes isolation of exposure (for example, risk from exposure to soil is not added to the risk from exposure to surface water). Because surface water is present irregularly in the arroyos, an aquatic community would unlikely become established; however, birds, mammals, and reptiles could ingest the water when it is available. The risk analysis does not account for exposure to COPECs in drinking water, but the magnitude of this uncertainty is unknown.

4.4.4 Risk to Plant and Invertebrate Communities

To address the potential risk to plant and invertebrate communities, concentration data from each sample are compared to the conservative screening values protective of individual plants and invertebrates. Table C-10 presents this analysis so that risk managers can evaluate the potential risk to these communities by sample location.

Aluminum and iron do not have screening values for either community. The magnitude of the impacts of aluminum and iron on nonmobile communities is unknown. Six additional COPECs at the Quivira Mines (cobalt, molybdenum, silver, thallium, uranium, and vanadium) do not have soil invertebrate screening values. The magnitude of the impacts of these metals on the soil invertebrate community is unknown.

5.0 RISK ASSESSMENT RESULTS SUMMARY

The HHRA and SLERA results indicate human health and ecological risk exceed the acceptable risk levels. Candidate COCs and COECs were identified based on available laboratory and toxicological data at the CR-1, CR-1E, Kerr-McGee Ponds on the Navajo Nation, Kerr-McGee Ponds on UNC property, and arroyos on the Navajo Nation EUs. No candidate COCs or COECs were identified for the arroyos on UNC property EU. The HHRA and ERA results indicate that risk is above a level of concern for the contaminants listed in Exhibit C-5.

Exhibit C-5. Candidate Contaminants of Concern or Contaminants of Ecological Concern for Soil

Exposure Unit	Soil Interval	Candidate COC or COEC														
		Uranium-234[1]	Uranium-238[1]	Radium-226 in SE	Arsenic	Barium	Chromium[2]	Cobalt	Iron	Lead	Manganese	Selenium	Thallium	Uranium	Vanadium	Zinc
CR-1	Surface and Subsurface Soils	--	--	X	X	--	X	X	X	--	X	--	X	X	--	--
CR-1E	Surface and Subsurface Soils	--	--	X	X	--	X	X	X	--	X	--	X	X	--	--
Kerr-McGee Ponds on the Navajo Nation	Surface and Subsurface Soils	--	--	X	X	--	X	X	X	--	X	--	X	X	--	--
Kerr-McGee Ponds on UNC Property	Surface and Subsurface Soils	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--
Arroyos on the Navajo Nation	Surface and Subsurface Soils	--	--	X	X	--	--	--	--	--	X	--	--	--	--	--
Arroyos on UNC Property	Surface and Subsurface Soils	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Site-Wide (Ecological)	Surface Soil	--	--	X	X	X	X	--	--	X	X	X	X	X	X	X
	Subsurface Soil	X	X	X	--	X	X	--	--	--	X	X	X	X	--	--

Notes:

[1] Uranium-234 and uranium-238 concentrations exceed the ecological no observed effects concentration for plants in a single subsurface sample (location KMP-SB28 from 60 to 66 inches below ground surface) in the Kerr-McGee Ponds on UNC Property EU. This area is considered a hot spot, and any recommendations for uranium-234 and uranium-238 apply only to this hot spot.

[2] No speciation data are available for chromium; therefore, chromium is assumed to be 100 percent hexavalent chromium.

-- Not a candidate COC or COEC. Not recommended for further evaluation in the EE/CA.

X Candidate COC and/or COEC. Recommended for further evaluation in the EE/CA.

COC	Contaminant of concern	EPC	Exposure point concentration
COEC	Contaminant of ecological concern	Kerr-McGee	Kerr-McGee Corporation
CR-1	Quivira Church Rock Mine No. 1	mg/kg	Milligram per kilogram
CR-1E	Quivira Church Rock Mine No. 1 East	SE	Secular equilibrium
EE/CA	Engineering evaluation/cost analysis	UNC	United Nuclear Corporation

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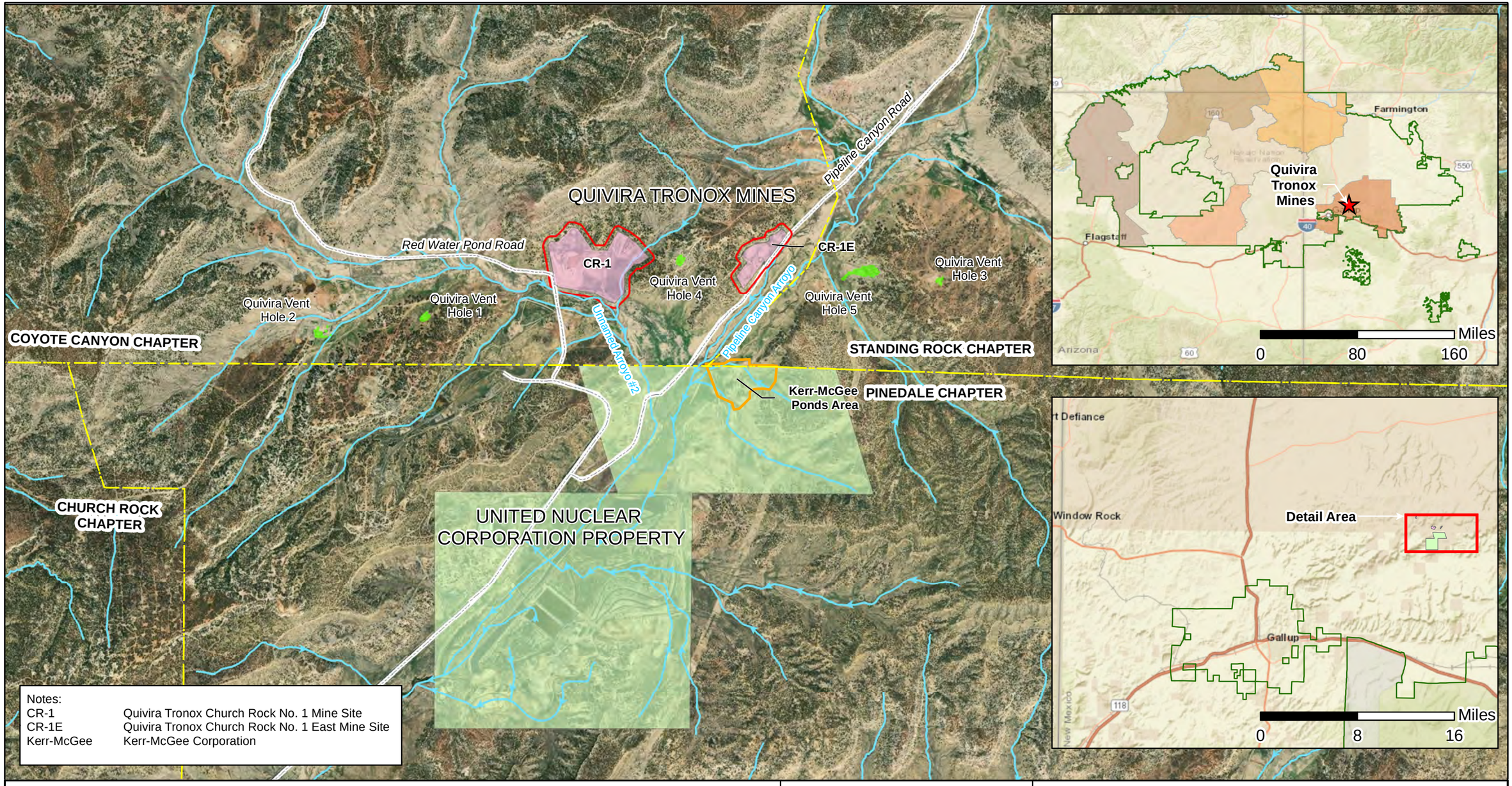
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FIGURES



Notes:

CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
Kerr-McGee	Kerr-McGee Corporation

Legend

- Drainage
- Road
- Former Vent Hole Closed by Removal Action
- Kerr-McGee Ponds Investigation Boundary
- Quivira Tronox Mine Lease Area
- 100-Foot Step-Out Boundary
- United Nuclear Corporation Property
- Navajo Nation Boundary
- Navajo Nation Chapter Boundary

Navajo Nation Regions

- Central Region
- Eastern Region
- North Central Region
- Northern Region
- Southern Region
- Western Region

N

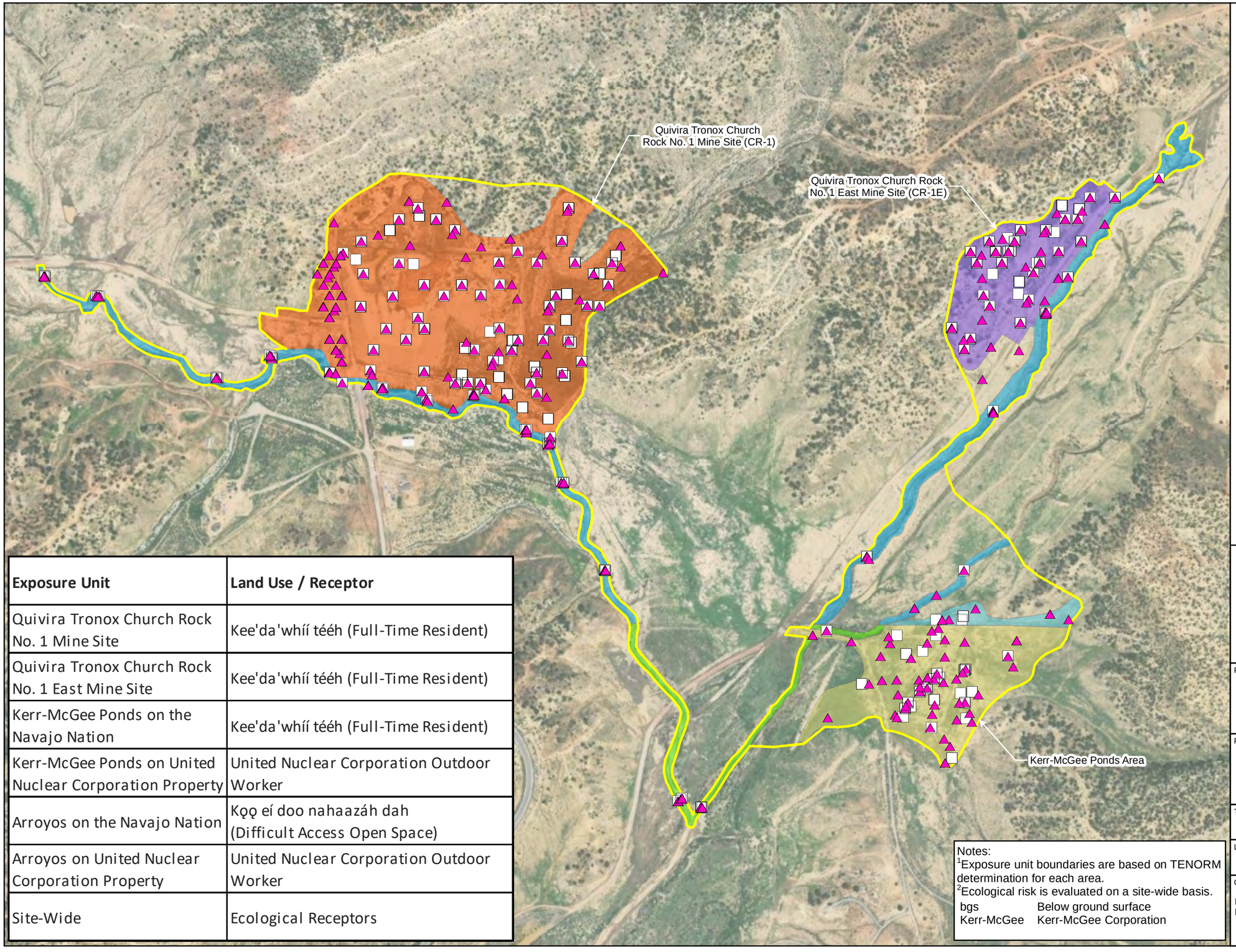
0 2,000 4,000 Feet

Prepared for: U.S. EPA Region 9

Prepared By: TETRA TECH

MINE LOCATION

Task Order No.: 0001	Contract No.: 68HE0923D0002	Figure No.: **C-1**
Location: QUIVIRA TRONOX MINES	Date: 3/8/2024	



Exposure Unit	Land Use / Receptor
Quivira Tronox Church Rock No. 1 Mine Site	Kee'da'whíí téél (Full-Time Resident)
Quivira Tronox Church Rock No. 1 East Mine Site	Kee'da'whíí téél (Full-Time Resident)
Kerr-McGee Ponds on the Navajo Nation	Kee'da'whíí téél (Full-Time Resident)
Kerr-McGee Ponds on United Nuclear Corporation Property	United Nuclear Corporation Outdoor Worker
Arroyos on the Navajo Nation	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)
Arroyos on United Nuclear Corporation Property	United Nuclear Corporation Outdoor Worker
Site-Wide	Ecological Receptors

Notes:
[1]Exposure unit boundaries are based on TENORM determination for each area.
[2]Ecological risk is evaluated on a site-wide basis.
bgs Below ground surface
Kerr-McGee Kerr-McGee Corporation

Surface Soil Sample (0-6 inches bgs)
(includes all lab samples with bottom depth ≤ 6 inches bgs)

Subsurface Soil Sample (below 6 inches bgs)
(includes all lab samples with bottom depth > 6 inches and ≤ 72 inches bgs)

Exposure Units[1,2]

- Church Rock Mine No. 1
- Church Rock Mine No. 1 East
- Kerr-McGee Ponds on the Navajo Nation
- Kerr-McGee Ponds on United Nuclear Corporation Property
- Arroyos on Navajo Nation
- Arroyos on United Nuclear Corporation Property
- Site-Wide (for Ecological Risk)

1 inch = 600 feet

1:7,200

600 300 0 600 Feet

N W E S

EXPOSURE UNITS AND SAMPLE LOCATIONS

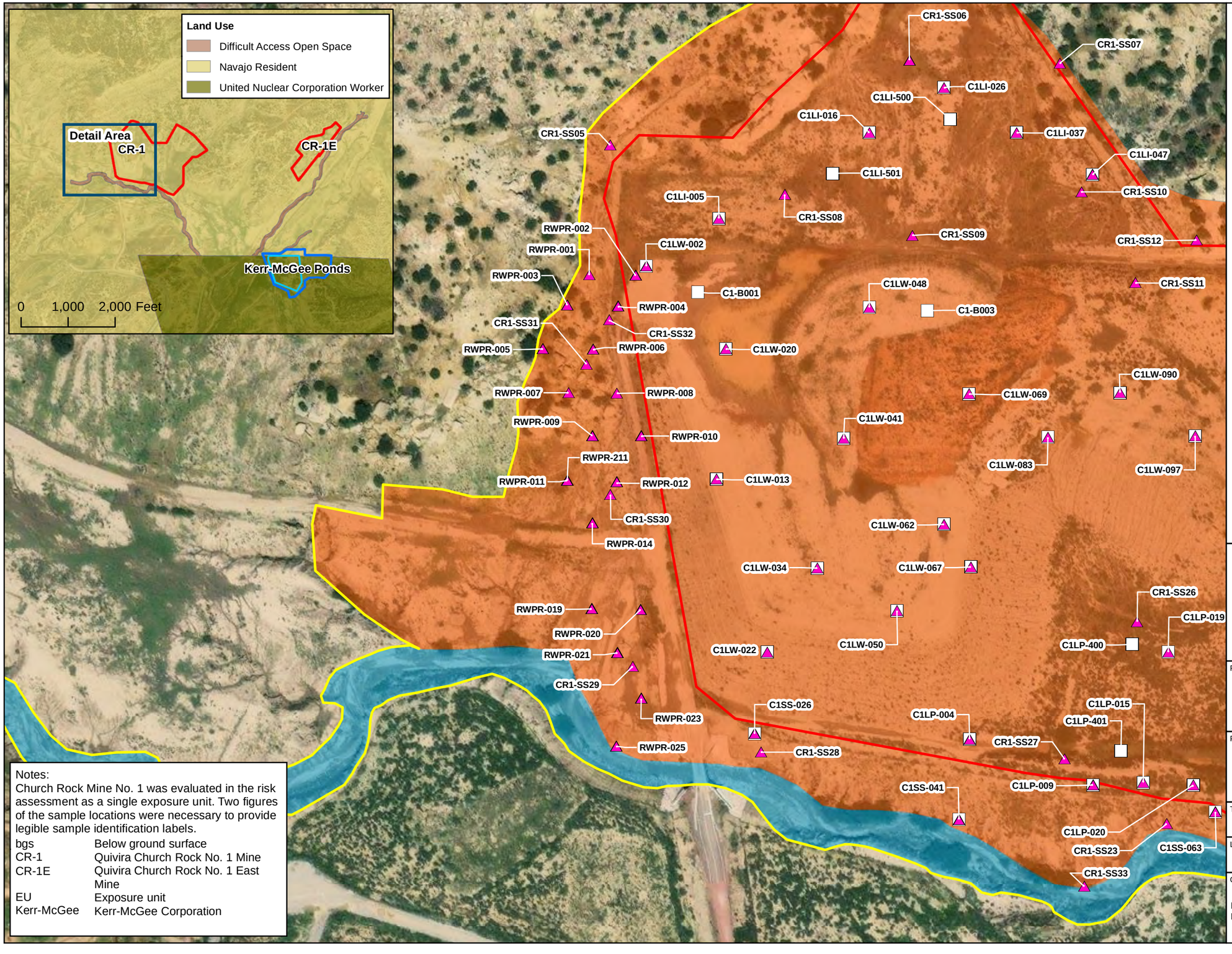
Prepared For: U.S. EPA Region 9

Prepared By:
TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.:	Contract No.:
0001	68HE0923D0002
Location:	**Date:**
QUIVIRA TRONOX MINES	3/8/2024

Coordinate System:
NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator

Figure No.: **C-2**



Notes:
Church Rock Mine No. 1 was evaluated in the risk assessment as a single exposure unit. Two figures of the sample locations were necessary to provide legible sample identification labels.

bgs	Below ground surface
CR-1	Quivira Church Rock No. 1 Mine
CR-1E	Quivira Church Rock No. 1 East Mine
EU	Exposure unit
Kerr-McGee	Kerr-McGee Corporation

Soil Sample Locations

- Surface Soil Sample (0-6 inches bgs) *(includes all lab samples with bottom depth ≤ 6 inches bgs)*
- Subsurface Soil Sample (below 6 inches bgs) *(includes all lab samples with bottom depth > 6 inches and ≤ 72 inches bgs)*
- Mine Lease Boundary
- Kerr-McGee Ponds Investigation Boundary
- Kerr-McGee Ponds Fenceline

Exposure Units

- Church Rock Mine No. 1
- Arroyos on Navajo Nation
- Site-Wide (for Ecological Risk)

1 inch = 150 feet

1:1,800

150 75 0 150 Feet

N W E S

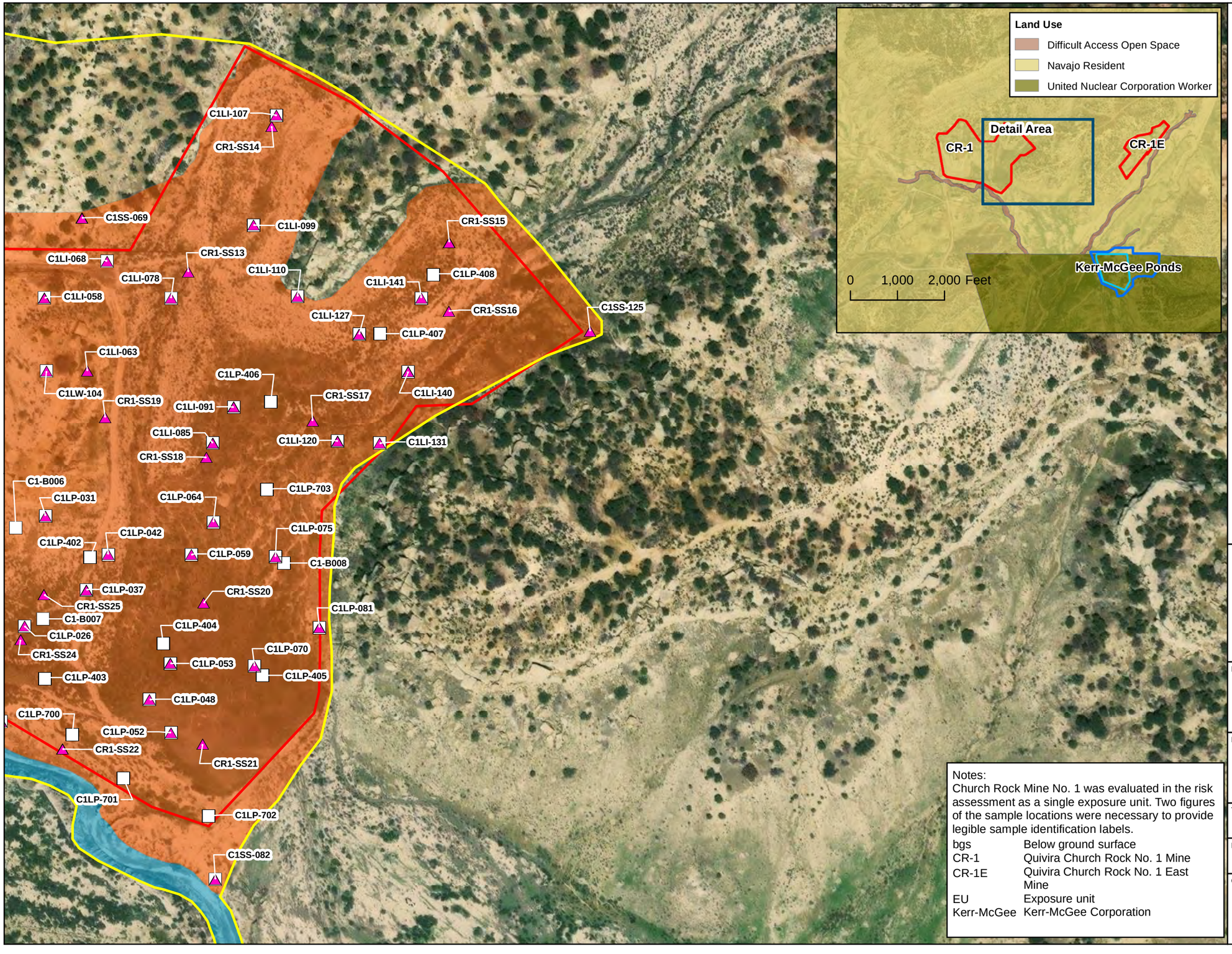
QUIVIRA CHURCH ROCK NO. 1 MINE EXPOSURE UNIT WITH SAMPLE LOCATIONS - WEST SIDE

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/8/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **C-3**



Soil Sample Locations

- Surface Soil Sample (0-6 inches bgs) *(includes all lab samples with bottom depth ≤ 6 inches bgs)*
- Subsurface Soil Sample (below 6 inches bgs) *(includes all lab samples with bottom depth > 6 inches and ≤ 72 inches bgs)*
- Mine Lease Boundary
- Kerr-McGee Ponds Investigation Boundary
- Kerr-McGee Ponds Fenceline

Exposure Units

- Church Rock Mine No. 1
- Arroyos on Navajo Nation
- Site-Wide (for Ecological Risk)

1 inch = 180 feet

1:2,160

N W E S

180 90 0 180 Feet

QUIVIRA CHURCH ROCK NO. 1 MINE EXPOSURE UNIT WITH SAMPLE LOCATIONS - EAST SIDE

Prepared For: U.S. EPA Region 9

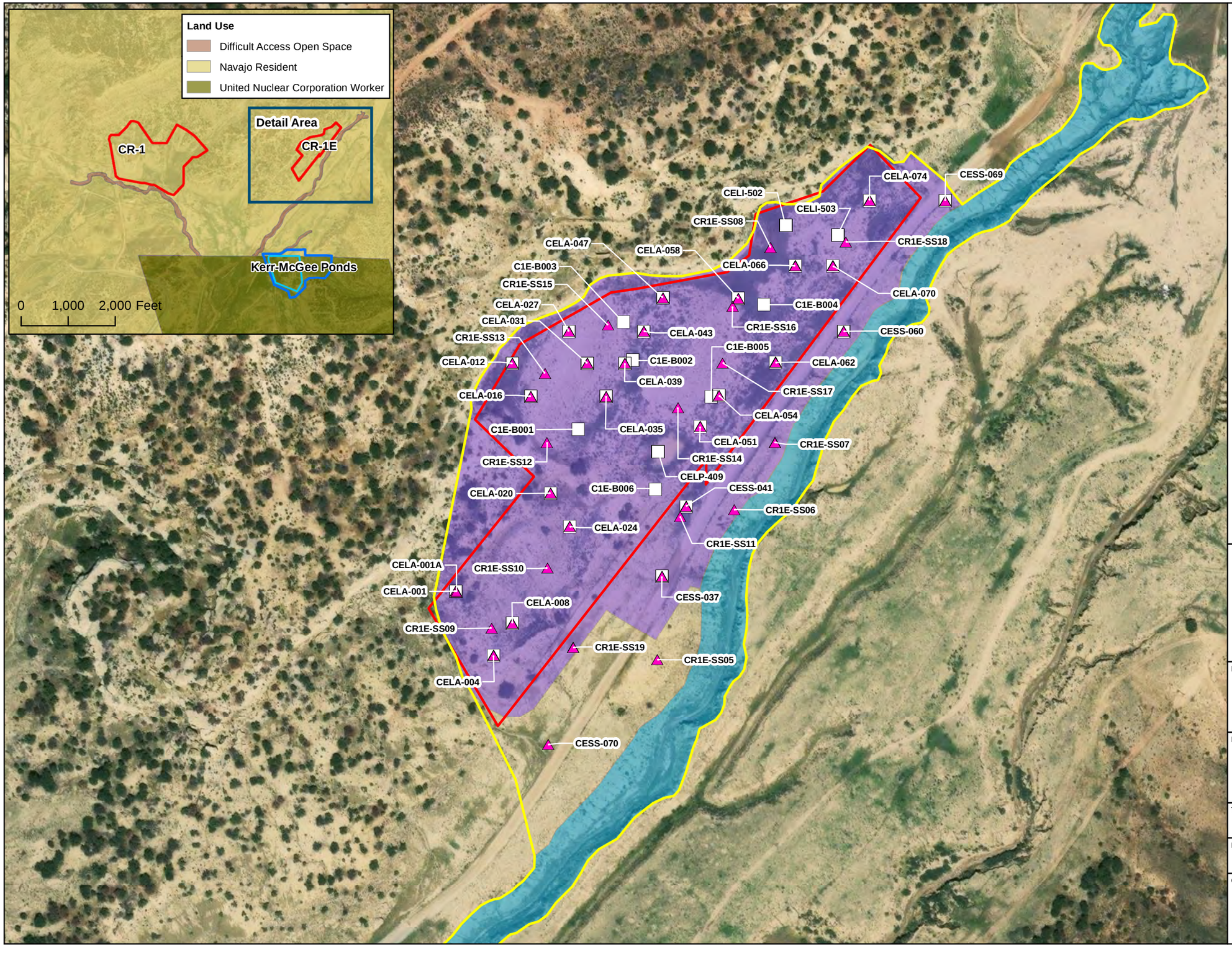
Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Notes:
Church Rock Mine No. 1 was evaluated in the risk assessment as a single exposure unit. Two figures of the sample locations were necessary to provide legible sample identification labels.

bgs	Below ground surface
CR-1	Quivira Church Rock No. 1 Mine
CR-1E	Quivira Church Rock No. 1 East Mine
EU	Exposure unit
Kerr-McGee	Kerr-McGee Corporation

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/8/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **C-4**



Soil Sample Locations

- Surface Soil Sample (0-6 inches bgs) *(includes all lab samples with bottom depth ≤ 6 inches bgs)*
- Subsurface Soil Sample (below 6 inches bgs) *(includes all lab samples with bottom depth > 6 inches and ≤ 72 inches bgs)*
- Mine Lease Boundary
- Kerr-McGee Ponds Investigation Boundary
- Kerr-McGee Ponds Fenceline

Exposure Units

- Church Rock Mine No. 1 East
- Arroyos on Navajo Nation
- Site-Wide (for Ecological Risk)

Notes:

bgs	Below ground surface
CR-1	Quivira Church Rock No. 1 Mine
CR-1E	Quivira Church Rock No. 1 East Mine
EU	Exposure unit
Kerr-McGee	Kerr-McGee Corporation

1 inch = 200 feet

1:2,400

N W E S

200 100 0 200 Feet

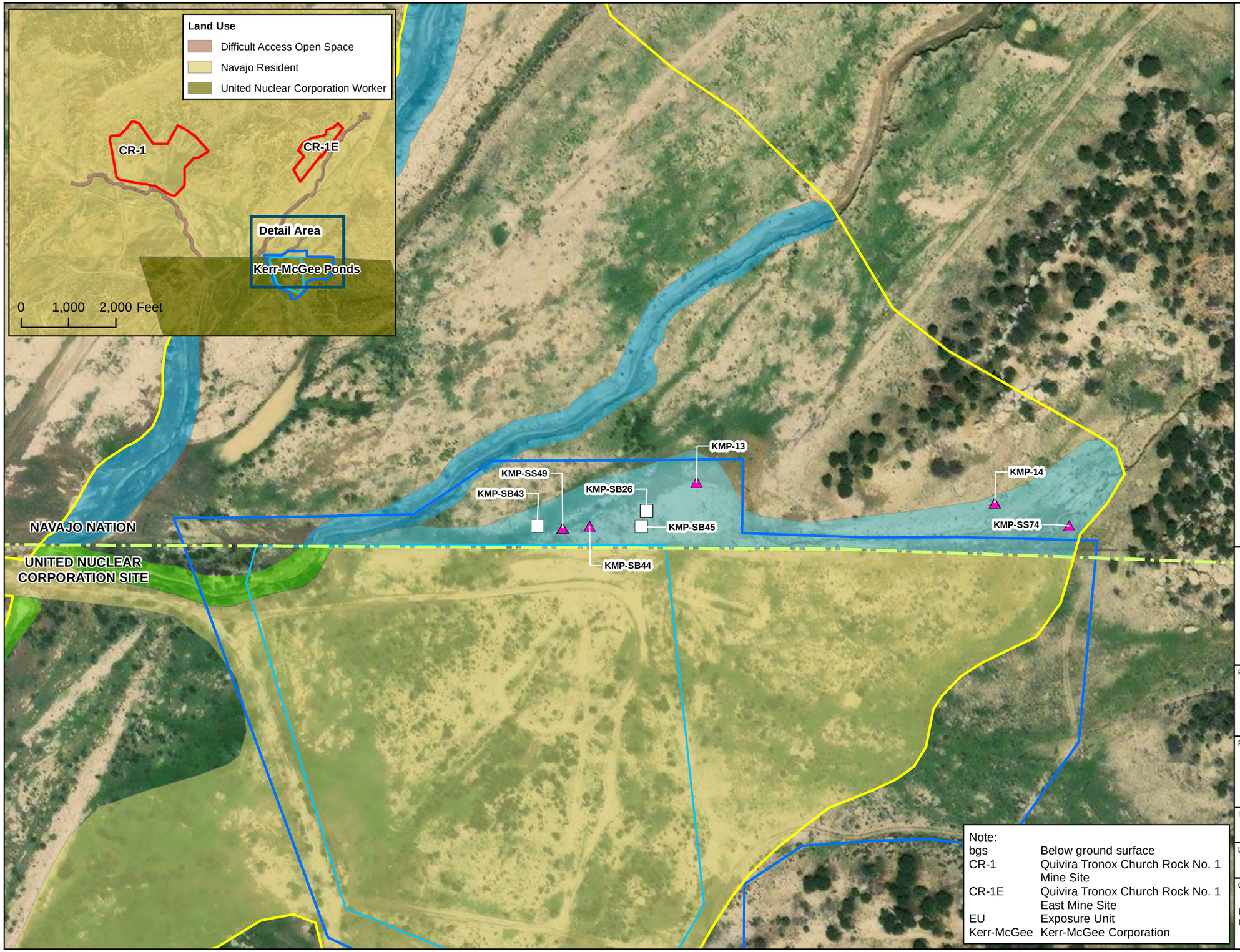
QUIVIRA CHURCH ROCK NO. 1 EAST MINE EXPOSURE UNIT WITH SAMPLE LOCATIONS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/8/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **C-5**



Soil Sample Locations

- Surface Soil Sample (0-6 inches bgs) *(includes all lab samples with bottom depth ≤ 6 inches bgs)*
- Subsurface Soil Sample (below 6 inches bgs) *(includes all lab samples with bottom depth > 6 inches and ≤ 72 inches bgs)*
- Mine Lease Boundary
- Kerr-McGee Ponds Investigation Boundary
- Kerr-McGee Ponds Fenceline
- United Nuclear Corporation Site Boundary

Exposure Units

- Kerr-McGee Ponds on the Navajo Nation
- Kerr-McGee Ponds on United Nuclear Corporation Property
- Arroyos on Navajo Nation
- Arroyos on United Nuclear Corporation Property
- Site-Wide (for Ecological Risk)

1 inch = 150 feet

1:1,800

N W E S

150 75 0 150 Feet

Note:

bgs	Below ground surface
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
EU	Exposure Unit
Kerr-McGee	Kerr-McGee Corporation

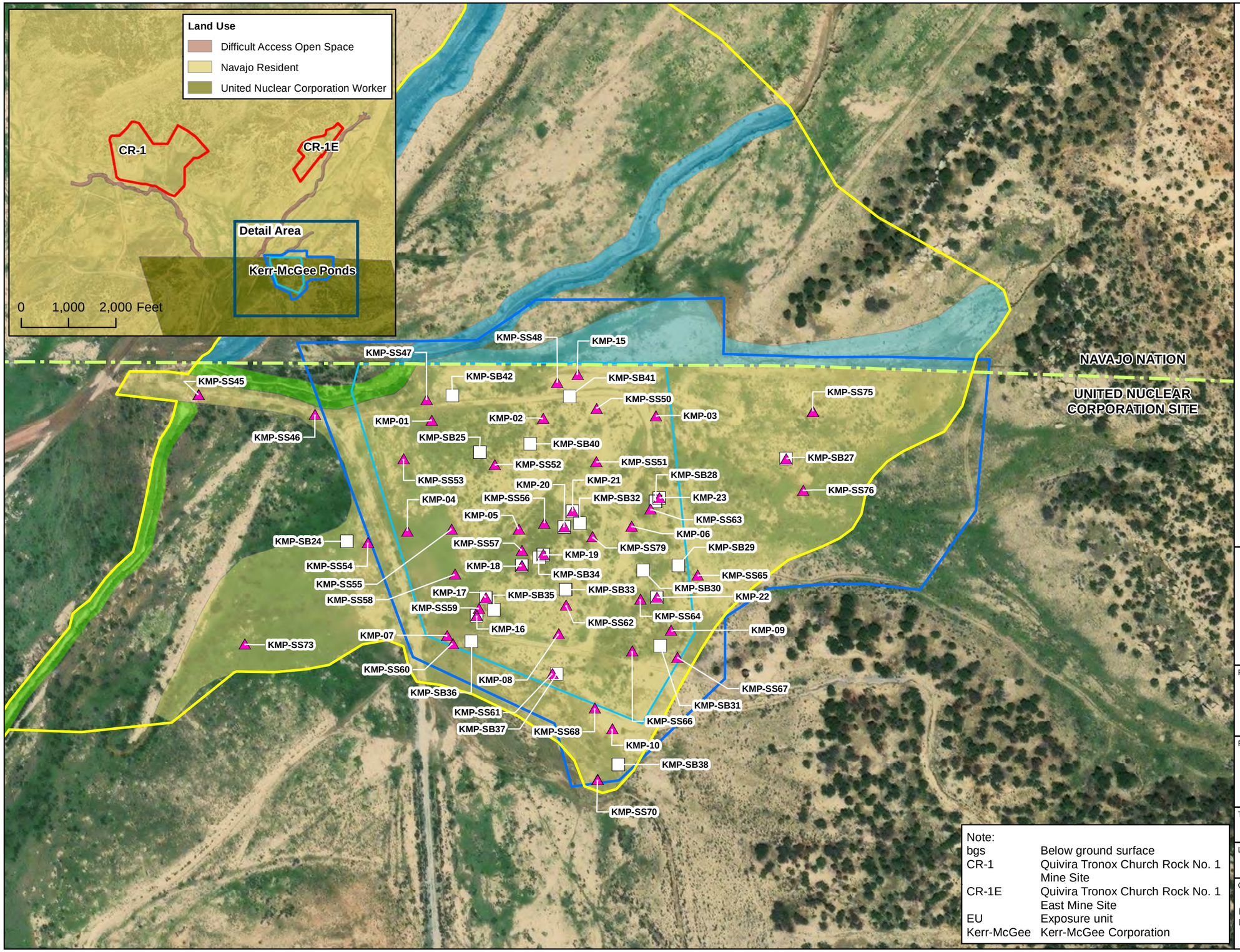
KERR-MCGEE PONDS ON THE NAVAJO NATION EXPOSURE UNIT WITH SAMPLE LOCATIONS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/8/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **C-6**



Soil Sample Locations

- Surface Soil Sample (0-6 inches bgs) *(includes all lab samples with bottom depth ≤ 6 inches bgs)*
- Subsurface Soil Sample (below 6 inches bgs) *(includes all lab samples with bottom depth > 6 inches and ≤ 72 inches bgs)*
- Mine Lease Boundary
- Kerr-McGee Ponds Investigation Boundary
- Kerr-McGee Ponds Fenceline
- United Nuclear Corporation Site Boundary

Exposure Units

- Kerr-McGee Ponds on the Navajo Nation
- Kerr-McGee Ponds on United Nuclear Corporation Property
- Arroyos on Navajo Nation
- Arroyos on United Nuclear Corporation Property
- EU - Site-Wide (for Ecological Risk)

1 inch = 200 feet

1:2,400

N W E S

200 100 0 200 Feet

Note:

bgs	Below ground surface
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
EU	Exposure unit
Kerr-McGee	Kerr-McGee Corporation

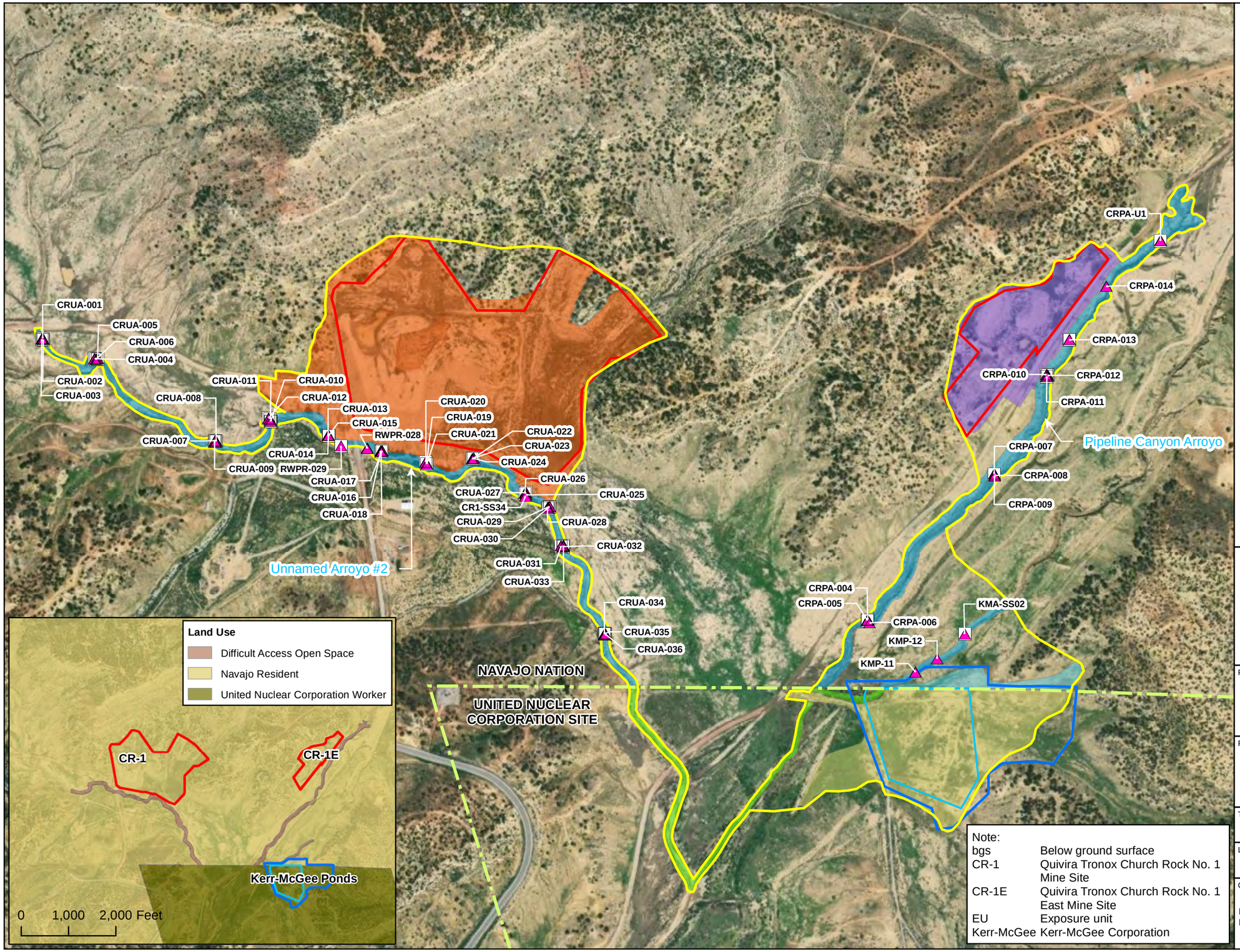
KERR-MCGEE PONDS ON UNITED NUCLEAR CORPORATION PROPERTY EXPOSURE UNIT WITH SAMPLE LOCATIONS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
Location: QUIVIRA MINES	Date: 3/8/2024
Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator	Figure No.: **C-7**



Soil Sample Locations

- Surface Soil Sample (0-6 inches bgs) *(includes all lab samples with bottom depth ≤ 6 inches bgs)*
- Subsurface Soil Sample (below 6 inches bgs) *(includes all lab samples with bottom depth > 6 inches and ≤ 72 inches bgs)*
- Mine Lease Boundary
- Kerr-McGee Ponds Investigation Boundary
- Kerr-McGee Ponds Fenceline
- United Nuclear Corporation Site Boundary

Exposure Units

- Church Rock Mine No. 1
- Church Rock Mine No. 1 East
- Kerr-McGee Ponds on the Navajo Nation
- Kerr-McGee Ponds on United Nuclear Corporation Property
- Arroyos on Navajo Nation
- Arroyos on United Nuclear Corporation Property
- Site-Wide (for Ecological Risk)

1 inch = 600 feet

1:7,200

600 300 0 600 Feet

N W E S

ARROYOS ON THE NAVAJO NATION EXPOSURE UNIT WITH SAMPLE LOCATIONS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.:	Contract No.:
0001	68HE0923D0002
Location:	**Date:**
QUIVIRA MINES	3/8/2024

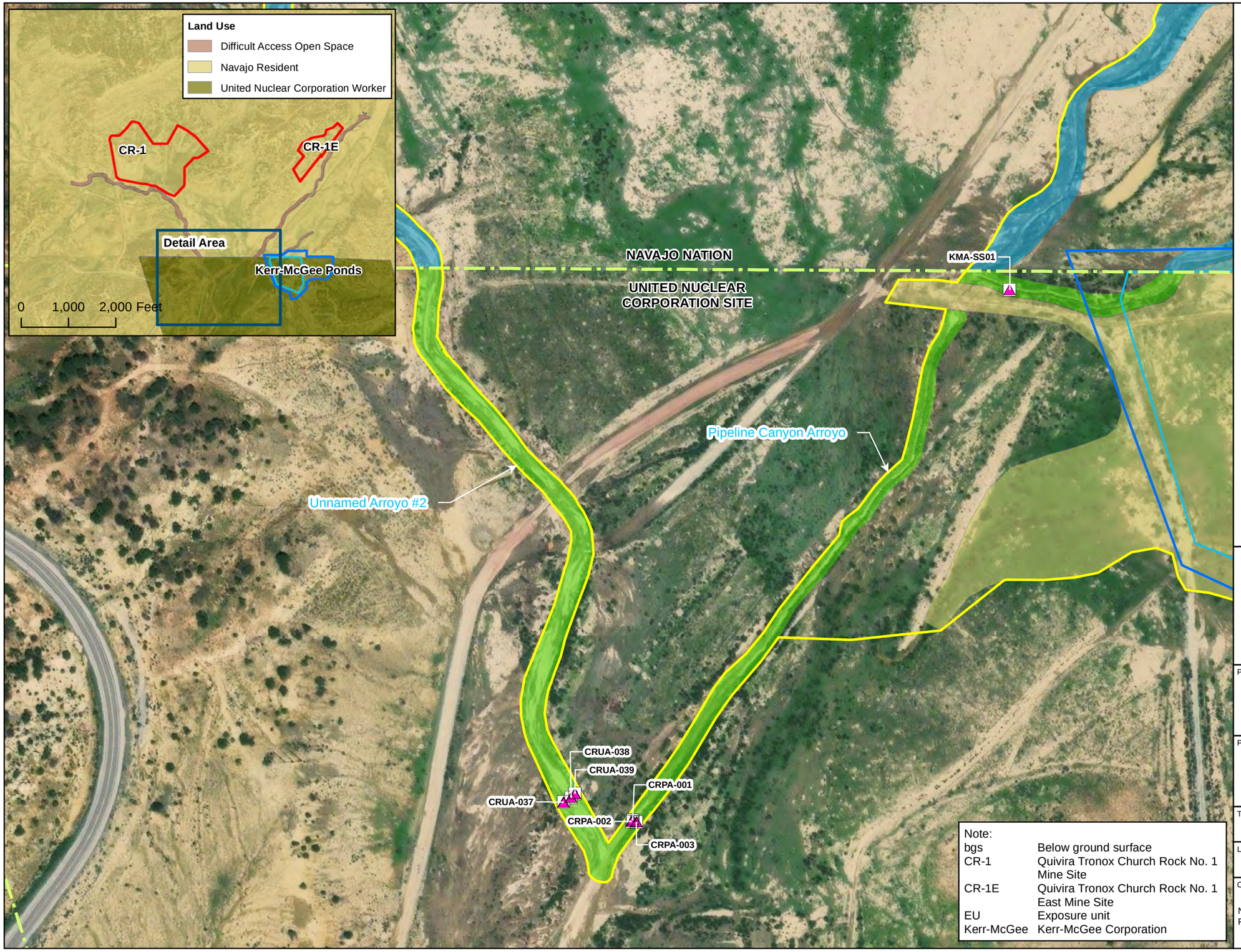
Coordinate System:

NAD 1983 State Plane New Mexico West FIPS 3003 Feet Transverse Mercator

Figure No.: **C-8**

Note:

bgs	Below ground surface
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
EU	Exposure unit
Kerr-McGee	Kerr-McGee Corporation



Soil Sample Locations

- Surface Soil Sample (0-6 inches bgs) *(includes all lab samples with bottom depth ≤ 6 inches bgs)*
- Subsurface Soil Sample (below 6 inches bgs) *(includes all lab samples with bottom depth > 6 inches and ≤ 72 inches bgs)*
- Kerr-McGee Ponds Investigation Boundary
- Kerr-McGee Ponds Fenceline
- United Nuclear Corporation Site Boundary

Exposure Units

- Kerr-McGee Ponds on the Navajo Nation
- Kerr-McGee Ponds on United Nuclear Corporation Property
- Arroyos on Navajo Nation
- Arroyos on United Nuclear Corporation Property
- Site-Wide (for Ecological Risk)

1 inch = 200 feet

1:2,400

N W E S

200 100 0 200 Feet

Note:

bgs	Below ground surface
CR-1	Quivira Tronox Church Rock No. 1 Mine Site
CR-1E	Quivira Tronox Church Rock No. 1 East Mine Site
EU	Exposure unit
Kerr-McGee	Kerr-McGee Corporation

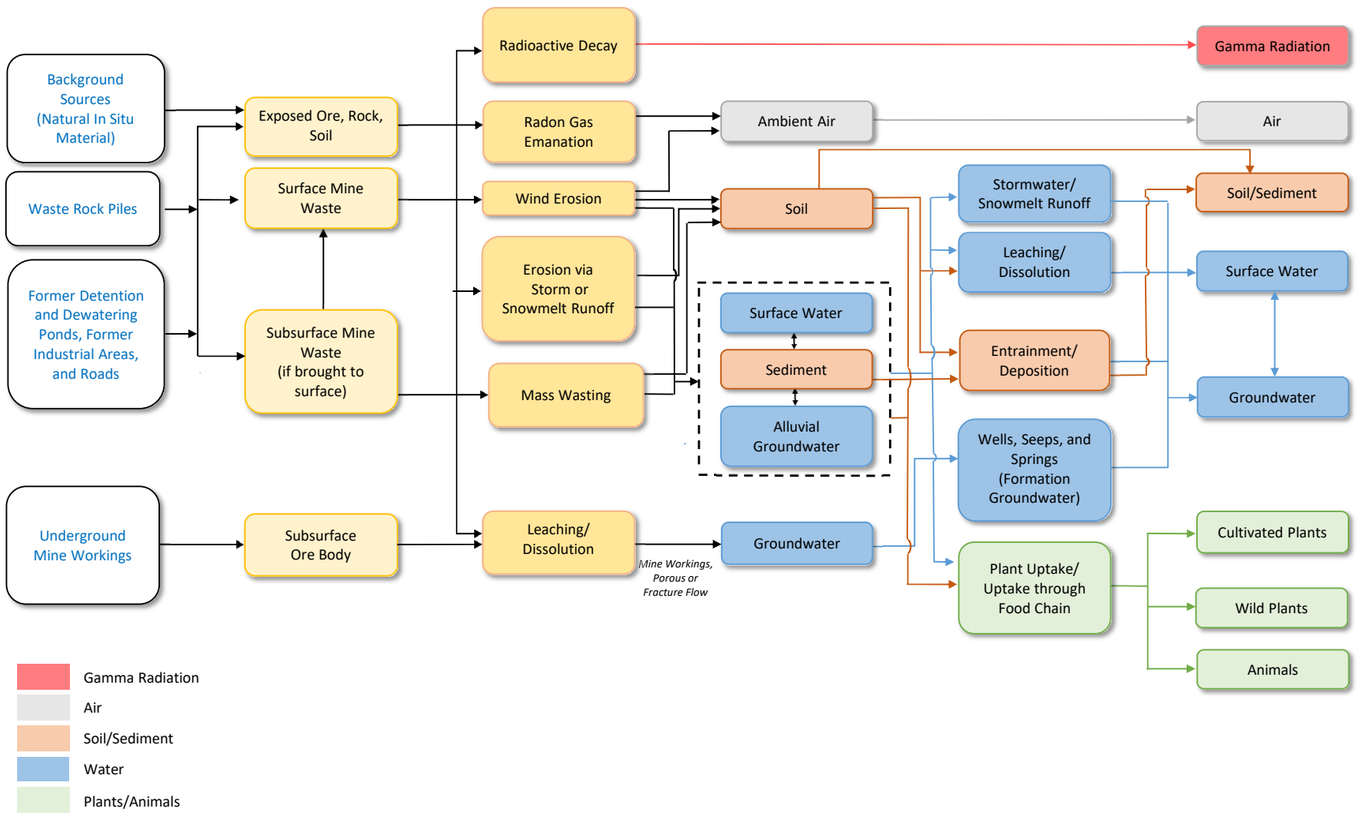
ARROYOS ON UNITED NUCLEAR CORPORATION PROPERTY EXPOSURE UNIT WITH SAMPLE LOCATIONS

Prepared For: U.S. EPA Region 9

Prepared By:

TETRA TECH
1999 Harrison Street, Suite 500
Oakland, CA 94612

Task Order No.: 0001	Contract No.: 68HE0923D0002
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EXPOSURE ROUTES	APPLICABLE HUMAN EXPOSURE SCENARIOS: Kee'da'whíí tééh (Full-Time Navajo Resident)	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)	United Nuclear Corporation Outdoor Worker	ECOLOGICAL EXPOSURE SCENARIOS: EXPOSURE ROUTES	Plants and Invertebrates	Birds and Mammals
External Exposure	X	X	X	External Exposure	X [6]	X [6]
Inhalation	X [1]	X [1]	--	Inhalation	X [7]	X [7]
Incidental Ingestion Dermal Inhalation	X	X	X	Dermal/Direct Contact Ingestion Trophic Transfer	X	X
Ingestion Dermal Inhalation	-- [2]	-- [2]	-- [2]	Dermal/Direct Contact Ingestion Trophic Transfer	X [8]	X [8]
Ingestion Dermal Inhalation	-- [2]	-- [2]	-- [2]			
Ingestion	X [3]	--	--			
Ingestion Dermal Inhalation	X [4]	X [4]	--	Ingestion	--	X
Ingestion	X [5]	X [5]	--	Ingestion Trophic Transfer	--	X

Notes:

X Indicates the exposure pathway is potentially complete and is evaluated in the risk assessment except as noted.

-- Indicates the exposure pathway is not complete or *de minimis* and is not evaluated in the risk assessment

[1] The human health risk evaluation does not include inhalation of radon by humans or animals. Because radon is a gas and readily disperses in outdoor air, the risk in outdoor is minimal. Radon in indoor air is a potential risk for future residential receptors; however, radon exposure is building-specific and the buildings are not currently present and, thus, cannot be evaluated. Furthermore, because radon is a known risk in the area, any future buildings would likely be constructed to mitigate this known risk.

[2] The human health risk evaluation does not include ingestion of surface water or groundwater by humans or animals. Safe drinking water is supplied to residents in the Quivira Tronox Mines area. Wells used for livestock have been tested and are upgradient of the known groundwater contamination in the area. The arroyos are mostly dry, and the ponds are dry since mine operations have stopped. If surface or groundwater use patterns change in the future, the risk from use should be evaluated.

[3] The human health risk evaluation includes ingestion of select cultivated plants (crops) by this receptor. Scenario inputs were provided by the Navajo Nation Environmental Protection Agency (NNEPA) (2021).

[4] The human health risk evaluation includes ingestion, dermal (metals only), and inhalation of select wild herbs and medicinal plants by this receptor. Scenario inputs were provided by NNEPA (2021).

[5] The human health risk evaluation includes ingestion of home-raised animals (meat, milk, and eggs) and hunted animals (meat only) for this receptor. Scenario inputs were provided by NNEPA (2021).

[6] The ecological risk evaluation includes evaluation of external radiation based on exposure to gamma-emitting radionuclides from contaminated soil and evaluation of internal radiation through plant uptake, incidental soil ingestion, and food web uptake (Los Alamos National Laboratory [LANL] 2015).

[7] Potential exposures include inhalation of ambient air and air in burrows and underground mines. The ecological risk evaluation does not include evaluation of the inhalation pathway.

[8] The ecological risk evaluation does not include evaluation of direct contact with or ingestion of surface water.

References:

Los Alamos National Laboratory (LANL). 2015. “Screening-Level Ecological Risk Assessment Methods.” Revision 4. EP2015-0174. October 29.

Navajo Nation Environmental Protection Agency (NNEPA). 2021. "Navajo Tribe Provisional Reasonable Maximum Exposures RME for the Navajo Risk Assessments." Draft. September 15.

Figure C-10. Quivira Mines Risk Assessment Conceptual Site Model

TABLES

Table C-1. Soil Results Data Summary and Contaminant of Potential Concern Screening

Constituent of Interest[a]	Detection Frequency[b]	Units	Minimum Detected Concentration (qualifier)[b]	Maximum Detected Concentration (qualifier)[b]	Location of Maximum Concentration[b]	Depth of Maximum Concentration (inches bgs)[b]	COPC Screening Level[c]	Include Constituent as a COPC?[d]
Radionuclides [e]								
Uranium-238	41 / 160	pCi/g	0.7	52.1	KMP-SB28-0042-0048-01	42-48	0.032	**Yes**
Uranium-234	24 / 24	pCi/g	0.7	49.4	KMP-SB28-0060-0066-02	60-66	0.028	**Yes**
Thorium-230	41 / 41	pCi/g	0.76	92 M3	CELI-502 SS3 3-4.5	36-54	0.13	**Yes**
Radium-226	797 / 797	pCi/g	0.41 LT,G	468 M3,G	C1LP-401 SS4 4.5-6	54-72	0.00053	**Yes**
Metals								
Aluminum	126 / 126	mg/kg	1,400	9,600	KMP-SB24-0048-0054-01	48-54	1,710	**Yes**
Antimony	125 / 126	mg/kg	0.038 J	0.26	KMP-SS75-0000-0003-02	0-3	0.45	No
Arsenic	175 / 175	mg/kg	2	11	KMP-12-00	0-2	0.025	**Yes**
Barium	169 / 169	mg/kg	20	420	CR1E-SS15-0000-0003-01	0-3	197	**Yes**
Beryllium	126 / 126	mg/kg	0.2	1.0	CR1E-SS12-0000-0003-01	0-3	3.5	No
Cadmium	154 / 169	mg/kg	0.043 J	0.25	CR1-SS21-0000-0003-01	0-3	0.052	**Yes**
Chromium	169 / 169	mg/kg	2.3	24 J	KMP-SS75-0000-0003-02	0-3	0.027	**Yes**
Cobalt	126 / 126	mg/kg	2.5	10	CR1E-SS12-0000-0003-01	0-3	0.30	**Yes**
Copper	126 / 126	mg/kg	3.2	21	CR1-SS21-0000-0003-01	0-3	8.0	**Yes**
Iron	126 / 126	mg/kg	5,000	23,000	CR1E-SS10-0000-0003-01	0-3	865	**Yes**
Lead	169 / 169	mg/kg	4.8	130 J	KMP-SS75-0000-0003-02	0-3	200	No
Manganese	126 / 126	mg/kg	89	400	KMA-SS02-0012-0018-01	12-18	4.5	**Yes**
Molybdenum	165 / 175	mg/kg	0.15 J	1.8	CELI-502 SS9	36-54	1.5	**Yes**
Nickel	126 / 126	mg/kg	2.7	20	CR1E-SS07-0000-0003-01	0-3	28	No
Selenium	170 / 175	mg/kg	0.47 J	37	KMP-16-18	18-24	1.8	**Yes**
Silver	29 / 169	mg/kg	0.057 J	0.19	KMP-22-18	18-24	2.3	No
Thallium	126 / 126	mg/kg	0.048	0.22	CR1E-SS12-0000-0003-01	0-3	0.0098	**Yes**
Uranium	226 / 226	mg/kg	0.37	210	CELI-502 SS3 3-4.5	36-54	0.32	**Yes**
Vanadium	175 / 175	mg/kg	5.4	58	KMP-16-18	18-24	8.2	**Yes**
Zinc	126 / 126	mg/kg	18	95	KMP-SS75-0000-0003-01	0-3	174	No

Notes:

[a] **Bolded constituents** are selected as human health COPCs because based on the maximum detected concentration, the cancer risk is greater than one in one million (1E-06) or noncancer hazard quotient is greater than 0.1.

[b] Includes soil and sediment samples collected from all depths from within the risk assessment boundary at all exposure units.

[c] The COPC screening levels are calculated using the NAUM Risk Calculator (USEPA 2024c) for the Kee'da'whíí téél (full-time Navajo resident) using a target risk of 1E-06 and target hazard quotient of 0.1 except for lead. The lead screening value is based on the recommended RSL for residential soil (USEPA 2024a).

[d] A constituent is included as a COPC for the human health risk assessment if the maximum detected concentration exceeds the COPC screening level.

[e] When uranium-238 is not in SE, site data for uranium-238, uranium-234, and thorium-230 in conjunction with radium-226 in SE toxicity values can be used to calculate the risk for the entire U-238 decay chain.

Table C-1. Soil Results Data Summary and Contaminant of Potential Concern Screening

Notes (Continued):

[f] In the absence of speciated chromium data, chromium is evaluated using the assumption that it is 100 percent hexavalent chromium (USEPA 2024b). No speciated chromium data are available.

bgs	Below ground surface
COPC	Contaminant of potential concern
G	Sample density differs by more than 15 percent of the LCS density
J	Estimated concentration
LCS	Laboratory control sample
LT	Less than
M3	The requested MDC was not met, but the reported activity is greater than the reported MDC
MDC	Minimum detectable concentration
mg/kg	Milligram per kilogram
NAUM	Navajo abandoned uranium mine
pCi/g	Picocurie per gram
RSL	Regional screening level
USEPA	U.S. Environmental Protection Agency

References:

U.S. Environmental Protection Agency (USEPA). 2024a. "Updated Residential Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities." Office of Land and Emergency Management. January 17.

USEPA. 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

USEPA. 2024c. “Navajo Abandoned Uranium Mine Risk Calculator." Version 1.03. March.

Table C-2. Exposure Unit Summary of Land Use, Geologic Formation, Type, Area, and Available Samples

Exposure Unit	Land Use / Receptor	Geologic Formation	Type	Area (acre)	Number of Surface Soil (or Sediment) Samples (0-6 inches bgs)[a]	Number of Subsurface Soil Samples (0-72 inches bgs)[a]
Quivira Tronox Church Rock Mine No. 1	Kee'da'whíí tééh (Full-Time Navajo Resident)	Kcb Kcda Alluvium	Waste Piles TENORM	53.3	Radium-226: 142 Uranium-238, Uranium-234, and Thorium-230: 3 Uranium: 82 Metals: 30	Radium-226: 302 Uranium-238, Uranium-234, and Thorium-230: 3 Uranium: 82 Arsenic, Molybdenum, Selenium, Vanadium: 32 All Other Metals: 30
Quivira Tronox Church Rock Mine No. 1 East	Kee'da'whíí tééh (Full-Time Navajo Resident)	Kcc Kmm Alluvium	Waste Piles TENORM	13.9	Radium-226: 65 Uranium-238, Uranium-234, and Thorium-230: 2 Metals: 15	Radium-226: 123 Uranium-238, Uranium-234, and Thorium-230: 2 Arsenic, Molybdenum, Selenium, Uranium, Vanadium: 19 All Other Metals: 15
Kerr-McGee Ponds on the Navajo Nation	Kee'da'whíí tééh (Full-Time Navajo Resident)	Kmm Alluvium	TENORM	2.23	Radium-226: 5 Uranium-238, Uranium-234, and Thorium-230: 1 Arsenic, Barium, Cadmium, Chromium, Lead, Molybdenum, Selenium, Silver, Uranium, Vanadium: 5 All Other Metals: 3	Radium-226: 7 Uranium-238, Uranium-234, Thorium-230: 1 Arsenic, Barium, Cadmium, Chromium, Lead, Molybdenum, Selenium, Silver, Uranium, Vanadium: 7 All Other Metals: 5
Kerr-McGee Ponds on United Nuclear Corporation Property	United Nuclear Corporation Outdoor Worker	Kmm Alluvium	TENORM	19.2	Radium-226: 54 Uranium-238, Uranium-234, and Thorium-230: 4 Arsenic, Barium, Cadmium, Chromium, Lead, Molybdenum, Selenium, Silver, Uranium, Vanadium: 54 All Other Metals: 35	Radium-226: 96 Uranium-238, Uranium-234 and Thorium-230: 8 Arsenic, Barium, Cadmium, Chromium, Lead, Molybdenum, Selenium, Silver, Uranium, Vanadium: 96 All Other Metals: 61
Arroyos on the Navajo Nation	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)	Alluvium	TENORM	16.1	Radium-226: 94 Uranium: 7 Arsenic, Barium, Cadmium, Chromium, Lead, Molybdenum, Selenium, Silver, Vanadium: 3 All Other Metals: 1	Radium-226: 135 Uranium: 9 Arsenic, Barium, Cadmium, Chromium, Lead, Molybdenum, Selenium, Silver, Vanadium: 4 All Other Metals: 2

Table C-2. Exposure Unit Summary of Land Use, Geologic Formation, Type, Area, and Available Samples

Exposure Unit	Land Use / Receptor	Geologic Formation	Type	Area (acre)	Number of Surface Soil (or Sediment) Samples (0-6 inches bgs)[a]	Number of Subsurface Soil Samples (0-72 inches bgs)[a]
Arroyos on United Nuclear Corporation Property	United Nuclear Corporation Outdoor Worker	Alluvium	TENORM	3.25	Radium-226: 13 Metals: 1	Radium-226: 20 Metals: 2
Ecological Risk Assessment						
Site-Wide	Ecological Receptors	Kcb Kcc Kcda Kmm Alluvium	Entire Site	137	Radium-226: 375 Uranium-238, Uranium-234, and Thorium-230: 10 Uranium: 164 Arsenic, Barium, Cadmium, Chromium, Lead, Molybdenum, Selenium, Silver, Vanadium: 108 All Other Metals: 85	Radium-226: 683 Uranium-238, Uranium-234, and Thorium-230: 14 Uranium: 213 Arsenic, Molybdenum, Selenium, Vanadium: 160 Barium, Cadmium, Chromium, Lead, Silver: 154 All Other Metals: 115

Notes:

[a] The total number of samples per area used in the risk assessment.

bgs	Below ground surface
Kcb	Bartlett Barren Member
Kcc	Crevasse Canyon Formation
Kcda	Dalton Sandstone Member
Kerr-McGee	Kerr-McGee Corporation
Kmm	Mulatto Tongue of Mancos Shale
TENORM	Technologically enhanced naturally occurring radioactive material

Table C-3. Human Health Exposure Parameters

Input Parameter	Symbol	Units	Receptor		
			Kee'da'whíí tééh (Full-time Navajo Resident)[a]	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)[a]	UNC Outdoor Worker[b]
Common Parameters					
Exposure Duration - Adult	ED	years	69	69	25
Exposure Duration - Child	EDc	years	6	6	--
Exposure Duration - Lifetime Total	EDa	years	75	75	25
Exposure Time - Lifetime Total	t	years	75	75	25
Averaging Time - Cancer	ATc	days	27,375	27,375	25,550
Averaging Time - Noncancer - Adult	ATnc	days	25,185	25,185	9,125
Averaging Time - Noncancer - Child	ATnc	days	2,190	2,190	--
Exposure Frequency - Adult	EFa	days/year	350	30	100
Exposure Frequency - Child	EFc	days/year	350	30	--
Consumption Exposure Frequency for Animal and Plant Products - Adult	CEFa	days/year	350	30	0
Consumption Exposure Frequency for Animal and Plant Products - Child	CEFc	days/year	350	30	--
Body Weight - Adult	BWa	kg	80	80	80
Body Weight - Child	BWc	kg	15	15	--
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	27.03		
Decay Constant	λ	1/year	Radionuclide-specific		
Soil Ingestion Parameters					
Onsite Soil Ingestion Rate - Adult	IRSa	mg/day	360	15	100
Onsite Soil Ingestion Rate - Child	IRSc	mg/day	400	17	--

Table C-3. Human Health Exposure Parameters

Input Parameter		Symbol	Units	Receptor		
				Kee'da'whíí tééh (Full-time Navajo Resident)[a]	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)[a]	UNC Outdoor Worker[b]
Dust Inhalation Parameters						
Inhalation Rate when Exposed - Adult		IRAres-a	m^3/day	25	25	20
Inhalation Rate when Exposed - Child		IRAres-c	m^3/day	10	10	--
Exposure Time - Adult		ETa	hours/day	22	1	8
Exposure Time - Child		ETc	hours/day	22	1	--
City/Climatic Zone		--	--	Albuquerque, New Mexico		
Mean Annual Wind Speed		Um	m/s	4.02		
Areal extent of site surface soil contamination		As	acres	0.5		
Fraction of Vegetative Cover		V	--	0.5		
Particulate Emission Factor		PEF	m^3/kg	6.61E+09		
Radiation External Exposure Parameters						
Gamma Shielding Factor - Outdoor		GSF_o	--	1	1	1
Gamma Shielding Factor - Indoor		GSF_i		0.7	--	--
Exposure Time on Site Outdoors - Adult		ET_{a-o}	hours/day	12	1	8
Exposure Time on Site Indoors - Adult		ET_{a-i}		10	1	0
Exposure Time on Site Outdoors - Child		ET_{c-o}	hours/day	12	1	--
Exposure Time on Site Indoors - Child		ET_{c-i}		10	1	--
Metals Dermal Exposure Parameters						
Surface Area - Adult		SAa	cm^2/day	6,032	6,032	6,032
Surface Area - Child		SAc	cm^2/day	2,373	2,373	--
Adherence Factor - Adult		AFa	mg/cm^2	0.07	0.07	0.07
Adherence Factor - Child		AFc	mg/cm^2	0.2	0.2	--
Plant Consumption Parameters						
Total Plant Ingestion Rate - Adult		IRa	g/day	834	834	--
Total Plant Ingestion Rate - Child		IRc	g/day	417	417	--
Produce Contaminated Fraction	Annual Average	CFproduce	--	0.55	--	--
	Fall	--	--	0.75	--	--
	Winter	--	--	0.5	--	--
	Spring	--	--	0.3	--	--
	Summer	--	--	0.65	--	--
	Herbs/medicinal	CFmedicinal	--	100%	8.3%	--

Table C-3. Human Health Exposure Parameters

Input Parameter		Symbol	Units	Receptor		
				Kee'da'whíí téél (Full-time Navajo Resident)[a]	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)[a]	UNC Outdoor Worker[b]
Plant Consumption Parameters (continued)						
Diet Fraction	Corn - White	DF	--	10%	--	--
	Corn - Blue		--	10%	--	--
	Corn - Yellow		--	5%	--	--
	Corn - Red Speckled		--	3%	--	--
	Corn - Sweet Corn		--	2%	--	--
	Squash - Pumpkin		--	2%	--	--
	Squash - Other Squash		--	8%	--	--
	Melons - Watermelon		--	5%	--	--
	Melons - Cantaloupe		--	5%	--	--
	Tree Fruit - Apples		--	5%	--	--
	Tree Fruit - Apricots		--	5%	--	--
	Tree Fruit - Peaches		--	5%	--	--
	Other Vegetables - Beans		--	10%	--	--
	Other Vegetables - Brussels Sprouts		--	2%	--	--
	Other Vegetables - Cucumbers		--	2%	--	--
	Other Vegetables - Tomatoes		--	2%	--	--
	Other Vegetables - Chili		--	5%	--	--
	Other Vegetables - Onions		--	2%	--	--
	Other Vegetables - Potatoes		--	2%	--	--
	Herbs and Medicinal		--	10%	10%	--
Plant-Soil Transfer Factor		Bvwet	pCi/g-fresh plant per pCi/g-dry soil	Plant-specific based on plant type[c]		--
Mass-Loading Factor		MLF	g-dry soil per g-fresh plant	Plant-specific based on plant type[c]		--

Table C-3. Human Health Exposure Parameters

Input Parameter		Symbol	Units	Receptor		
				Kee'da'whíí tééh (Full-time Navajo Resident)[a]	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)[a]	UNC Outdoor Worker[b]
Animal Consumption Parameters						
Total Animal Ingestion Rate - Adult		IRa	g/day	983	983	--
Total Animal Ingestion Rate - Child		IRc	g/day	491.5	491.5	--
Contaminated Fraction	Chicken	CF	--	5%	5%	--
	Chicken Eggs	CF	--	75%	75%	--
	Beef	CF	--	25%	25%	--
	Milk - Cow	CF	--	1%	1%	--
	Pig	CF	--	5%	5%	--
	Goat	CF	--	100%	100%	--
	Milk - Goat	CF	--	100%	100%	--
	Sheep	CF	--	90%	90%	--
	Milk - Sheep	CF	--	90%	90%	--
	Horse	CF	--	100%	100%	--
	Domesticated Turkey	CF	--	5%	5%	--
	Wild Turkey	CF	--	2%	2%	--
	Deer	CF	--	2%	2%	--
	Elk	CF	--	2%	2%	--
	Rabbit	CF	--	100%	100%	--
	Prairie Dog	CF	--	100%	100%	--
	Badger	CF	--	100%	100%	--
Diet Fraction	Chicken	DF	--	20%	20%	--
	Chicken Eggs	DF	--	7%	7%	--
	Beef	DF	--	25%	25%	--
	Milk - Cow	DF	--	6%	6%	--
	Pig	DF	--	7%	7%	--
	Goat	DF	--	5%	5%	--
	Milk - Goat	DF	--	1%	1%	--
	Sheep	DF	--	20%	20%	--
	Milk - Sheep	DF	--	0%	0%	--
	Horse	DF	--	1%	1%	--
	Domesticated Turkey	DF	--	0.3%	0.3%	--
	Wild Turkey	DF	--	0.2%	0.2%	--
	Deer	DF	--	3%	3%	--
	Elk	DF	--	3%	3%	--
	Rabbit	DF	--	1%	1%	--
	Prairie Dog	DF	--	1%	1%	--
	Badger	DF	--	1%	1%	--

Table C-3. Human Health Exposure Parameters

Input Parameter		Symbol	Units	Receptor		
				Kee'da'whíí tééh (Full-time Navajo Resident)[a]	Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)[a]	UNC Outdoor Worker[b]
Animal Consumption Parameters (continued)						
Mass-Loading Factor for Pasture		MLFpasture	g-dry soil per g-dry plant	0.25		--
Density of Milk		ρm	kg/L	1.03		--
Soil Intake Rate		Qs	kg/day	Animal-specific[d]		--
Fodder Intake Rate		Qp	kg/day	Animal-specific[d]		--
Bioaccumulation Factor for Metals		Ba	day/kg	Animal-specific[d]		--
Other Diné Lifeways [e]						
Age-Adjusted Ingestion Rate of Medicinal Plants	Navajo Tea	IFadj	g/day	1.0	1.0	--
	Sumac (Skunkbush and Other)	IFadj	g/day	6.4	6.4	--
	Soaptree Yucca	IFadj	g/day	6.4	6.4	--
	Sagebrush	IFadj	g/day	12.9	12.9	--
	Corn Pollen and Other Corn	IFadj	g/day	19.3	19.3	--
	Other Plant Types	IFadj	g/day	6.4	6.4	--
Adult Dermal Rate of Medicinal Plants	Navajo Tea	DCRa	g/day	2.1	2.1	--
	Sumac (Skunkbush and Other)	DCRa	g/day	38.6	38.6	--
	Soaptree Yucca	DCRa	g/day	38.6	38.6	--
	Sagebrush	DCRa	g/day	12.9	12.9	--
	Corn Pollen and Other Corn	DCRa	g/day	38.6	38.6	--
	Other Plant Types	DCRa	g/day	6.4	6.4	--
Mass of Plant Available for Inhalation	Sagebrush	IMa	g/day	25.7	25.7	--
	Corn Pollen and Other Corn	IMa	g/day	12.9	12.9	--
	Other Plant Types	IMa	g/day	6.4	6.4	--
Inhalation Fraction	Sagebrush	IF	--	10%	10%	--
	Corn Pollen and Other Corn	IF	--	10%	10%	--
	Other Plant Types	IF	--	10%	10%	--

Table C-3. Human Health Exposure Parameters

Notes:

[a] Exposure inputs for the Navajo receptors provided by NNEPA (2021).

[b] Default values for the UNC outdoor worker receptor are from the PRG Calculator (USEPA 2023b) and RSL Calculator (USEPA 2023c) except for days per week on site, which is a protective assumption based on site knowledge.

[c] Plant-specific inputs are from Appendix B of the "Navajo Abandoned Uranium Mines Risk Assessment Methodology" (USEPA 2024b).

[d] Animal-specific inputs are from Appendix B of the "Navajo Abandoned Uranium Mines Risk Assessment Methodology" (USEPA 2024b).

[e] Input parameters for Other Diné Lifeways were only provided for adult receptors (NNEPA 2021).

--	Not applicable	m/s	Meter per second
cm^2/day	Square centimeter per day	m^3/day	Cubic meter per day
day/kg	Day per kilogram	m^3/kg	Cubic meter per kilogram
g	Gram	mg/cm^2	Milligram per square centimeter
g/day	Gram per day	mg/day	Milligram per day
g/kg	Gram per kilogram	NNEPA	Navajo Nation Environmental Protection Agency
g/mg	Gram per milligram	pCi/Bq	Picocurie per becquerel
kg	Kilogram	pCi/g	Picocurie per gram
kg/day	Kilogram per day	PRG	Preliminary remediation goal
kg/g	Kilogram per gram	RSL	Regional screening level
kg/L	Kilogram per liter	UNC	United Nuclear Corporation
kg/mg	Kilogram per milligram	USEPA	U.S. Environmental Protection Agency

References:

Navajo Nation Environmental Protection Agency (NNEPA). 2021. "Navajo Tribe Provisional Reasonable Maximum Exposures for the Navajo Risk Assessments." Draft. September 15.

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USEPA. 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Church Rock Mine No. 1											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Surface Soil (0-6 inches bgs)											
Uranium-238	pCi/g	3 / 3	--	1.12	CR1-SS16-0000-0003-01	0.987	--	--	1.1	Maximum	(1)
Uranium-234	pCi/g	3 / 3	--	1.21	CR1-SS16-0000-0003-01	0.977	--	--	1.2	Maximum	(1)
Thorium-230	pCi/g	3 / 3	--	1.71	CR1-SS15-0000-0003-01	1.343	--	--	1.7	Maximum	(1)
Radium-226	pCi/g	150 / 150	--	48.5 M3	RWPR-SS-002 (1.5-2)	5.464	6.68	NP	6.7	UCL95	(14)
Aluminum	mg/kg	30 / 30	--	7,000	CR1-SS21-0000-0003-01	4,267	4,633	N	4,600	UCL95	(2)
Arsenic	mg/kg	30 / 30	--	6.1	CR1-SS25-0000-0003-01, CR1-SS26-0000-0003-01	4.613	4.904	N	4.9	UCL95	(2)
Barium	mg/kg	30 / 30	--	330	CR1-SS24-0000-0003-01	92.13	110.5	NP	110	UCL95	(14)
Cadmium	mg/kg	29 / 30	0	0.25	CR1-SS21-0000-0003-01	0.129	0.144	N	0.14	UCL95	(3)
Chromium	mg/kg	30 / 30	--	13	CR1-SS32-0000-0003-01	5.257	5.98	LN	6.0	UCL95	(14)
Cobalt	mg/kg	30 / 30	--	8.3	CR1-SS21-0000-0003-01	5.63	6.066	N	6.1	UCL95	(2)
Copper	mg/kg	30 / 30	--	21	CR1-SS21-0000-0003-01	10.46	11.85	N	12	UCL95	(2)
Iron	mg/kg	30 / 30	--	13,000	CR1-SS09-0000-0003-01, CR1-SS21-0000-0003-01, CR1-SS26-0000-0003-01	10,163	10726	N	11,000	UCL95	(2)
Manganese	mg/kg	30 / 30	--	200	CR1-SS24-0000-0003-01, CR1-SS25-0000-0003-01	151.6	160.4	N	160	UCL95	(2)
Molybdenum	mg/kg	30 / 30	--	1 J	CR1-SS26-0000-0003-01	0.288	0.321	N	0.32	UCL95	(2)
Selenium	mg/kg	30 / 30	--	14	CR1-SS28-0000-0003-01	2	3.38	NP	3.4	UCL95	(14)
Thallium	mg/kg	30 / 30	--	0.21	CR1-SS21-0000-0003-01	0.125	0.137	N	0.14	UCL95	(2)
Uranium	mg/kg	86 / 86	--	61	RWPR-SS-002 (1.5-2)	5.504	7.315	LN	7.3	UCL95	(14)
Vanadium	mg/kg	30 / 30	--	20	CR1-SS26-0000-0003-01, CR1-SS28-0000-0003-01	13.34	14.33	N	14	UCL95	(2)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Church Rock Mine No. 1											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Subsurface Soil (0-72 inches bgs)											
Uranium-238	pCi/g	3 / 3	--	1.12	CR1-SS16-0000-0003-01	0.987	--	--	1.1	Maximum	(1)
Uranium-234	pCi/g	3 / 3	--	1.21	CR1-SS16-0000-0003-01	0.977	--	--	1.2	Maximum	(1)
Thorium-230	pCi/g	3 / 3	--	1.71	CR1-SS15-0000-0003-01	1.343	--	--	1.7	Maximum	(1)
Radium-226	pCi/g	302 / 302	--	468 M3,G	C1LP-401 SS4 4.5-6	13.000	17.15	NP	17	UCL95	(14)
Aluminum	mg/kg	30 / 30	--	7,000	CR1-SS21-0000-0003-01	4,267	4,633	N	4,600	UCL95	(2)
Arsenic	mg/kg	32 / 32	--	6.1	CR1-SS25-0000-0003-01, CR1-SS26-0000-0003-01	4.544	4.827	N	4.8	UCL95	(2)
Barium	mg/kg	30 / 30	--	330	CR1-SS24-0000-0003-01	92.13	110.5	NP	110	UCL95	(14)
Cadmium	mg/kg	29 / 30	0	0.25	CR1-SS21-0000-0003-01	0.129	0.144	N	0.14	UCL95	(3)
Chromium	mg/kg	30 / 30	--	13	CR1-SS32-0000-0003-01	5.257	5.98	LN	6.0	UCL95	(14)
Cobalt	mg/kg	30 / 30	--	8.3	CR1-SS21-0000-0003-01	5.63	6.066	N	6.1	UCL95	(2)
Copper	mg/kg	30 / 30	--	21	CR1-SS21-0000-0003-01	10.46	11.85	N	12	UCL95	(2)
Iron	mg/kg	30 / 30	--	13,000	CR1-SS09-0000-0003-01, CR1-SS21-0000-0003-01, CR1-SS26-0000-0003-01	10,163	10726	N	11,000	UCL95	(2)
Manganese	mg/kg	30 / 30	--	200	CR1-SS24-0000-0003-01, CR1-SS25-0000-0003-01	151.6	160.4	N	160	UCL95	(2)
Molybdenum	mg/kg	30 / 32	2	1 J	CR1-SS26-0000-0003-01	0	0	N	0.32	UCL95	(3)
Selenium	mg/kg	30 / 32	0	14	CR1-SS28-0000-0003-01	2	3.138	NP	3.1	UCL95	(15)
Thallium	mg/kg	30 / 30	--	0.21	CR1-SS21-0000-0003-01	0.125	0.137	N	0.14	UCL95	(2)
Uranium	mg/kg	82 / 82	--	61	RWPR-SS-002 (1.5-2)	5.504	7.315	LN	7.3	UCL95	(14)
Vanadium	mg/kg	32 / 32	--	20	CR1-SS26-0000-0003-01, CR1-SS28-0000-0003-01	13.15	14.1	N	14	UCL95	(2)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Church Rock Mine No. 1 East											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Surface Soil (0-6 inches bgs)											
Uranium-238	pCi/g	2 / 2	--	1.27	CR1E-SS07-0000-0003-01	1.115	--	--	1.3	Maximum	(1)
Uranium-234	pCi/g	2 / 2	--	1.35	CR1E-SS07-0000-0003-01	1.195	--	--	1.4	Maximum	(1)
Thorium-230	pCi/g	2 / 2	--	3.57	CR1E-SS07-0000-0003-01	2.365	--	--	3.6	Maximum	(1)
Radium-226	pCi/g	65 / 65	--	86.3 M3,G	CESS-041 (2-6)	6.156	9.31	NP	9.3	UCL95	(14)
Aluminum	mg/kg	14 / 14	--	8,400	CR1E-SS10-0000-0003-01	5,621	6,257	NP	6,300	UCL95	(14)
Arsenic	mg/kg	14 / 14	--	10	CR1E-SS10-0000-0003-01	5.714	6.616	N	6.6	UCL95	(2)
Barium	mg/kg	14 / 14	--	420	CR1E-SS15-0000-0003-01	116.4	161.9	LN	160	UCL95	(14)
Cadmium	mg/kg	14 / 14	--	0.23	CR1E-SS12-0000-0003-01	0.106	0.13	N	0.13	UCL95	(2)
Chromium	mg/kg	14 / 14	--	22	CR1E-SS07-0000-0003-01	8.0	10.1	N	10	UCL95	(2)
Cobalt	mg/kg	14 / 14	--	10	CR1E-SS12-0000-0003-01	6.071	6.927	N	6.9	UCL95	(2)
Copper	mg/kg	14 / 14	--	19	CR1E-SS12-0000-0003-01	10.91	12.73	N	13	UCL95	(2)
Iron	mg/kg	14 / 14	--	23,000	CR1E-SS10-0000-0003-01	13,907	15786	NP	16,000	UCL95	(14)
Manganese	mg/kg	14 / 14	--	290	CR1E-SS12-0000-0003-01	181.4	202.1	NP	200	UCL95	(14)
Molybdenum	mg/kg	14 / 14	--	0.40	CR1E-SS12-0000-0003-01, CR1E-SS15-0000-0003-01	0.27	0.308	N	0.31	UCL95	(2)
Selenium	mg/kg	14 / 14	--	5	CR1E-SS14-0000-0003-01	2	2.957	G	3.0	UCL95	(4)
Thallium	mg/kg	14 / 14	--	0.22	CR1E-SS12-0000-0003-01	0.137	0.156	N	0.16	UCL95	(2)
Uranium	mg/kg	14 / 14	--	6.3	CR1E-SS17-0000-0003-01	2.727	3.58	N	3.6	UCL95	(2)
Vanadium	mg/kg	14 / 14	--	23	CR1E-SS12-0000-0003-01	14.86	16.35	N	16	UCL95	(2)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Church Rock Mine No. 1 East											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Subsurface Soil (0-72 inches bgs)											
Uranium-238	pCi/g	2 / 2	--	1.27	CR1E-SS07-0000-0003-01	1.115	--	--	1.3	Maximum	(1)
Uranium-234	pCi/g	2 / 2	--	1.35	CR1E-SS07-0000-0003-01	1.195	--	--	1.4	Maximum	(1)
Thorium-230	pCi/g	2 / 2	--	3.57	CR1E-SS07-0000-0003-01	2.365	--	--	3.6	Maximum	(1)
Radium-226	pCi/g	121 / 121	--	429 M3	CELA-039 (27-33)	31.370	43.02	NP	43.0	UCL99	(14)
Aluminum	mg/kg	14 / 14	--	8,400	CR1E-SS10-0000-0003-01	5,621	6,257	NP	6,300	UCL95	(14)
Arsenic	mg/kg	18 / 18	--	10	CR1E-SS10-0000-0003-01	5.456	6.292	N	6.3	UCL95	(2)
Barium	mg/kg	14 / 14	--	420	CR1E-SS15-0000-0003-01	116.4	161.9	LN	160	UCL95	(14)
Cadmium	mg/kg	14 / 14	--	0.23	CR1E-SS12-0000-0003-01	0.106	0.13	N	0.13	UCL95	(2)
Chromium	mg/kg	14 / 14	--	22	CR1E-SS07-0000-0003-01	8.0	10.1	N	10.00	UCL95	(2)
Cobalt	mg/kg	14 / 14	--	10	CR1E-SS12-0000-0003-01	6.071	6.927	N	6.9	UCL95	(2)
Copper	mg/kg	14 / 14	--	19	CR1E-SS12-0000-0003-01	10.91	12.73	N	13	UCL95	(2)
Iron	mg/kg	14 / 14	--	23,000	CR1E-SS10-0000-0003-01	13,907	15786	NP	16,000	UCL95	(14)
Manganese	mg/kg	14 / 14	--	290	CR1E-SS12-0000-0003-01	181.4	202.1	NP	200	UCL95	(14)
Molybdenum	mg/kg	15 / 18	0	1.8	CR1E-SS12-0000-0003-01, CR1E-SS15-0000-0003-01	0.355	0.513	N	0.51	UCL95	(15)
Selenium	mg/kg	15 / 18	0	23	CR1E-SS14-0000-0003-01	3	5.399	G	5.4	UCL95	(15)
Thallium	mg/kg	14 / 14	--	0.22	CR1E-SS12-0000-0003-01	0.137	0.156	N	0.16	UCL95	(2)
Uranium	mg/kg	16 / 16	--	210	CELI-502 SS3 3-4.5	20.07	41.94	N	42	UCL95	(14)
Vanadium	mg/kg	18 / 18	--	28	CELI-502 SS9	15.89	17.74	N	18	UCL95	(2)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Kerr-McGee Ponds on the Navajo Nation											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Surface Soil (0-6 inches bgs)											
Uranium-238	pCi/g	1 / 1	--	1.13	KMP-SS74-0000-0003-01	--	--	--	1.1	Maximum	(1)
Uranium-234	pCi/g	1 / 1	--	0.97	KMP-SS74-0000-0003-01	--	--	--	1.0	Maximum	(1)
Thorium-230	pCi/g	1 / 1	--	2.04	KMP-SS74-0000-0003-01	--	--	--	2.0	Maximum	(1)
Radium-226	pCi/g	5 / 5	--	9.3 J	KMP-SB44-0000-0006-01	5.292	--	--	9.3	Maximum	(1)
Aluminum	mg/kg	3 / 3	--	6,900	KMP-SS49-0000-0003-02	6,333	--	--	6,900	Maximum	(1)
Arsenic	mg/kg	5 / 5	--	5.9	KMP-SS49-0000-0003-02	5.46	--	--	5.9	Maximum	(1)
Barium	mg/kg	5 / 5	--	82	KMP-SB44-0000-0006-01	71.4	--	--	82	Maximum	(1)
Cadmium	mg/kg	5 / 5	--	0.16 J	KMP-SB44-0000-0006-01	0.11	--	--	0.16	Maximum	(1)
Chromium	mg/kg	5 / 5	--	8.2	KMP-14D-00	7.22	--	--	8.2	Maximum	(1)
Cobalt	mg/kg	3 / 3	--	5.2	KMP-SS49-0000-0003-02	4.8	--	--	5.2	Maximum	(1)
Copper	mg/kg	3 / 3	--	11	KMP-SB44-0000-0006-01	9.233	--	--	11	Maximum	(1)
Iron	mg/kg	3 / 3	--	15,000	KMP-SS49-0000-0003-02	13,667	--	--	15,000	Maximum	(1)
Manganese	mg/kg	3 / 3	--	230	KMP-SB44-0000-0006-01	213.3	--	--	230	Maximum	(1)
Molybdenum	mg/kg	5 / 5	--	1 J	KMP-14-00	0.436	--	--	0.55	Maximum	(1)
Selenium	mg/kg	5 / 5	--	2.9	KMP-14D-00	2.080	--	--	2.9	Maximum	(1)
Thallium	mg/kg	3 / 3	--	0.15	KMP-SB44-0000-0006-01, KMP-SS49-0000-0003-02	0.14	--	--	0.15	Maximum	(1)
Uranium	mg/kg	5 / 5	--	6.2	KMP-SB44-0000-0006-01	2.142	--	--	6.2	Maximum	(1)
Vanadium	mg/kg	5 / 5	--	17	KMP-14-00	15	--	--	17	Maximum	(1)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Kerr-McGee Ponds on the Navajo Nation											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Subsurface Soil (0-66 inches bgs)											
Uranium-238	pCi/g	1 / 1	--	1.13	KMP-SS74-0000-0003-01	--	--	--	1.1	Maximum	(1)
Uranium-234	pCi/g	1 / 1	--	0.97	KMP-SS74-0000-0003-01	--	--	--	1.0	Maximum	(1)
Thorium-230	pCi/g	1 / 1	--	2.04	KMP-SS74-0000-0003-01	--	--	--	2.0	Maximum	(1)
Radium-226	pCi/g	7 / 7	--	9.3 J	KMP-SB44-0000-0006-01	4.293	--	--	9.3	Maximum	(1)
Aluminum	mg/kg	5 / 5	--	6,900	KMP-SS49-0000-0003-02	6,500	--	--	6,900	Maximum	(1)
Arsenic	mg/kg	7 / 7	--	5.9	KMP-SS49-0000-0003-02	5.557	--	--	5.9	Maximum	(1)
Barium	mg/kg	7 / 7	--	82	KMP-SB44-0000-0006-01	69.57	--	--	82	Maximum	(1)
Cadmium	mg/kg	7 / 7	--	0.16 J	KMP-SB44-0000-0006-01	0.0974	--	--	0.16	Maximum	(1)
Chromium	mg/kg	7 / 7	--	8.2	KMP-14D-00	7.214	--	--	8.2	Maximum	(1)
Cobalt	mg/kg	5 / 5	--	5.2	KMP-SS49-0000-0003-02	4.92	--	--	5.2	Maximum	(1)
Copper	mg/kg	5 / 5	--	11	KMP-SB44-0000-0006-01	8.96	--	--	11	Maximum	(1)
Iron	mg/kg	5 / 5	--	15,000	KMP-SS49-0000-0003-02	14,000	--	--	15,000	Maximum	(1)
Manganese	mg/kg	5 / 5	--	230	KMP-SB44-0000-0006-01	214	--	--	230	Maximum	(1)
Molybdenum	mg/kg	7 / 7	--	1 J	KMP-14-00	0.416	--	--	0.55	Maximum	(1)
Selenium	mg/kg	7 / 7	--	2.9	KMP-14D-00	1.843	--	--	2.9	Maximum	(1)
Thallium	mg/kg	5 / 5	--	0.15	KMP-SB44-0000-0006-01, KMP-SS49-0000-0003-02	0.14	--	--	0.15	Maximum	(1)
Uranium	mg/kg	7 / 7	--	6.2	KMP-SB44-0000-0006-01	2.164	--	--	6.2	Maximum	(1)
Vanadium	mg/kg	7 / 7	--	17	KMP-14-00	14.71	--	--	17	Maximum	(1)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Kerr-McGee Ponds on United Nuclear Corporation Property											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Surface Soil (0-6 inches bgs)											
Uranium-238	pCi/g	4 / 4	--	2.43	KMP-SS66-0000-0003-01	1.63	--	--	2.4	Maximum	(1)
Uranium-234	pCi/g	4 / 4	--	2.43	KMP-SS50-0000-0003-01	1.68	--	--	2.4	Maximum	(1)
Thorium-230	pCi/g	4 / 4	--	3.41	KMP-SS50-0000-0003-01	2.17	--	--	3.4	Maximum	(1)
Radium-226	pCi/g	54 / 54	--	68.1 M3	KMP-SS75-0000-0003-01	9.51	12.66	LN	13	UCL95	(14)
Aluminum	mg/kg	35 / 35	--	8,300	KMP-SS55-0000-0003-01	6,309	6,553	N	6,600	UCL95	(2)
Arsenic	mg/kg	54 / 54	--	9.2	KMP-07-00	5.731	5.965	N	6.0	UCL95	(2)
Barium	mg/kg	54 / 54	--	170	KMP-SS75-0000-0003-01, KMP-SS77-0000-0003-01	76.13	82.85	NP	83	UCL95	(14)
Cadmium	mg/kg	51 / 54	0	0.19 J	KMP-SS77-0000-0003-01	0.0995	0.107	N	0.11	UCL95	(3)
Chromium	mg/kg	54 / 54	--	24 J	KMP-SS75-0000-0003-02	7.944	8.546	NP	8.5	UCL95	(14)
Cobalt	mg/kg	35 / 35	--	6.7	KMP-SS55-0000-0003-01	4.966	5.151	N	5.2	UCL95	(2)
Copper	mg/kg	35 / 35	--	18	KMP-SS75-0000-0003-02	9.657	10.52	G	11	UCL95	(4)
Iron	mg/kg	35 / 35	--	19,000	KMP-SS55-0000-0003-01	14609	15207	N	15,000	UCL95	(2)
Manganese	mg/kg	35 / 35	--	310	KMP-SS77-0000-0003-01	210	218	N	220	UCL95	(2)
Molybdenum	mg/kg	50 / 54	0	2	KMP-SS75-0000-0003-02	1	1	N	0.57	UCL95	(3)
Selenium	mg/kg	54 / 54	--	21	KMP-17-00	3	3.963	NP	4.0	UCL95	(14)
Thallium	mg/kg	35 / 35	--	0.18	KMP-SS55-0000-0003-01, KMP-SS76-0000-0003-01	0.13	0.136	N	0.14	UCL95	(2)
Uranium	mg/kg	54 / 54	--	40	KMP-17-00	5.963	7.684	LN	7.7	UCL95	(14)
Vanadium	mg/kg	54 / 54	--	41	KMP-17-00	17.63	19.04	NP	19	UCL95	(14)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Kerr-McGee Ponds on United Nuclear Corporation Property											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Subsurface Soil (0-72 inches bgs)											
Uranium-238	pCi/g	8 / 8	--	51.5	KMP-SB28-0060-0066-01	7.684	--	--	52	Maximum	(1)
Uranium-234	pCi/g	8 / 8	--	49.4	KMP-SB28-0060-0066-01	7.436	--	--	49	Maximum	(1)
Thorium-230	pCi/g	8 / 8	--	3.41	KMP-SS50-0000-0003-01	1.638	--	--	3.4	Maximum	(1)
Radium-226	pCi/g	96 / 96	--	143.1	KMP-16-18	8.237	11.51	NP	12	UCL95	(14)
Aluminum	mg/kg	61 / 61	--	9,600	KMP-SB24-0048-0054-01	6,413	6,629	N	6,600	UCL95	(2)
Arsenic	mg/kg	96 / 96	--	9.2	KMP-07-00	5.61	5.78	NP	5.8	UCL95	(14)
Barium	mg/kg	96 / 96	--	190	KMP-16-18	70.03	75.33	NP	75	UCL95	(14)
Cadmium	mg/kg	83 / 96	0	0.19 J	KMP-SS77-0000-0003-01	0.0877	0.093	G	0.093	UCL95	(7)
Chromium	mg/kg	96 / 96	--	24 J	KMP-SS75-0000-0003-02	7.685	8.059	NP	8.1	UCL95	(14)
Cobalt	mg/kg	61 / 61	--	7.9	KMP-SB24-0048-0054-01	5.048	5.207	NP	5.2	UCL95	(14)
Copper	mg/kg	61 / 61	--	18	KMP-SS75-0000-0003-02	9.22	9.78	LN	9.8	UCL95	(14)
Iron	mg/kg	61 / 61	--	22,000	KMP-SB24-0048-0054-01	14,480	14952	N	15,000	UCL95	(2)
Manganese	mg/kg	61 / 61	--	310	KMP-SS77-0000-0003-01	212.1	219.2	NP	220	UCL95	(14)
Molybdenum	mg/kg	91 / 96	0	2	KMP-SB28-0036-0042-01	1	1	LN	0.63	UCL95	(15)
Selenium	mg/kg	96 / 96	--	37	KMP-16-18	3	3.746	NP	3.7	UCL95	(14)
Thallium	mg/kg	61 / 61	--	0.21	KMP-SB24-0048-0054-01	0.133	0.138	NP	0.14	UCL95	(14)
Uranium	mg/kg	96 / 96	--	190	KMP-SB28-0042-0048-01	18.58	24.85	NP	25	UCL95	(14)
Vanadium	mg/kg	96 / 96	--	58	KMP-16-18	16.91	18.04	NP	18	UCL95	(14)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Arroyos on the Navajo Nation											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Surface Soil (0-6 inches bgs)											
Uranium-238	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Uranium-234	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Thorium-230	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Radium-226	pCi/g	94 / 94	--	3.05	CRUA-020.2 (2-6)	1.254	1.326	N	1.3	UCL95	(2)
Aluminum	mg/kg	1 / 1	--	4,700	KMA-SS02-0000-0003-01	--	--	--	4,700	Maximum	(1)
Arsenic	mg/kg	3 / 3	--	11	KMP-12-00	7.667	--	--	11	Maximum	(1)
Barium	mg/kg	3 / 3	--	74	KMP-11-00	64	--	--	74	Maximum	(1)
Cadmium	mg/kg	3 / 3	--	0.064 J	KMP-12-00	0.0545	--	--	0.064	Maximum	(1)
Chromium	mg/kg	3 / 3	--	6.7	KMP-12-00	5.767	--	--	6.7	Maximum	(1)
Cobalt	mg/kg	1 / 1	--	4.0	KMA-SS02-0000-0003-01	--	--	--	4.0	Maximum	(1)
Copper	mg/kg	1 / 1	--	5.1	KMA-SS02-0000-0003-01	--	--	--	5.1	Maximum	(1)
Iron	mg/kg	1 / 1	--	12,000	KMA-SS02-0000-0003-01	--	--	--	12,000	Maximum	(1)
Manganese	mg/kg	1 / 1	--	200	KMA-SS02-0000-0003-01	--	--	--	200	Maximum	(1)
Molybdenum	mg/kg	3 / 3	--	0.81 J	KMP-12-00	0.557	--	--	0.81	Maximum	(1)
Selenium	mg/kg	3 / 3	--	1.5	KMP-12-00	1.2	--	--	1.5	Maximum	(1)
Thallium	mg/kg	1 / 1	--	0.092	KMA-SS02-0000-0003-01	--	--	--	0.092	Maximum	(1)
Uranium	mg/kg	7 / 7	--	2.9	RWPR-SS-029 (0-6)	1.186	--	--	2.9	Maximum	(1)
Vanadium	mg/kg	3 / 3	--	25	KMP-12-00	17.67	--	--	25	Maximum	(1)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Arroyos on the Navajo Nation											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Subsurface Soil (0-36 inches bgs)											
Uranium-238	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Uranium-234	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Thorium-230	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Radium-226	pCi/g	135 / 135	--	3.28	CRUA-020.3 (30-36)	1.414	1.492	G	1.5	UCL95	(6)
Aluminum	mg/kg	2 / 2	--	4,700	KMA-SS02-0000-0003-01	4450	--	--	4,700	Maximum	(1)
Arsenic	mg/kg	4 / 4	--	11	KMP-12-00	7.15	--	--	11	Maximum	(1)
Barium	mg/kg	4 / 4	--	75	KMA-SS02-0012-0018-01	66.75	--	--	75	Maximum	(1)
Cadmium	mg/kg	4 / 4	--	0.073 J	KMA-SS02-0012-0018-01	0.0613	--	--	0.073	Maximum	(1)
Chromium	mg/kg	4 / 4	--	6.7	KMP-12-00	5.45	--	--	6.7	Maximum	(1)
Cobalt	mg/kg	2 / 2	--	4.5	KMA-SS02-0012-0018-01	4.25	--	--	4.5	Maximum	(1)
Copper	mg/kg	2 / 2	--	5.1	KMA-SS02-0000-0003-01	5.1	--	--	5.1	Maximum	(1)
Iron	mg/kg	2 / 2	--	15,000	KMA-SS02-0012-0018-01	13,500	--	--	15,000	Maximum	(1)
Manganese	mg/kg	2 / 2	--	400	KMA-SS02-0012-0018-01	300	--	--	400	Maximum	(1)
Molybdenum	mg/kg	4 / 4	--	0.81 J	KMP-12-00	0.53	--	--	0.81	Maximum	(1)
Selenium	mg/kg	4 / 4	--	1.5	KMP-12-00	1.125	--	--	1.5	Maximum	(1)
Thallium	mg/kg	2 / 2	--	0.092	KMA-SS02-0000-0003-01	0.087	--	--	0.092	Maximum	(1)
Uranium	mg/kg	9 / 9	--	2.9	RWPR-SS-029 (0-6)	1.262	--	--	2.9	Maximum	(1)
Vanadium	mg/kg	4 / 4	--	25	KMP-12-00	16.5	--	--	25	Maximum	(1)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Arroyos on United Nuclear Corporation Property											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Surface Soil (0-6 inches bgs)											
Uranium-238	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Uranium-234	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Thorium-230	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Radium-226	pCi/g	13 / 13	--	1.55 G	CRPA-003.2 (2-6)	0.94	1.075	N	1.1	UCL95	(2)
Aluminum	mg/kg	1 / 1	--	4,400	KMA-SS01-0000-0003-01	--	--	--	4,400	Maximum	(1)
Arsenic	mg/kg	1 / 1	--	4.6	KMA-SS01-0000-0003-01	--	--	--	4.6	Maximum	(1)
Barium	mg/kg	1 / 1	--	48	KMA-SS01-0000-0003-01	--	--	--	48	Maximum	(1)
Cadmium	mg/kg	1 / 1	--	0.054 J	KMA-SS01-0000-0003-01	--	--	--	0.054	Maximum	(1)
Chromium	mg/kg	1 / 1	--	5	KMA-SS01-0000-0003-01	--	--	--	5.0	Maximum	(1)
Cobalt	mg/kg	1 / 1	--	4.4	KMA-SS01-0000-0003-01	--	--	--	4.4	Maximum	(1)
Copper	mg/kg	1 / 1	--	4.7	KMA-SS01-0000-0003-01	--	--	--	4.7	Maximum	(1)
Iron	mg/kg	1 / 1	--	13,000	KMA-SS01-0000-0003-01	--	--	--	13,000	Maximum	(1)
Manganese	mg/kg	1 / 1	--	240	KMA-SS01-0000-0003-01	--	--	--	240	Maximum	(1)
Molybdenum	mg/kg	1 / 1	--	0.28	KMA-SS01-0000-0003-01	--	--	--	0.28	Maximum	(1)
Selenium	mg/kg	11 / 11	--	1.55	KMA-SS01-0000-0003-01	0.942	1.102	N	1.1	UCL95	(2)
Thallium	mg/kg	0 / 1	0	0.057 U	KMA-SS01-0000-0003-01	--	--	--	0.057	Maximum-ND	--
Uranium	mg/kg	1 / 1	--	0.091	KMA-SS01-0000-0003-01	--	--	--	0.09	Maximum	(1)
Vanadium	mg/kg	1 / 1	--	0.53	KMA-SS01-0000-0003-01	--	--	--	0.53	Maximum	(1)

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Arroyos on United Nuclear Corporation Property											
COPC[a]	Units	Detection Frequency	Number of High Nondetect Results[b]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[c]	UCL95 / Distribution[d]		Exposure Point Concentration		
									Value[e]	Statistic[e]	Method[f]
Subsurface Soil (0-36 inches bgs)											
Uranium-238	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Uranium-234	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Thorium-230	pCi/g	0 / 0	--	--	--	--	--	--	--	--	--
Radium-226	pCi/g	20 / 20	--	1.83 G	CRUA-037.3 (30-36)	0.976	1.101	N	1.1	UCL95	(2)
Aluminum	mg/kg	2 / 2	--	4,700	KMA-SS01-0012-0018-01	4,550	--	--	4,700	Maximum	(1)
Arsenic	mg/kg	2 / 2	--	4.8	KMA-SS01-0012-0018-01	4.7	--	--	5	Maximum	(1)
Barium	mg/kg	2 / 2	--	62	KMA-SS01-0012-0018-01	55	--	--	62	Maximum	(1)
Cadmium	mg/kg	2 / 2	--	0.055 J	KMA-SS01-0012-0018-01	0.0545	--	--	0.055	Maximum	(1)
Chromium	mg/kg	2 / 2	--	5	KMA-SS01-0012-0018-01	4.95	--	--	5.0	Maximum	(1)
Cobalt	mg/kg	2 / 2	--	4.4	KMA-SS01-0000-0003-01	4.15	--	--	4.4	Maximum	(1)
Copper	mg/kg	2 / 2	--	5.4	KMA-SS01-0012-0018-01	5.05	--	--	5.4	Maximum	(1)
Iron	mg/kg	2 / 2	--	15,000	KMA-SS01-0012-0018-01	14,000	--	--	15,000	Maximum	(1)
Manganese	mg/kg	2 / 2	--	280	KMA-SS01-0012-0018-01	260	--	--	280	Maximum	(1)
Molybdenum	mg/kg	2 / 2	--	0.28	KMA-SS01-0000-0003-01, KMA-SS01-0012-0018-01	0.28	--	--	0.28	Maximum	(1)
Selenium	mg/kg	18 / 18	--	1.83	KMA-SS01-0000-0003-01	0.981	1.12	N	1.1	UCL95	(2)
Thallium	mg/kg	0 / 2	0	0.059 U	KMA-SS01-0000-0003-01	--	--	--	0.059	Maximum-ND	--
Uranium	mg/kg	2 / 2	--	0.091	KMA-SS01-0012-0018-01	0.0885	--	--	0.09	Maximum	(1)
Vanadium	mg/kg	2 / 2	--	0.62	KMA-SS01-0012-0018-01	0.575	--	--	1	Maximum	(1)

Notes:

[a] EPCs calculated if "Yes" for "Include Constituent as a COPC?" on Table C-1.

[b] Number of nondetect results that exceeded the maximum detected concentration. These results were not included in the statistical calculations.

[c] The arithmetic mean for datasets with nondetected results is calculated using the KM method.

[d] Tested using the Shapiro-Wilk W or Lilliefors test for normal and lognormal distributions and the Anderson-Darling and Kolmogorov-Smirnov tests for gamma distributions. A 5 percent level of significance was used in all tests. Distribution tests were conducted only for samples with at least four detected results. Distributions not confirmed as N, LN, or G were treated as NP in all statistical calculations.

[e] The EPC is the lesser of the UCL95 (or UCL99) and the maximum detected concentration. The maximum detected concentration is the default when there are fewer than 10 samples or fewer than four detected results. See Appendix D of USEPA (2024b).

Table C-4. Exposure Point Concentrations for Human Health Risk Assessment

Notes (continued):

[f] The statistical methods for selecting the exposure point concentration are as follows (not all are used):

(1)	Maximum detected concentration	(7)	95% Gamma Approximate KM-UCL	(13)	95% KM BCA UCL
(2)	95% Student's t UCL	(8)	95% H-UCL	(14)	95% Percentile Bootstrap UCL
(3)	95% KM (t) UCL	(9)	95% H-UCL (KM log)	(15)	95% KM Percentile Bootstrap UCL
(4)	95% Adjusted Gamma UCL	(10)	95% Bootstrap-t UCL	(16)	99% Bootstrap-t UCL
(5)	95% Gamma Adjusted KM-UCL	(11)	95% KM Bootstrap-t UCL	(17)	99% KM Percentile Bootstrap UCL
(6)	95% Approximate Gamma UCL	(12)	95% BCA UCL		

--	Not applicable
BCA	Bias-corrected accelerated bootstrap method
bgs	Below ground surface
COPC	Contaminant of potential concern
EPC	Exposure point concentration
G (data qualifier)	Sample density differs by more than 15% of the LCS density.
G (distribution)	Gamma distribution
H-UCL	UCL based upon Land's H-statistic
J	Estimated concentration
Kerr-McGee	Kerr-McGee Corporation
KM	Kaplan-Meier
LN	Lognormal distribution
M3	The requested MDC was not met, but the reported activity is greater than the reported MDC
mg/kg	Milligram per kilogram
N	Normal distribution
ND	Nondetect
NP	Nonparametric distribution
pCi/g	Picocurie per gram
UCL	Upper confidence limit
UCL95	95 percent upper confidence limit
UCL99	99 percent upper confidence limit
USEPA	U.S. Environmental Protection Agency

Reference:

U.S. Environmental Protection Agency (USEPA). 2024b. "Navajo Abandoned Uranium Mines Risk Assessment Methodology." Draft Final. March.

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Church Rock Mine No. 1 - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Incidental Soil Ingestion																	
Uranium-238	1.1	pCi/g	1.0E+04	pCi/g	1.3E-10	risk/pCi/g	1.4E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	1.1E+04	pCi/g	1.5E-10	risk/pCi/g	1.7E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	1.6E+04	pCi/g	1.7E-10	risk/pCi/g	2.7E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	6.7	pCi/g	6.4E+04	pCi/g	5.7E-09	risk/pCi/g	3.6E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.0E-02	mg/kg-day	1.0E+00	mg/kg-day	0.020	1.2E-01	mg/kg-day	1.0E+00	mg/kg-day	0.12
Arsenic	4.9	mg/kg	1.8E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-05	1.3E-05	mg/kg-day	3.0E-04	mg/kg-day	0.042	7.4E-05	mg/kg-day	3.0E-04	mg/kg-day	0.25
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.7E-04	mg/kg-day	2.0E-01	mg/kg-day	0.0024	2.9E-03	mg/kg-day	2.0E-01	mg/kg-day	0.014
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.0E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0060	3.6E-06	mg/kg-day	1.0E-04	mg/kg-day	0.036
Chromium	6.0	mg/kg	9.62E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	4.8E-05	2.6E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0086	1.6E-04	mg/kg-day	3.0E-03	mg/kg-day	0.052
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.6E-05	mg/kg-day	3.0E-04	mg/kg-day	0.087	1.6E-04	mg/kg-day	3.0E-04	mg/kg-day	0.53
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.2E-05	mg/kg-day	4.0E-02	mg/kg-day	0.0013	3.1E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0078
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.7E-02	mg/kg-day	7.0E-01	mg/kg-day	0.068	2.9E-01	mg/kg-day	7.0E-01	mg/kg-day	0.41
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.9E-04	mg/kg-day	2.4E-02	mg/kg-day	0.029	4.2E-03	mg/kg-day	2.4E-02	mg/kg-day	0.17
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00028	8.3E-06	mg/kg-day	5.0E-03	mg/kg-day	0.0017
Selenium	3.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0029	8.8E-05	mg/kg-day	5.0E-03	mg/kg-day	0.018
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.0E-07	mg/kg-day	1.0E-05	mg/kg-day	0.060	3.6E-06	mg/kg-day	1.0E-05	mg/kg-day	0.36
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.1E-05	mg/kg-day	2.0E-04	mg/kg-day	0.16	1.9E-04	mg/kg-day	2.0E-04	mg/kg-day	0.95
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.0E-05	mg/kg-day	5.0E-03	mg/kg-day	0.012	3.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.073
Metals Cancer Total							7E-05	**Metals Noncancer Total**				0.5	**Metals Noncancer Total**				3
Exposure Route Cancer Total							4E-04	**Exposure Route Noncancer Total**				0.5	**Exposure Route Noncancer Total**				3

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Church Rock Mine No. 1 - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: External Exposure																	
Uranium-238	1.1	pCi/g	5.6E+01	pCi/g	1.2E-10	risk/year pCi/g	7.0E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	6.1E+01	pCi/g	2.5E-10	risk/year pCi/g	1.5E-08	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	8.7E+01	pCi/g	8.5E-10	risk/year pCi/g	7.3E-08	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	6.7	pCi/g	3.4E+02	pCi/g	8.4E-06	risk/year pCi/g	2.9E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							3E-03	**Exposure Route Noncancer Total**				--	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure																	
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	4.9	mg/kg	1.0E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-06	7.4E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0025	4.5E-06	mg/kg-day	3.0E-04	mg/kg-day	0.015
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.8E-08	mg/kg-day	1.0E-04	mg/kg-day	0.00028	1.7E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0017
Chromium	6.0	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	3.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							2E-06	**Metals Noncancer Total**				0.003	**Metals Noncancer Total**				0.02
Exposure Route Cancer Total							2E-06	**Exposure Route Noncancer Total**				0.003	**Exposure Route Noncancer Total**				0.02

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Church Rock Mine No. 1 - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Inhalation of Particulates																	
Uranium-238	1.1	pCi/g	9.6E-02	pCi	2.4E-08	risk/pCi	2.3E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	1.0E-01	pCi	2.8E-08	risk/pCi	2.9E-09	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	1.5E-01	pCi	3.4E-08	risk/pCi	5.0E-09	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	6.7	pCi/g	5.8E-01	pCi	5.9E-08	risk/pCi	3.5E-08	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-08	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	6.0E-07	mg/m^3	5.0E-03	mg/m^3	0.00012	6.0E-07	mg/m^3	5.0E-03	mg/m^3	0.00012
Arsenic	4.9	mg/kg	6.4E-07	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	2.7E-09	6.4E-10	mg/m^3	1.5E-05	mg/m^3	0.000042	6.4E-10	mg/m^3	1.5E-05	mg/m^3	0.000042
Barium	110	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.4E-08	mg/m^3	5.0E-04	mg/m^3	0.000029	1.4E-08	mg/m^3	5.0E-04	mg/m^3	0.000029
Cadmium	0.14	mg/kg	1.8E-08	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	3.3E-11	1.8E-11	mg/m^3	1.0E-05	mg/m^3	0.0000018	1.8E-11	mg/m^3	1.0E-05	mg/m^3	0.0000018
Chromium	6.0	mg/kg	1.3E-06	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	1.1E-07	7.8E-10	mg/m^3	1.0E-04	mg/m^3	0.0000078	7.8E-10	mg/m^3	1.0E-04	mg/m^3	0.0000078
Cobalt	6.1	mg/kg	7.9E-07	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	7.1E-09	7.9E-10	mg/m^3	6.0E-06	mg/m^3	0.00013	7.9E-10	mg/m^3	6.0E-06	mg/m^3	0.00013
Copper	12	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	11,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	160	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.1E-08	mg/m^3	5.0E-05	mg/m^3	0.00042	2.1E-08	mg/m^3	5.0E-05	mg/m^3	0.00042
Molybdenum	0.32	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.2E-11	mg/m^3	2.0E-03	mg/m^3	0.000000021	4.2E-11	mg/m^3	2.0E-03	mg/m^3	0.000000021
Selenium	3.4	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.4E-10	mg/m^3	2.0E-02	mg/m^3	0.000000022	4.4E-10	mg/m^3	2.0E-02	mg/m^3	0.000000022
Thallium	0.14	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	7.3	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	9.5E-10	mg/m^3	4.0E-05	mg/m^3	0.000024	9.5E-10	mg/m^3	4.0E-05	mg/m^3	0.000024
Vanadium	14	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.8E-09	mg/m^3	1.0E-04	mg/m^3	0.000018	1.8E-09	mg/m^3	1.0E-04	mg/m^3	0.000018
Metals Cancer Total							1E-07	**Metals Noncancer Total**				0.0008	**Metals Noncancer Total**				0.0008
Exposure Route Cancer Total							2E-07	**Exposure Route Noncancer Total**				0.0008	**Exposure Route Noncancer Total**				0.0008
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Plant Consumption																	
Uranium-238	1.1	pCi/g	7.8E+04	pCi/g	8.7E-11	risk/pCi/g	6.8E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	8.5E+04	pCi/g	9.6E-11	risk/pCi/g	8.1E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	3.1E+04	pCi/g	1.2E-10	risk/pCi/g	3.6E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	6.7	pCi/g	7.4E+05	pCi/g	3.7E-09	risk/pCi/g	2.7E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.5E-02	mg/kg-day	1.0E+00	mg/kg-day	0.055	1.4E-01	mg/kg-day	1.0E+00	mg/kg-day	0.14
Arsenic	4.9	mg/kg	6.9E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-04	6.4E-05	mg/kg-day	3.0E-04	mg/kg-day	0.21	1.7E-04	mg/kg-day	3.0E-04	mg/kg-day	0.56
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.5E-03	mg/kg-day	2.0E-01	mg/kg-day	0.013	6.7E-03	mg/kg-day	2.0E-01	mg/kg-day	0.034
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.3E-06	mg/kg-day	1.0E-04	mg/kg-day	0.083	2.2E-05	mg/kg-day	1.0E-04	mg/kg-day	0.22
Chromium	6.0	mg/kg	1.68E-04	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	8.4E-05	7.2E-05	mg/kg-day	3.0E-03	mg/kg-day	0.024	1.9E-04	mg/kg-day	3.0E-03	mg/kg-day	0.064
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-04	mg/kg-day	3.0E-04	mg/kg-day	0.37	2.9E-04	mg/kg-day	3.0E-04	mg/kg-day	0.98
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.0E-03	mg/kg-day	4.0E-02	mg/kg-day	0.051	5.4E-03	mg/kg-day	4.0E-02	mg/kg-day	0.14
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.3E-01	mg/kg-day	7.0E-01	mg/kg-day	0.19	*3.4E-01*	mg/kg-day	7.0E-01	mg/kg-day	0.49
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-02	mg/kg-day	2.4E-02	mg/kg-day	0.73	4.6E-02	mg/kg-day	2.4E-02	mg/kg-day	1.9
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0070	9.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.019
Selenium	3.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.012	1.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.033
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-06	mg/kg-day	1.0E-05	mg/kg-day	0.14	3.9E-06	mg/kg-day	1.0E-05	mg/kg-day	0.39
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.5E-05	mg/kg-day	2.0E-04	mg/kg-day	0.47	2.6E-04	mg/kg-day	2.0E-04	mg/kg-day	1.3
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-04	mg/kg-day	5.0E-03	mg/kg-day	0.034	4.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.092
Metals Cancer Total							2E-04	**Metals Noncancer Total**				2	**Metals Noncancer Total**				6
Exposure Route Cancer Total							3E-03	**Exposure Route Noncancer Total**				2	**Exposure Route Noncancer Total**				6

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Church Rock Mine No. 1 - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Animal Consumption																	
Uranium-238	1.1	pCi/g	8.9E+04	pCi/g	8.7E-11	risk/pCi/g	7.7E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	9.7E+04	pCi/g	9.6E-11	risk/pCi/g	9.3E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	6.6E+01	pCi/g	1.2E-10	risk/pCi/g	7.9E-09	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	6.7	pCi/g	1.4E+06	pCi/g	3.7E-09	risk/pCi/g	5.2E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							5E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.2E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0032	8.7E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0087
Arsenic	4.9	mg/kg	5.4E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.1E-06	4.8E-06	mg/kg-day	3.0E-04	mg/kg-day	0.016	1.3E-05	mg/kg-day	3.0E-04	mg/kg-day	0.042
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-05	mg/kg-day	2.0E-01	mg/kg-day	0.000072	3.9E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00019
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.2E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0032	8.4E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0084
Chromium	6.0	mg/kg	3.68E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-05	1.6E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0053	4.2E-05	mg/kg-day	3.0E-03	mg/kg-day	0.014
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.9E-05	mg/kg-day	3.0E-04	mg/kg-day	0.20	1.6E-04	mg/kg-day	3.0E-04	mg/kg-day	0.53
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0027	2.9E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0072
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.0E-01	mg/kg-day	7.0E-01	mg/kg-day	0.14	2.6E-01	mg/kg-day	7.0E-01	mg/kg-day	0.38
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.3E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0022	1.4E-04	mg/kg-day	2.4E-02	mg/kg-day	0.0059
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00029	3.8E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00077
Selenium	3.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.052	7.1E-04	mg/kg-day	5.0E-03	mg/kg-day	0.14
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.5E-06	mg/kg-day	1.0E-05	mg/kg-day	0.25	6.9E-06	mg/kg-day	1.0E-05	mg/kg-day	0.69
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.0E-06	mg/kg-day	2.0E-04	mg/kg-day	0.0051	2.8E-06	mg/kg-day	2.0E-04	mg/kg-day	0.014
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0031	4.2E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0084
Metals Cancer Total							3E-05	**Metals Noncancer Total**				0.7	**Metals Noncancer Total**				2
Exposure Route Cancer Total							5E-03	**Exposure Route Noncancer Total**				0.7	**Exposure Route Noncancer Total**				2
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Ingestion																	
Uranium-238	1.1	pCi/g	3.6E+04	pCi/g	8.7E-11	risk/pCi/g	3.1E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	4.0E+04	pCi/g	9.6E-11	risk/pCi/g	3.8E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	1.7E+04	pCi/g	1.2E-10	risk/pCi/g	2.0E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	6.7	pCi/g	4.0E+05	pCi/g	3.7E-09	risk/pCi/g	1.5E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							1E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.3E-02	mg/kg-day	1.0E+00	mg/kg-day	0.033	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	4.9	mg/kg	3.5E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.2E-05	3.8E-05	mg/kg-day	3.0E-04	mg/kg-day	0.13	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-03	mg/kg-day	2.0E-01	mg/kg-day	0.0083	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.6E-06	mg/kg-day	1.0E-04	mg/kg-day	0.056	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	6.0	mg/kg	5.2E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-05	4.4E-05	mg/kg-day	3.0E-03	mg/kg-day	0.015	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.7E-05	mg/kg-day	3.0E-04	mg/kg-day	0.22	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.3E-03	mg/kg-day	4.0E-02	mg/kg-day	0.033	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.8E-02	mg/kg-day	7.0E-01	mg/kg-day	0.11	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-02	mg/kg-day	2.4E-02	mg/kg-day	0.49	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0047	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	3.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.7E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0075	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.8E-07	mg/kg-day	1.0E-05	mg/kg-day	0.088	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.1E-05	mg/kg-day	2.0E-04	mg/kg-day	0.30	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-04	mg/kg-day	5.0E-03	mg/kg-day	0.021	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							8E-05	**Metals Noncancer Total**				2	**Metals Noncancer Total**				--
Exposure Route Cancer Total							2E-03	**Exposure Route Noncancer Total**				2	**Exposure Route Noncancer Total**				--

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Church Rock Mine No. 1 - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Dermal																	
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	4.9	mg/kg	2.9E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-06	3.2E-06	mg/kg-day	3.0E-04	mg/kg-day	0.011	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.2E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0062	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	6.0	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	3.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							4E-06	**Metals Noncancer Total**				0.02	**Metals Noncancer Total**				--
Exposure Route Cancer Total							4E-06	**Exposure Route Noncancer Total**				0.02	**Exposure Route Noncancer Total**				--
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Inhalation																	
Uranium-238	1.1	pCi/g	2.5E+02	pCi	2.4E-08	risk/pCi	6.0E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	2.8E+02	pCi	2.8E-08	risk/pCi	7.7E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	7.7E+01	pCi	3.4E-08	risk/pCi	2.6E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	6.7	pCi/g	4.2E+03	pCi	5.9E-08	risk/pCi	2.5E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.3E-04	mg/m^3	5.0E-03	mg/m^3	0.066	--	mg/m^3	5.0E-03	mg/m^3	--
Arsenic	4.9	mg/kg	3.5E-04	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	1.5E-06	3.9E-07	mg/m^3	1.5E-05	mg/m^3	0.026	--	mg/m^3	1.5E-05	mg/m^3	--
Barium	110	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.7E-05	mg/m^3	5.0E-04	mg/m^3	0.033	--	mg/m^3	5.0E-04	mg/m^3	--
Cadmium	0.14	mg/kg	5.2E-05	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	9.3E-08	5.6E-08	mg/m^3	1.0E-05	mg/m^3	0.0056	--	mg/m^3	1.0E-05	mg/m^3	--
Chromium	6.0	mg/kg	5.3E-04	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	4.5E-05	8.9E-08	mg/m^3	1.0E-04	mg/m^3	0.00089	--	mg/m^3	1.0E-04	mg/m^3	--
Cobalt	6.1	mg/kg	6.7E-04	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	6.0E-06	7.3E-07	mg/m^3	6.0E-06	mg/m^3	0.12	--	mg/m^3	6.0E-06	mg/m^3	--
Copper	12	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	11,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	160	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.2E-04	mg/m^3	5.0E-05	mg/m^3	2.3	--	mg/m^3	5.0E-05	mg/m^3	--
Molybdenum	0.32	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.3E-07	mg/m^3	2.0E-03	mg/m^3	0.00012	--	mg/m^3	2.0E-03	mg/m^3	--
Selenium	3.4	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.7E-07	mg/m^3	2.0E-02	mg/m^3	0.000019	--	mg/m^3	2.0E-02	mg/m^3	--
Thallium	0.14	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	7.3	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	6.2E-07	mg/m^3	4.0E-05	mg/m^3	0.016	--	mg/m^3	4.0E-05	mg/m^3	--
Vanadium	14	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.1E-06	mg/m^3	1.0E-04	mg/m^3	0.011	--	mg/m^3	1.0E-04	mg/m^3	--
Metals Cancer Total							5E-05	**Metals Noncancer Total**				3	**Metals Noncancer Total**				--
Exposure Route Cancer Total							3E-04	**Exposure Route Noncancer Total**				3	**Exposure Route Noncancer Total**				--
Surface Soil (0-6 inches bgs) Receptor Cancer Risk Total							**1E-02**	**Receptor/Media Noncancer Hazard Total**				**8**	**Receptor/Media Noncancer Hazard Total**				**10**

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Church Rock Mine No. 1 - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Incidental Soil Ingestion																	
Uranium-238	1.1	pCi/g	1.0E+04	pCi/g	1.3E-10	risk/pCi/g	1.4E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	1.1E+04	pCi/g	1.5E-10	risk/pCi/g	1.7E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	1.6E+04	pCi/g	1.7E-10	risk/pCi/g	2.7E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	17	pCi/g	1.6E+05	pCi/g	5.7E-09	risk/pCi/g	9.2E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							9E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	2.0E-02	mg/kg-day	1.0E+00	mg/kg-day	0.020	1.2E-01	mg/kg-day	1.0E+00	mg/kg-day	0.12
Arsenic	4.8	mg/kg	1.7E-05	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.6E-05	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	0.042	7.2E-05	mg/kg-day	3.0E-04	mg/kg-day	0.24
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	4.7E-04	mg/kg-day	2.0E-01	mg/kg-day	0.0024	2.9E-03	mg/kg-day	2.0E-01	mg/kg-day	0.014
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	6.0E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0060	3.6E-06	mg/kg-day	1.0E-04	mg/kg-day	0.036
Chromium	6.00	mg/kg	9.62E-05	mg/kg-day	5.0E-01	$(mg/kg-day)^{-1}$	4.8E-05	2.6E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0086	1.6E-04	mg/kg-day	3.0E-03	mg/kg-day	0.052
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	2.6E-05	mg/kg-day	3.0E-04	mg/kg-day	0.087	1.6E-04	mg/kg-day	3.0E-04	mg/kg-day	0.53
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	5.2E-05	mg/kg-day	4.0E-02	mg/kg-day	0.0013	3.1E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0078
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	4.7E-02	mg/kg-day	7.0E-01	mg/kg-day	0.068	2.9E-01	mg/kg-day	7.0E-01	mg/kg-day	0.41
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	6.9E-04	mg/kg-day	2.4E-02	mg/kg-day	0.029	4.2E-03	mg/kg-day	2.4E-02	mg/kg-day	0.17
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	1.4E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00028	8.3E-06	mg/kg-day	5.0E-03	mg/kg-day	0.0017
Selenium	3.1	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	1.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0027	8.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.016
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	6.0E-07	mg/kg-day	1.0E-05	mg/kg-day	0.060	3.6E-06	mg/kg-day	1.0E-05	mg/kg-day	0.36
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	3.1E-05	mg/kg-day	2.0E-04	mg/kg-day	0.16	1.9E-04	mg/kg-day	2.0E-04	mg/kg-day	0.95
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg-day)^{-1}$	--	6.0E-05	mg/kg-day	5.0E-03	mg/kg-day	0.012	3.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.073
Metals Cancer Total							7E-05	**Metals Noncancer Total**				0.5	**Metals Noncancer Total**				3
Exposure Route Cancer Total							1E-03	**Exposure Route Noncancer Total**				0.5	**Exposure Route Noncancer Total**				3

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Church Rock Mine No. 1 - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: External Exposure																	
Uranium-238	1.1	pCi/g	5.6E+01	pCi/g	1.2E-10	risk/year pCi/g	7.0E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	6.1E+01	pCi/g	2.5E-10	risk/year pCi/g	1.5E-08	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	8.7E+01	pCi/g	8.5E-10	risk/year pCi/g	7.3E-08	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	17	pCi/g	8.7E+02	pCi/g	8.4E-06	risk/year pCi/g	7.3E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							7E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							7E-03	**Exposure Route Noncancer Total**				--	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure																	
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	4.8	mg/kg	1.0E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-06	7.2E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0024	4.4E-06	mg/kg-day	3.0E-04	mg/kg-day	0.015
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.8E-08	mg/kg-day	1.0E-04	mg/kg-day	0.00028	1.7E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0017
Chromium	6.0	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	3.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							2E-06	**Metals Noncancer Total**				0.003	**Metals Noncancer Total**				0.02
Exposure Route Cancer Total							2E-06	**Exposure Route Noncancer Total**				0.003	**Exposure Route Noncancer Total**				0.02

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Church Rock Mine No. 1 - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Inhalation of Particulates																	
Uranium-238	1.1	pCi/g	9.6E-02	pCi	2.4E-08	risk/pCi	2.3E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	1.0E-01	pCi	2.8E-08	risk/pCi	2.9E-09	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	1.5E-01	pCi	3.4E-08	risk/pCi	5.0E-09	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	17	pCi/g	1.5E+00	pCi	5.9E-08	risk/pCi	8.8E-08	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							1E-07	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	6.0E-07	mg/m^3	5.0E-03	mg/m^3	0.00012	6.0E-07	mg/m^3	5.0E-03	mg/m^3	0.00012
Arsenic	4.8	mg/kg	6.2E-07	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	2.7E-09	6.2E-10	mg/m^3	1.5E-05	mg/m^3	0.000042	6.2E-10	mg/m^3	1.5E-05	mg/m^3	0.000042
Barium	110	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.4E-08	mg/m^3	5.0E-04	mg/m^3	0.00003	1.4E-08	mg/m^3	5.0E-04	mg/m^3	0.00003
Cadmium	0.14	mg/kg	1.8E-08	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	3.3E-11	1.8E-11	mg/m^3	1.0E-05	mg/m^3	0.0000018	1.8E-11	mg/m^3	1.0E-05	mg/m^3	0.0000018
Chromium	6.0	mg/kg	1.3E-06	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	1.1E-07	7.8E-10	mg/m^3	1.0E-04	mg/m^3	0.0000078	7.8E-10	mg/m^3	1.0E-04	mg/m^3	0.0000078
Cobalt	6.1	mg/kg	7.9E-07	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	7.1E-09	7.9E-10	mg/m^3	6.0E-06	mg/m^3	0.00013	7.9E-10	mg/m^3	6.0E-06	mg/m^3	0.00013
Copper	12	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	11,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	160	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.1E-08	mg/m^3	5.0E-05	mg/m^3	0.00042	2.1E-08	mg/m^3	5.0E-05	mg/m^3	0.00042
Molybdenum	0.32	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.2E-11	mg/m^3	2.0E-03	mg/m^3	0.000000021	4.2E-11	mg/m^3	2.0E-03	mg/m^3	0.000000021
Selenium	3.1	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.0E-10	mg/m^3	2.0E-02	mg/m^3	0.000000020	4.0E-10	mg/m^3	2.0E-02	mg/m^3	0.000000020
Thallium	0.14	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	7.3	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	9.5E-10	mg/m^3	4.0E-05	mg/m^3	0.000024	9.5E-10	mg/m^3	4.0E-05	mg/m^3	0.000024
Vanadium	14	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.8E-09	mg/m^3	1.0E-04	mg/m^3	0.000018	1.8E-09	mg/m^3	1.0E-04	mg/m^3	0.000018
Metals Cancer Total							1E-07	**Metals Noncancer Total**				0.0008	**Metals Noncancer Total**				0.001
Exposure Route Cancer Total							2E-07	**Exposure Route Noncancer Total**				0.0008	**Exposure Route Noncancer Total**				0.001
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Plant Consumption																	
Uranium-238	1.1	pCi/g	7.8E+04	pCi/g	8.7E-11	risk/pCi/g	6.8E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	8.5E+04	pCi/g	9.6E-11	risk/pCi/g	8.1E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	3.1E+04	pCi/g	1.2E-10	risk/pCi/g	3.6E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	17	pCi/g	1.9E+06	pCi/g	3.7E-09	risk/pCi/g	6.9E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							7E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.5E-02	mg/kg-day	1.0E+00	mg/kg-day	0.055	1.4E-01	mg/kg-day	1.0E+00	mg/kg-day	0.14
Arsenic	4.8	mg/kg	6.7E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-04	6.2E-05	mg/kg-day	3.0E-04	mg/kg-day	0.21	1.6E-04	mg/kg-day	3.0E-04	mg/kg-day	0.54
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.5E-03	mg/kg-day	2.0E-01	mg/kg-day	0.013	6.7E-03	mg/kg-day	2.0E-01	mg/kg-day	0.034
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.3E-06	mg/kg-day	1.0E-04	mg/kg-day	0.083	2.2E-05	mg/kg-day	1.0E-04	mg/kg-day	0.22
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-04	mg/kg-day	3.0E-04	mg/kg-day	0.37	2.9E-04	mg/kg-day	3.0E-04	mg/kg-day	0.98
Chromium	6.0	mg/kg	1.7E-04	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	8.4E-05	7.2E-05	mg/kg-day	3.0E-03	mg/kg-day	0.024	1.9E-04	mg/kg-day	3.0E-03	mg/kg-day	0.064
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.0E-03	mg/kg-day	4.0E-02	mg/kg-day	0.051	5.4E-03	mg/kg-day	4.0E-02	mg/kg-day	0.14
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.3E-01	mg/kg-day	7.0E-01	mg/kg-day	0.19	*3.4E-01*	mg/kg-day	7.0E-01	mg/kg-day	0.49
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-02	mg/kg-day	2.4E-02	mg/kg-day	0.73	4.6E-02	mg/kg-day	2.4E-02	mg/kg-day	1.9
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0070	9.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.019
Selenium	3.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.6E-05	mg/kg-day	5.0E-03	mg/kg-day	0.011	1.5E-04	mg/kg-day	5.0E-03	mg/kg-day	0.030
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-06	mg/kg-day	1.0E-05	mg/kg-day	0.14	3.9E-06	mg/kg-day	1.0E-05	mg/kg-day	0.39
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.5E-05	mg/kg-day	2.0E-04	mg/kg-day	0.47	2.6E-04	mg/kg-day	2.0E-04	mg/kg-day	1.3
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-04	mg/kg-day	5.0E-03	mg/kg-day	0.034	4.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.092
Metals Cancer Total							2E-04	**Metals Noncancer Total**				2	**Metals Noncancer Total**				6
Exposure Route Cancer Total							7E-03	**Exposure Route Noncancer Total**				2	**Exposure Route Noncancer Total**				6

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Church Rock Mine No. 1 - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Animal Consumption																	
Uranium-238	1.1	pCi/g	8.9E+04	pCi/g	8.7E-11	risk/pCi/g	7.7E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	9.7E+04	pCi/g	9.6E-11	risk/pCi/g	9.3E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	6.6E+01	pCi/g	1.2E-10	risk/pCi/g	7.9E-09	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	17	pCi/g	3.6E+06	pCi/g	3.7E-09	risk/pCi/g	1.3E-02	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							1E-02	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.2E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0032	8.7E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0087
Arsenic	4.8	mg/kg	5.3E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.9E-06	4.7E-06	mg/kg-day	3.0E-04	mg/kg-day	0.016	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	0.042
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-05	mg/kg-day	2.0E-01	mg/kg-day	0.000072	3.9E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00019
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.2E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0032	8.4E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0084
Chromium	6.0	mg/kg	3.7E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-05	1.6E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0053	4.2E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0141
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.9E-05	mg/kg-day	3.0E-04	mg/kg-day	0.20	1.6E-04	mg/kg-day	3.0E-04	mg/kg-day	0.53
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0027	2.9E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0072
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.0E-01	mg/kg-day	7.0E-01	mg/kg-day	0.14	2.6E-01	mg/kg-day	7.0E-01	mg/kg-day	0.38
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.3E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0022	1.4E-04	mg/kg-day	2.4E-02	mg/kg-day	0.0059
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00029	3.8E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00077
Selenium	3.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.4E-04	mg/kg-day	5.0E-03	mg/kg-day	0.048	6.5E-04	mg/kg-day	5.0E-03	mg/kg-day	0.13
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.5E-06	mg/kg-day	1.0E-05	mg/kg-day	0.25	6.9E-06	mg/kg-day	1.0E-05	mg/kg-day	0.69
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.0E-06	mg/kg-day	2.0E-04	mg/kg-day	0.0051	2.8E-06	mg/kg-day	2.0E-04	mg/kg-day	0.014
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0031	4.2E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0084
Metals Cancer Total							3E-05	**Metals Noncancer Total**				0.7	**Metals Noncancer Total**				2
Exposure Route Cancer Total							1E-02	**Exposure Route Noncancer Total**				0.7	**Exposure Route Noncancer Total**				2
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Ingestion																	
Uranium-238	1.1	pCi/g	3.6E+04	pCi/g	8.7E-11	risk/pCi/g	3.1E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	4.0E+04	pCi/g	9.6E-11	risk/pCi/g	3.8E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	1.7E+04	pCi/g	1.2E-10	risk/pCi/g	2.0E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	17	pCi/g	1.0E+06	pCi/g	3.7E-09	risk/pCi/g	3.8E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.3E-02	mg/kg-day	1.0E+00	mg/kg-day	0.033	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	4.8	mg/kg	3.4E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-05	3.7E-05	mg/kg-day	3.0E-04	mg/kg-day	0.12	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-03	mg/kg-day	2.0E-01	mg/kg-day	0.0083	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.6E-06	mg/kg-day	1.0E-04	mg/kg-day	0.056	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	6.0	mg/kg	5.2E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-05	4.4E-05	mg/kg-day	3.0E-03	mg/kg-day	0.015	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.7E-05	mg/kg-day	3.0E-04	mg/kg-day	0.22	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.3E-03	mg/kg-day	4.0E-02	mg/kg-day	0.033	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.8E-02	mg/kg-day	7.0E-01	mg/kg-day	0.11	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-02	mg/kg-day	2.4E-02	mg/kg-day	0.49	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0047	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	3.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.4E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0068	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.8E-07	mg/kg-day	1.0E-05	mg/kg-day	0.088	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.1E-05	mg/kg-day	2.0E-04	mg/kg-day	0.30	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-04	mg/kg-day	5.0E-03	mg/kg-day	0.021	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							8E-05	**Metals Noncancer Total**				2	**Metals Noncancer Total**				--
Exposure Route Cancer Total							4E-03	**Exposure Route Noncancer Total**				2	**Exposure Route Noncancer Total**				--

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Church Rock Mine No. 1 - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Dermal																	
Aluminum	4,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	4.8	mg/kg	2.9E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.3E-06	3.1E-06	mg/kg-day	3.0E-04	mg/kg-day	0.010	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	110	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.2E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0062	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	6.0	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	6.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	12	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	11,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.32	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	3.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	7.3	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
						Metals Cancer Total	4E-06				**Metals Noncancer Total**	0.02				**Metals Noncancer Total**	--
						Exposure Route Cancer Total	4E-06				**Exposure Route Noncancer Total**	0.02				**Exposure Route Noncancer Total**	--
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Inhalation																	
Uranium-238	1.1	pCi/g	2.5E+02	pCi	2.4E-08	risk/pCi	6.0E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.2	pCi/g	2.8E+02	pCi	2.8E-08	risk/pCi	7.7E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	1.7	pCi/g	7.7E+01	pCi	3.4E-08	risk/pCi	2.6E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	17	pCi/g	1.1E+04	pCi	5.9E-08	risk/pCi	6.3E-04	--	--	--	--	--	--	--	--	--	--
						Radionuclide Cancer Total	7E-04				**Radionuclide Noncancer Total**	--				**Radionuclide Noncancer Total**	--
Aluminum	4,600	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.3E-04	mg/m^3	5.0E-03	mg/m^3	0.066	--	mg/m^3	5.0E-03	mg/m^3	--
Arsenic	4.8	mg/kg	3.5E-04	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	1.5E-06	3.8E-07	mg/m^3	1.5E-05	mg/m^3	0.025	--	mg/m^3	1.5E-05	mg/m^3	--
Barium	110	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.7E-05	mg/m^3	5.0E-04	mg/m^3	0.033	--	mg/m^3	5.0E-04	mg/m^3	--
Cadmium	0.14	mg/kg	5.2E-05	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	9.3E-08	5.6E-08	mg/m^3	1.0E-05	mg/m^3	0.0056	--	mg/m^3	1.0E-05	mg/m^3	--
Chromium	6.0	mg/kg	5.3E-04	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	4.5E-05	8.9E-08	mg/m^3	1.0E-04	mg/m^3	0.00089	--	mg/m^3	1.0E-04	mg/m^3	--
Cobalt	6.1	mg/kg	6.7E-04	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	6.0E-06	7.3E-07	mg/m^3	6.0E-06	mg/m^3	0.12	--	mg/m^3	6.0E-06	mg/m^3	--
Copper	12	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	11,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	160	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.2E-04	mg/m^3	5.0E-05	mg/m^3	2.3	--	mg/m^3	5.0E-05	mg/m^3	--
Molybdenum	0.32	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.3E-07	mg/m^3	2.0E-03	mg/m^3	0.00012	--	mg/m^3	2.0E-03	mg/m^3	--
Selenium	3.1	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.4E-07	mg/m^3	2.0E-02	mg/m^3	0.000017	--	mg/m^3	2.0E-02	mg/m^3	--
Thallium	0.14	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	7.3	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	6.2E-07	mg/m^3	4.0E-05	mg/m^3	0.016	--	mg/m^3	4.0E-05	mg/m^3	--
Vanadium	14	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.1E-06	mg/m^3	1.0E-04	mg/m^3	0.011	--	mg/m^3	1.0E-04	mg/m^3	--
						Metals Cancer Total	5E-05				**Metals Noncancer Total**	3				**Metals Noncancer Total**	--
						Exposure Route Cancer Total	7E-04				**Exposure Route Noncancer Total**	3				**Exposure Route Noncancer Total**	--
						Subsurface Soil (0-72 inches bgs) Receptor Cancer Risk Total	**3E-02**				**Receptor/Media Noncancer Hazard Total**	**8**				**Receptor/Media Noncancer Hazard Total**	**10**

Table C-5.1. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1

Notes:

[a] COPCs are the constituents of interest with a maximum detected concentration exceeding the COPC screening level (see Table C-1).

[b] EPCs are provided on Table C-4.

[c] The intakes are the EPC multiplied by the exposure parameters and any applicable contaminant-specific inputs (see Table C-3 for exposure inputs, Table 4 of the NAUM risk assessment methodology [USEPA 2024b] report for contaminant-specific inputs, and Appendix B of the NAUM risk assessment methodology [USEPA 2024b] report for equations).

[d] The toxicity values are provided in Table 4 of the NAUM risk assessment methodology (USEPA 2024b).

[e] The cancer risk for each contaminant for each exposure pathway is calculated by multiplying the cancer intake value with the toxicity value as follows: For contaminant *i* : $Risk_i = Cancer\ Intake_i \times Toxicity\ Factor_i$

[f] The noncancer hazard for each contaminant for each exposure pathway is calculated by dividing the noncancer intake value by the toxicity value as follows: For contaminant *i* : $Hazard_i = Noncancer\ Intake_i / Toxicity\ Factor_i$

--	Not applicable
µg/m^3	Microgram per cubic meter
bgs	Below ground surface
COPC	Contaminant of potential concern
EPC	Exposure point concentration
mg/kg	Milligram per kilogram
mg/kg-day	Milligram per kilogram per day
mg/m^3	Milligram per cubic meter
NAUM	Navajo abandoned uranium mine
pCi	Picocurie
pCi/g	Picocurie per gram
RfC	Reference concentration
RfD	Reference dose
SE	Secular equilibrium
USEPA	U.S. Environmental Protection Agency

Reference:

U.S. Environmental Protection Agency (USEPA). 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Incidental Soil Ingestion																	
Uranium-238	1.3	pCi/g	1.2E+04	pCi/g	1.3E-10	risk/pCi/g	1.7E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	1.3E+04	pCi/g	1.5E-10	risk/pCi/g	2.0E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	3.4E+04	pCi/g	1.7E-10	risk/pCi/g	5.7E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	8.8E+04	pCi/g	5.7E-09	risk/pCi/g	5.0E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							5E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.7E-02	mg/kg-day	1.0E+00	mg/kg-day	0.027	1.6E-01	mg/kg-day	1.0E+00	mg/kg-day	0.16
Arsenic	6.6	mg/kg	2.4E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.6E-05	1.7E-05	mg/kg-day	3.0E-04	mg/kg-day	0.057	9.9E-05	mg/kg-day	3.0E-04	mg/kg-day	0.33
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.9E-04	mg/kg-day	2.0E-01	mg/kg-day	0.0034	4.2E-03	mg/kg-day	2.0E-01	mg/kg-day	0.021
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.6E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0056	3.4E-06	mg/kg-day	1.0E-04	mg/kg-day	0.034
Chromium	10	mg/kg	1.60E-04	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	8.0E-05	4.3E-05	mg/kg-day	3.0E-03	mg/kg-day	0.014	2.6E-04	mg/kg-day	3.0E-03	mg/kg-day	0.087
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.0E-05	mg/kg-day	3.0E-04	mg/kg-day	0.099	1.8E-04	mg/kg-day	3.0E-04	mg/kg-day	0.60
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.6E-05	mg/kg-day	4.0E-02	mg/kg-day	0.0014	3.4E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0085
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.9E-02	mg/kg-day	7.0E-01	mg/kg-day	0.098	4.2E-01	mg/kg-day	7.0E-01	mg/kg-day	0.59
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.6E-04	mg/kg-day	2.4E-02	mg/kg-day	0.036	5.2E-03	mg/kg-day	2.4E-02	mg/kg-day	0.22
Molybdenum	0.31	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.3E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00027	8.1E-06	mg/kg-day	5.0E-03	mg/kg-day	0.0016
Selenium	3.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0026	7.8E-05	mg/kg-day	5.0E-03	mg/kg-day	0.016
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.9E-07	mg/kg-day	1.0E-05	mg/kg-day	0.069	4.2E-06	mg/kg-day	1.0E-05	mg/kg-day	0.42
Uranium	3.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-05	mg/kg-day	2.0E-04	mg/kg-day	0.08	9.4E-05	mg/kg-day	2.0E-04	mg/kg-day	0.47
Vanadium	16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.9E-05	mg/kg-day	5.0E-03	mg/kg-day	0.014	4.2E-04	mg/kg-day	5.0E-03	mg/kg-day	0.083
Metals Cancer Total							1E-04	**Metals Noncancer Total**				0.5	**Metals Noncancer Total**				3
Exposure Route Cancer Total							6E-04	**Exposure Route Noncancer Total**				0.5	**Exposure Route Noncancer Total**				3

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: External Exposure																	
Uranium-238	1.3	pCi/g	6.6E+01	pCi/g	1.2E-10	risk/year pCi/g	8.2E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	7.1E+01	pCi/g	2.5E-10	risk/year pCi/g	1.8E-08	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	1.8E+02	pCi/g	8.5E-10	risk/year pCi/g	1.6E-07	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	4.7E+02	pCi/g	8.4E-06	risk/year pCi/g	4.0E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							4E-03	**Exposure Route Noncancer Total**				--	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure																	
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	6.6	mg/kg	1.4E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-06	9.9E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0033	6.0E-06	mg/kg-day	3.0E-04	mg/kg-day	0.020
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.6E-08	mg/kg-day	1.0E-04	mg/kg-day	0.00026	1.6E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0016
Chromium	10	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.31	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	3.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	3.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							2E-06	**Metals Noncancer Total**				0.004	**Metals Noncancer Total**				0.02
Exposure Route Cancer Total							2E-06	**Exposure Route Noncancer Total**				0.004	**Exposure Route Noncancer Total**				0.02

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Inhalation of Particulates																	
Uranium-238	1.3	pCi/g	1.1E-01	pCi	2.4E-08	risk/pCi	2.7E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	1.2E-01	pCi	2.8E-08	risk/pCi	3.4E-09	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	3.1E-01	pCi	3.4E-08	risk/pCi	1.1E-08	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	8.1E-01	pCi	5.9E-08	risk/pCi	4.8E-08	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							6E-08	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	8.2E-07	mg/m^3	5.0E-03	mg/m^3	0.00016	8.2E-07	mg/m^3	5.0E-03	mg/m^3	0.00016
Arsenic	6.6	mg/kg	8.6E-07	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	3.7E-09	8.6E-10	mg/m^3	1.5E-05	mg/m^3	0.000057	8.6E-10	mg/m^3	1.5E-05	mg/m^3	0.000057
Barium	160	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.1E-08	mg/m^3	5.0E-04	mg/m^3	0.000042	2.1E-08	mg/m^3	5.0E-04	mg/m^3	0.000042
Cadmium	0.13	mg/kg	1.7E-08	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	3.0E-11	1.7E-11	mg/m^3	1.0E-05	mg/m^3	0.0000017	1.7E-11	mg/m^3	1.0E-05	mg/m^3	0.0000017
Chromium	10	mg/kg	2.1E-06	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	1.8E-07	1.3E-09	mg/m^3	1.0E-04	mg/m^3	0.000013	1.3E-09	mg/m^3	1.0E-04	mg/m^3	0.000013
Cobalt	6.9	mg/kg	9.0E-07	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	8.1E-09	9.0E-10	mg/m^3	6.0E-06	mg/m^3	0.00015	9.0E-10	mg/m^3	6.0E-06	mg/m^3	0.00015
Copper	13	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	16,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	200	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.6E-08	mg/m^3	5.0E-05	mg/m^3	0.00052	2.6E-08	mg/m^3	5.0E-05	mg/m^3	0.00052
Molybdenum	0.31	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.0E-11	mg/m^3	2.0E-03	mg/m^3	0.000000020	4.0E-11	mg/m^3	2.0E-03	mg/m^3	0.000000020
Selenium	3.0	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.9E-10	mg/m^3	2.0E-02	mg/m^3	0.000000020	3.9E-10	mg/m^3	2.0E-02	mg/m^3	0.000000020
Thallium	0.16	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	3.6	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.7E-10	mg/m^3	4.0E-05	mg/m^3	0.000012	4.7E-10	mg/m^3	4.0E-05	mg/m^3	0.000012
Vanadium	16	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.1E-09	mg/m^3	1.0E-04	mg/m^3	0.000021	2.1E-09	mg/m^3	1.0E-04	mg/m^3	0.000021
Metals Cancer Total							2E-07	**Metals Noncancer Total**				0.001	**Metals Noncancer Total**				0.001
Exposure Route Cancer Total							3E-07	**Exposure Route Noncancer Total**				0.001	**Exposure Route Noncancer Total**				0.001
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Plant Consumption																	
Uranium-238	1.3	pCi/g	9.2E+04	pCi/g	8.7E-11	risk/pCi/g	8.0E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	9.9E+04	pCi/g	9.6E-11	risk/pCi/g	9.5E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	6.5E+04	pCi/g	1.2E-10	risk/pCi/g	7.7E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	1.0E+06	pCi/g	3.7E-09	risk/pCi/g	3.8E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.6E-02	mg/kg-day	1.0E+00	mg/kg-day	0.076	2.0E-01	mg/kg-day	1.0E+00	mg/kg-day	0.20
Arsenic	6.6	mg/kg	9.2E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-04	8.6E-05	mg/kg-day	3.0E-04	mg/kg-day	0.29	2.2E-04	mg/kg-day	3.0E-04	mg/kg-day	0.75
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.7E-03	mg/kg-day	2.0E-01	mg/kg-day	0.018	9.8E-03	mg/kg-day	2.0E-01	mg/kg-day	0.049
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.7E-06	mg/kg-day	1.0E-04	mg/kg-day	0.077	2.1E-05	mg/kg-day	1.0E-04	mg/kg-day	0.21
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-04	mg/kg-day	3.0E-04	mg/kg-day	0.41	3.3E-04	mg/kg-day	3.0E-04	mg/kg-day	1.1
Chromium	10	mg/kg	2.80E-04	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-04	1.2E-04	mg/kg-day	3.0E-03	mg/kg-day	0.040	3.2E-04	mg/kg-day	3.0E-03	mg/kg-day	0.11
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-03	mg/kg-day	4.0E-02	mg/kg-day	0.055	5.9E-03	mg/kg-day	4.0E-02	mg/kg-day	0.15
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-01	mg/kg-day	7.0E-01	mg/kg-day	0.27	*5.0E-01*	mg/kg-day	7.0E-01	mg/kg-day	0.71
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-02	mg/kg-day	2.4E-02	mg/kg-day	0.92	5.8E-02	mg/kg-day	2.4E-02	mg/kg-day	2.4
Molybdenum	0.31	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.4E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0068	9.0E-05	mg/kg-day	5.0E-03	mg/kg-day	0.018
Selenium	3.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.4E-05	mg/kg-day	5.0E-03	mg/kg-day	0.011	1.4E-04	mg/kg-day	5.0E-03	mg/kg-day	0.029
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.6E-06	mg/kg-day	1.0E-05	mg/kg-day	0.16	4.5E-06	mg/kg-day	1.0E-05	mg/kg-day	0.45
Uranium	3.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.7E-05	mg/kg-day	2.0E-04	mg/kg-day	0.23	1.3E-04	mg/kg-day	2.0E-04	mg/kg-day	0.6
Vanadium	16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-04	mg/kg-day	5.0E-03	mg/kg-day	0.038	5.3E-04	mg/kg-day	5.0E-03	mg/kg-day	0.106
Metals Cancer Total							3E-04	**Metals Noncancer Total**				3	**Metals Noncancer Total**				7
Exposure Route Cancer Total							4E-03	**Exposure Route Noncancer Total**				3	**Exposure Route Noncancer Total**				7

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Animal Consumption																	
Uranium-238	1.3	pCi/g	1.1E+05	pCi/g	8.7E-11	risk/pCi/g	9.1E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	1.1E+05	pCi/g	9.6E-11	risk/pCi/g	1.1E-05	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	1.4E+02	pCi/g	1.2E-10	risk/pCi/g	1.7E-08	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	2.0E+06	pCi/g	3.7E-09	risk/pCi/g	7.2E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							7E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.4E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0044	1.2E-02	mg/kg-day	1.0E+00	mg/kg-day	0.012
Arsenic	6.6	mg/kg	7.3E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-05	6.5E-06	mg/kg-day	3.0E-04	mg/kg-day	0.022	1.7E-05	mg/kg-day	3.0E-04	mg/kg-day	0.057
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	0.000104	5.6E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00028
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.0E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0030	7.8E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0078
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.6E-05	mg/kg-day	3.0E-04	mg/kg-day	0.22	1.8E-04	mg/kg-day	3.0E-04	mg/kg-day	0.60
Chromium	10	mg/kg	6.14E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	3.1E-05	2.6E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0088	7.0E-05	mg/kg-day	3.0E-03	mg/kg-day	0.023
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0029	3.1E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0078
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-01	mg/kg-day	7.0E-01	mg/kg-day	0.21	3.8E-01	mg/kg-day	7.0E-01	mg/kg-day	0.55
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.6E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0028	1.8E-04	mg/kg-day	2.4E-02	mg/kg-day	0.0074
Molybdenum	0.31	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00028	3.7E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00074
Selenium	3.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-04	mg/kg-day	5.0E-03	mg/kg-day	0.046	6.3E-04	mg/kg-day	5.0E-03	mg/kg-day	0.13
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.9E-06	mg/kg-day	1.0E-05	mg/kg-day	0.29	7.8E-06	mg/kg-day	1.0E-05	mg/kg-day	0.78
Uranium	3.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.0E-07	mg/kg-day	2.0E-04	mg/kg-day	0.0025	1.4E-06	mg/kg-day	2.0E-04	mg/kg-day	0.0068
Vanadium	16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0035	4.8E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0096
Metals Cancer Total							4E-05	**Metals Noncancer Total**				0.8	**Metals Noncancer Total**				2
Exposure Route Cancer Total							7E-03	**Exposure Route Noncancer Total**				0.8	**Exposure Route Noncancer Total**				2
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Ingestion																	
Uranium-238	1.3	pCi/g	4.3E+04	pCi/g	8.7E-11	risk/pCi/g	3.7E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	4.6E+04	pCi/g	9.6E-11	risk/pCi/g	4.4E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	3.5E+04	pCi/g	1.2E-10	risk/pCi/g	4.2E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	5.6E+05	pCi/g	3.7E-09	risk/pCi/g	2.1E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							2E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.5E-02	mg/kg-day	1.0E+00	mg/kg-day	0.045	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	6.6	mg/kg	4.7E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.0E-05	5.1E-05	mg/kg-day	3.0E-04	mg/kg-day	0.17	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.4E-03	mg/kg-day	2.0E-01	mg/kg-day	0.0120	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.2E-06	mg/kg-day	1.0E-04	mg/kg-day	0.052	--	mg/kg-day	1.0E-04	mg/kg-day	--
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.6E-05	mg/kg-day	3.0E-04	mg/kg-day	0.25	--	mg/kg-day	3.0E-04	mg/kg-day	--
Chromium	10	mg/kg	8.7E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	4.4E-05	7.3E-05	mg/kg-day	3.0E-03	mg/kg-day	0.024	--	mg/kg-day	3.0E-03	mg/kg-day	--
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-03	mg/kg-day	4.0E-02	mg/kg-day	0.036	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-01	mg/kg-day	7.0E-01	mg/kg-day	0.16	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-02	mg/kg-day	2.4E-02	mg/kg-day	0.61	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.31	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0045	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	3.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0066	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.0E-06	mg/kg-day	1.0E-05	mg/kg-day	0.101	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	3.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.0E-05	mg/kg-day	2.0E-04	mg/kg-day	0.15	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-04	mg/kg-day	5.0E-03	mg/kg-day	0.024	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-04	**Metals Noncancer Total**				2	**Metals Noncancer Total**				--
Exposure Route Cancer Total							2E-03	**Exposure Route Noncancer Total**				2	**Exposure Route Noncancer Total**				--

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Dermal																	
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	6.6	mg/kg	4.0E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.9E-06	4.3E-06	mg/kg-day	3.0E-04	mg/kg-day	0.014	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.7E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0057	--	mg/kg-day	1.0E-04	mg/kg-day	--
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Chromium	10	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.31	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	3.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	3.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							6E-06	**Metals Noncancer Total**				0.02	**Metals Noncancer Total**				--
Exposure Route Cancer Total							6E-06	**Exposure Route Noncancer Total**				0.02	**Exposure Route Noncancer Total**				--
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Inhalation																	
Uranium-238	1.3	pCi/g	3.0E+02	pCi	2.4E-08	risk/pCi	7.1E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	3.2E+02	pCi	2.8E-08	risk/pCi	9.0E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	1.6E+02	pCi	3.4E-08	risk/pCi	5.5E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	5.9E+03	pCi	5.9E-08	risk/pCi	3.5E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.5E-04	mg/m^3	5.0E-03	mg/m^3	0.091	--	mg/m^3	5.0E-03	mg/m^3	--
Arsenic	6.6	mg/kg	4.8E-04	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	2.0E-06	5.2E-07	mg/m^3	1.5E-05	mg/m^3	0.035	--	mg/m^3	1.5E-05	mg/m^3	--
Barium	160	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.4E-05	mg/m^3	5.0E-04	mg/m^3	0.048	--	mg/m^3	5.0E-04	mg/m^3	--
Cadmium	0.13	mg/kg	4.8E-05	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	8.7E-08	5.2E-08	mg/m^3	1.0E-05	mg/m^3	0.0052	--	mg/m^3	1.0E-05	mg/m^3	--
Chromium	10	mg/kg	8.9E-04	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	7.5E-05	7.5E-07	mg/m^3	1.0E-04	mg/m^3	0.0075	--	mg/m^3	1.0E-04	mg/m^3	--
Cobalt	6.9	mg/kg	7.6E-04	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	6.8E-06	8.3E-07	mg/m^3	6.0E-06	mg/m^3	0.14	--	mg/m^3	6.0E-06	mg/m^3	--
Copper	13	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	16,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	200	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.5E-04	mg/m^3	5.0E-05	mg/m^3	2.9	--	mg/m^3	5.0E-05	mg/m^3	--
Molybdenum	0.31	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.3E-07	mg/m^3	2.0E-03	mg/m^3	0.00011	--	mg/m^3	2.0E-03	mg/m^3	--
Selenium	3.0	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.3E-07	mg/m^3	2.0E-02	mg/m^3	0.000017	--	mg/m^3	2.0E-02	mg/m^3	--
Thallium	0.16	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	3.6	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.1E-07	mg/m^3	4.0E-05	mg/m^3	0.008	--	mg/m^3	4.0E-05	mg/m^3	--
Vanadium	16	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.2E-06	mg/m^3	1.0E-04	mg/m^3	0.012	--	mg/m^3	1.0E-04	mg/m^3	--
Metals Cancer Total							8E-05	**Metals Noncancer Total**				3	**Metals Noncancer Total**				--
Exposure Route Cancer Total							4E-04	**Exposure Route Noncancer Total**				3	**Exposure Route Noncancer Total**				--
Surface Soil (0-6 inches bgs) Receptor Cancer Risk Total							**2E-02**	**Receptor/Media Noncancer Hazard Total**				**9**	**Receptor/Media Noncancer Hazard Total**				**10**

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Incidental Soil Ingestion																	
Uranium-238	1.3	pCi/g	1.2E+04	pCi/g	1.3E-10	risk/pCi/g	1.7E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	1.3E+04	pCi/g	1.5E-10	risk/pCi/g	2.0E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	3.4E+04	pCi/g	1.7E-10	risk/pCi/g	5.7E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	43	pCi/g	4.1E+05	pCi/g	5.7E-09	risk/pCi/g	2.3E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							2E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.7E-02	mg/kg-day	1.0E+00	mg/kg-day	0.027	1.6E-01	mg/kg-day	1.0E+00	mg/kg-day	0.16
Arsenic	6.3	mg/kg	2.3E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-05	1.6E-05	mg/kg-day	3.0E-04	mg/kg-day	0.055	9.5E-05	mg/kg-day	3.0E-04	mg/kg-day	0.32
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.9E-04	mg/kg-day	2.0E-01	mg/kg-day	0.0034	4.2E-03	mg/kg-day	2.0E-01	mg/kg-day	0.021
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.6E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0056	3.4E-06	mg/kg-day	1.0E-04	mg/kg-day	0.034
Chromium	10	mg/kg	1.60E-04	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	8.0E-05	4.3E-05	mg/kg-day	3.0E-03	mg/kg-day	0.014	2.6E-04	mg/kg-day	3.0E-03	mg/kg-day	0.087
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.0E-05	mg/kg-day	3.0E-04	mg/kg-day	0.099	1.8E-04	mg/kg-day	3.0E-04	mg/kg-day	0.60
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.6E-05	mg/kg-day	4.0E-02	mg/kg-day	0.0014	3.4E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0085
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.9E-02	mg/kg-day	7.0E-01	mg/kg-day	0.098	4.2E-01	mg/kg-day	7.0E-01	mg/kg-day	0.59
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.6E-04	mg/kg-day	2.4E-02	mg/kg-day	0.036	5.2E-03	mg/kg-day	2.4E-02	mg/kg-day	0.22
Molybdenum	0.51	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00044	1.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0027
Selenium	5.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0046	1.4E-04	mg/kg-day	5.0E-03	mg/kg-day	0.028
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.9E-07	mg/kg-day	1.0E-05	mg/kg-day	0.069	4.2E-06	mg/kg-day	1.0E-05	mg/kg-day	0.42
Uranium	42	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-04	mg/kg-day	2.0E-04	mg/kg-day	0.90	1.1E-03	mg/kg-day	2.0E-04	mg/kg-day	5.5
Vanadium	18	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.7E-05	mg/kg-day	5.0E-03	mg/kg-day	0.015	4.7E-04	mg/kg-day	5.0E-03	mg/kg-day	0.094
Metals Cancer Total							1E-04	**Metals Noncancer Total**				1.3	**Metals Noncancer Total**				8
Exposure Route Cancer Total							2E-03	**Exposure Route Noncancer Total**				1.3	**Exposure Route Noncancer Total**				8

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: External Exposure																	
Uranium-238	1.3	pCi/g	6.6E+01	pCi/g	1.2E-10	risk/year pCi/g	8.2E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	7.1E+01	pCi/g	2.5E-10	risk/year pCi/g	1.8E-08	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	1.8E+02	pCi/g	8.5E-10	risk/year pCi/g	1.6E-07	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	43	pCi/g	2.2E+03	pCi/g	8.4E-06	risk/year pCi/g	1.8E-02	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							2E-02	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							2E-02	**Exposure Route Noncancer Total**				--	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure																	
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	6.3	mg/kg	1.3E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-06	9.5E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0032	5.7E-06	mg/kg-day	3.0E-04	mg/kg-day	0.019
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.6E-08	mg/kg-day	1.0E-04	mg/kg-day	0.00026	1.6E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0016
Chromium	10	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.51	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	5.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	42	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	18	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							2E-06	**Metals Noncancer Total**				0.003	**Metals Noncancer Total**				0.02
Exposure Route Cancer Total							2E-06	**Exposure Route Noncancer Total**				0.003	**Exposure Route Noncancer Total**				0.02

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**	**Child Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Child**
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Inhalation of Particulates																	
Uranium-238	1.3	pCi/g	1.1E-01	pCi	2.4E-08	risk/pCi	2.7E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	1.2E-01	pCi	2.8E-08	risk/pCi	3.4E-09	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	3.1E-01	pCi	3.4E-08	risk/pCi	1.1E-08	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	43	pCi/g	3.7E+00	pCi	5.9E-08	risk/pCi	2.2E-07	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							2E-07	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	8.2E-07	mg/m^3	5.0E-03	mg/m^3	0.00016	8.2E-07	mg/m^3	5.0E-03	mg/m^3	0.00016
Arsenic	6.3	mg/kg	8.2E-07	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	3.5E-09	8.2E-10	mg/m^3	1.5E-05	mg/m^3	0.000055	8.2E-10	mg/m^3	1.5E-05	mg/m^3	0.000055
Barium	160	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.1E-08	mg/m^3	5.0E-04	mg/m^3	0.00004	2.1E-08	mg/m^3	5.0E-04	mg/m^3	0.000042
Cadmium	0.13	mg/kg	1.7E-08	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	3.0E-11	1.7E-11	mg/m^3	1.0E-05	mg/m^3	0.0000017	1.7E-11	mg/m^3	1.0E-05	mg/m^3	0.0000017
Chromium	10	mg/kg	2.1E-06	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	1.8E-07	1.3E-09	mg/m^3	1.0E-04	mg/m^3	0.000013	1.3E-09	mg/m^3	1.0E-04	mg/m^3	0.000013
Cobalt	6.9	mg/kg	9.0E-07	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	8.1E-09	9.0E-10	mg/m^3	6.0E-06	mg/m^3	0.00015	9.0E-10	mg/m^3	6.0E-06	mg/m^3	0.00015
Copper	13	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	16,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	200	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.6E-08	mg/m^3	5.0E-05	mg/m^3	0.00052	2.6E-08	mg/m^3	5.0E-05	mg/m^3	0.00052
Molybdenum	0.51	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	6.6E-11	mg/m^3	2.0E-03	mg/m^3	0.000000033	6.6E-11	mg/m^3	2.0E-03	mg/m^3	0.000000033
Selenium	5.4	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	7.0E-10	mg/m^3	2.0E-02	mg/m^3	0.000000035	7.0E-10	mg/m^3	2.0E-02	mg/m^3	0.000000035
Thallium	0.16	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	42	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	5.5E-09	mg/m^3	4.0E-05	mg/m^3	0.000137	5.5E-09	mg/m^3	4.0E-05	mg/m^3	0.00014
Vanadium	18	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.3E-09	mg/m^3	1.0E-04	mg/m^3	0.000023	2.3E-09	mg/m^3	1.0E-04	mg/m^3	0.000023
Metals Cancer Total							2E-07	**Metals Noncancer Total**				0.0011	**Metals Noncancer Total**				0.001
Exposure Route Cancer Total							4E-07	**Exposure Route Noncancer Total**				0.0011	**Exposure Route Noncancer Total**				0.001
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Plant Consumption																	
Uranium-238	1.3	pCi/g	9.2E+04	pCi/g	8.7E-11	risk/pCi/g	8.0E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	9.9E+04	pCi/g	9.6E-11	risk/pCi/g	9.5E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	6.5E+04	pCi/g	1.2E-10	risk/pCi/g	7.7E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	43	pCi/g	4.7E+06	pCi/g	3.7E-09	risk/pCi/g	1.7E-02	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							2E-02	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.6E-02	mg/kg-day	1.0E+00	mg/kg-day	0.076	2.0E-01	mg/kg-day	1.0E+00	mg/kg-day	0.20
Arsenic	6.3	mg/kg	8.8E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-04	8.2E-05	mg/kg-day	3.0E-04	mg/kg-day	0.27	2.1E-04	mg/kg-day	3.0E-04	mg/kg-day	0.71
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.7E-03	mg/kg-day	2.0E-01	mg/kg-day	0.018	9.8E-03	mg/kg-day	2.0E-01	mg/kg-day	0.049
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.7E-06	mg/kg-day	1.0E-04	mg/kg-day	0.077	2.1E-05	mg/kg-day	1.0E-04	mg/kg-day	0.21
Chromium	10	mg/kg	2.8E-04	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-04	1.2E-04	mg/kg-day	3.0E-03	mg/kg-day	0.040	3.2E-04	mg/kg-day	3.0E-03	mg/kg-day	0.11
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-04	mg/kg-day	3.0E-04	mg/kg-day	0.41	3.3E-04	mg/kg-day	3.0E-04	mg/kg-day	1.1
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-03	mg/kg-day	4.0E-02	mg/kg-day	0.055	5.9E-03	mg/kg-day	4.0E-02	mg/kg-day	0.15
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-01	mg/kg-day	7.0E-01	mg/kg-day	0.27	*5.0E-01*	mg/kg-day	7.0E-01	mg/kg-day	0.71
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-02	mg/kg-day	2.4E-02	mg/kg-day	0.92	5.8E-02	mg/kg-day	2.4E-02	mg/kg-day	2.4
Molybdenum	0.51	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.6E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0112	1.5E-04	mg/kg-day	5.0E-03	mg/kg-day	0.030
Selenium	5.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.7E-05	mg/kg-day	5.0E-03	mg/kg-day	0.019	2.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.052
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.6E-06	mg/kg-day	1.0E-05	mg/kg-day	0.16	4.5E-06	mg/kg-day	1.0E-05	mg/kg-day	0.45
Uranium	42	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.5E-04	mg/kg-day	2.0E-04	mg/kg-day	2.73	1.5E-03	mg/kg-day	2.0E-04	mg/kg-day	7.6
Vanadium	18	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-04	mg/kg-day	5.0E-03	mg/kg-day	0.043	5.9E-04	mg/kg-day	5.0E-03	mg/kg-day	0.12
Metals Cancer Total							3E-04	**Metals Noncancer Total**				5	**Metals Noncancer Total**				14
Exposure Route Cancer Total							2E-02	**Exposure Route Noncancer Total**				5	**Exposure Route Noncancer Total**				14

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Animal Consumption																	
Uranium-238	1.3	pCi/g	1.1E+05	pCi/g	8.7E-11	risk/pCi/g	9.1E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	1.1E+05	pCi/g	9.6E-11	risk/pCi/g	1.1E-05	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	1.4E+02	pCi/g	1.2E-10	risk/pCi/g	1.7E-08	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	43	pCi/g	9.0E+06	pCi/g	3.7E-09	risk/pCi/g	3.3E-02	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-02	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.4E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0044	1.2E-02	mg/kg-day	1.0E+00	mg/kg-day	0.012
Arsenic	6.3	mg/kg	6.9E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-05	6.2E-06	mg/kg-day	3.0E-04	mg/kg-day	0.021	1.6E-05	mg/kg-day	3.0E-04	mg/kg-day	0.055
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00010	5.6E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00028
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.0E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0030	7.8E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0078
Chromium	10	mg/kg	6.1E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	3.1E-05	2.6E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0088	7.0E-05	mg/kg-day	3.0E-03	mg/kg-day	0.023
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.6E-05	mg/kg-day	3.0E-04	mg/kg-day	0.22	1.8E-04	mg/kg-day	3.0E-04	mg/kg-day	0.60
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0029	3.1E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0078
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-01	mg/kg-day	7.0E-01	mg/kg-day	0.21	3.8E-01	mg/kg-day	7.0E-01	mg/kg-day	0.55
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.6E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0028	1.8E-04	mg/kg-day	2.4E-02	mg/kg-day	0.0074
Molybdenum	0.51	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00046	6.1E-06	mg/kg-day	5.0E-03	mg/kg-day	0.0012
Selenium	5.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.2E-04	mg/kg-day	5.0E-03	mg/kg-day	0.083	1.1E-03	mg/kg-day	5.0E-03	mg/kg-day	0.23
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.9E-06	mg/kg-day	1.0E-05	mg/kg-day	0.29	7.8E-06	mg/kg-day	1.0E-05	mg/kg-day	0.78
Uranium	42	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.9E-06	mg/kg-day	2.0E-04	mg/kg-day	0.0294	1.6E-05	mg/kg-day	2.0E-04	mg/kg-day	0.080
Vanadium	18	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.0E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0040	5.4E-05	mg/kg-day	5.0E-03	mg/kg-day	0.011
Metals Cancer Total							4E-05	**Metals Noncancer Total**				0.9	**Metals Noncancer Total**				2
Exposure Route Cancer Total							3E-02	**Exposure Route Noncancer Total**				0.9	**Exposure Route Noncancer Total**				2
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Ingestion																	
Uranium-238	1.3	pCi/g	4.3E+04	pCi/g	8.7E-11	risk/pCi/g	3.7E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	4.6E+04	pCi/g	9.6E-11	risk/pCi/g	4.4E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	3.5E+04	pCi/g	1.2E-10	risk/pCi/g	4.2E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	43	pCi/g	2.6E+06	pCi/g	3.7E-09	risk/pCi/g	9.5E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							1E-02	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.5E-02	mg/kg-day	1.0E+00	mg/kg-day	0.045	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	6.3	mg/kg	4.5E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.7E-05	4.9E-05	mg/kg-day	3.0E-04	mg/kg-day	0.16	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.4E-03	mg/kg-day	2.0E-01	mg/kg-day	0.0120	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.2E-06	mg/kg-day	1.0E-04	mg/kg-day	0.052	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	10	mg/kg	8.7E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	4.4E-05	7.3E-05	mg/kg-day	3.0E-03	mg/kg-day	0.024	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.6E-05	mg/kg-day	3.0E-04	mg/kg-day	0.25	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-03	mg/kg-day	4.0E-02	mg/kg-day	0.036	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-01	mg/kg-day	7.0E-01	mg/kg-day	0.16	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-02	mg/kg-day	2.4E-02	mg/kg-day	0.61	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.51	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.7E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0074	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	5.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.9E-05	mg/kg-day	5.0E-03	mg/kg-day	0.012	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.0E-06	mg/kg-day	1.0E-05	mg/kg-day	0.10	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	42	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.5E-04	mg/kg-day	2.0E-04	mg/kg-day	1.7	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	18	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-04	mg/kg-day	5.0E-03	mg/kg-day	0.027	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-04	**Metals Noncancer Total**				3	**Metals Noncancer Total**				--
Exposure Route Cancer Total							1E-02	**Exposure Route Noncancer Total**				3	**Exposure Route Noncancer Total**				--

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Church Rock Mine No. 1 East - Kee'da'whíí téèh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Dermal																	
Aluminum	6,300	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	6.3	mg/kg	3.8E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-06	4.1E-06	mg/kg-day	3.0E-04	mg/kg-day	0.014	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	160	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.7E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0057	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	10	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	6.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	13	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	16,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.51	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	5.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	42	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	18	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							6E-06	**Metals Noncancer Total**				0.02	**Metals Noncancer Total**				--
Exposure Route Cancer Total							6E-06	**Exposure Route Noncancer Total**				0.02	**Exposure Route Noncancer Total**				--
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Inhalation																	
Uranium-238	1.3	pCi/g	3.0E+02	pCi	2.4E-08	risk/pCi	7.1E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	1.4	pCi/g	3.2E+02	pCi	2.8E-08	risk/pCi	9.0E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	3.6	pCi/g	1.6E+02	pCi	3.4E-08	risk/pCi	5.5E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	43	pCi/g	2.7E+04	pCi	5.9E-08	risk/pCi	1.6E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							2E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,300	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.5E-04	mg/m^3	5.0E-03	mg/m^3	0.091	--	mg/m^3	5.0E-03	mg/m^3	--
Arsenic	6.3	mg/kg	4.5E-04	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	2.0E-06	5.0E-07	mg/m^3	1.5E-05	mg/m^3	0.033	--	mg/m^3	1.5E-05	mg/m^3	--
Barium	160	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.4E-05	mg/m^3	5.0E-04	mg/m^3	0.048	--	mg/m^3	5.0E-04	mg/m^3	--
Cadmium	0.13	mg/kg	4.8E-05	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	8.7E-08	5.2E-08	mg/m^3	1.0E-05	mg/m^3	0.0052	--	mg/m^3	1.0E-05	mg/m^3	--
Chromium	10	mg/kg	8.9E-04	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	7.5E-05	7.5E-07	mg/m^3	1.0E-04	mg/m^3	0.0075	--	mg/m^3	1.0E-04	mg/m^3	--
Cobalt	6.9	mg/kg	7.6E-04	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	6.8E-06	8.3E-07	mg/m^3	6.0E-06	mg/m^3	0.14	--	mg/m^3	6.0E-06	mg/m^3	--
Copper	13	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	16,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	200	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.5E-04	mg/m^3	5.0E-05	mg/m^3	2.9	--	mg/m^3	5.0E-05	mg/m^3	--
Molybdenum	0.51	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.7E-07	mg/m^3	2.0E-03	mg/m^3	0.00019	--	mg/m^3	2.0E-03	mg/m^3	--
Selenium	5.4	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	5.9E-07	mg/m^3	2.0E-02	mg/m^3	0.000030	--	mg/m^3	2.0E-02	mg/m^3	--
Thallium	0.16	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	42	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.6E-06	mg/m^3	4.0E-05	mg/m^3	0.089	--	mg/m^3	4.0E-05	mg/m^3	--
Vanadium	18	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.4E-06	mg/m^3	1.0E-04	mg/m^3	0.014	--	mg/m^3	1.0E-04	mg/m^3	--
Metals Cancer Total							8E-05	**Metals Noncancer Total**				3	**Metals Noncancer Total**				--
Exposure Route Cancer Total							2E-03	**Exposure Route Noncancer Total**				3	**Exposure Route Noncancer Total**				--
Subsurface Soil (0-72 inches bgs) Receptor Cancer Risk Total							**8E-02**	**Receptor/Media Noncancer Hazard Total**				**10**	**Receptor/Media Noncancer Hazard Total**				**20**

Table C-5.2. Human Health Risk and Hazard Calculations - Quivira Church Rock Mine No. 1 East

Notes:

[a] COPCs are the constituents of interest with a maximum detected concentration exceeding the COPC screening level (see Table C-1).

[b] EPCs are provided on Table C-4.

[c] The intakes are the EPC multiplied by the exposure parameters and any applicable contaminant-specific inputs (see Table C-3 for exposure inputs, Table 4 of the NAUM risk assessment methodology [USEPA 2024b] report for contaminant-specific inputs, and Appendix B of the NAUM risk assessment methodology [USEPA 2024b] report for equations).

[d] The toxicity values are provided in Table 4 of the NAUM risk assessment methodology (USEPA 2024b).

[e] The cancer risk for each contaminant for each exposure pathway is calculated by multiplying the cancer intake value with the toxicity value as follows: For contaminant *i* : $Risk_i = Cancer\ Intake_i \times Toxicity\ Factor_i$

[f] The noncancer hazard for each contaminant for each exposure pathway is calculated by dividing the noncancer intake value by the toxicity value as follows: For contaminant *i* : $Hazard_i = Noncancer\ Intake_i / Toxicity\ Factor_i$

--	Not applicable	NAUM	Navajo abandoned uranium mine
µg/m^3	Microgram per cubic meter	pCi	Picocurie
bgs	Below ground surface	pCi/g	Picocurie per gram
COPC	Contaminant of potential concern	RfC	Reference concentration
EPC	Exposure point concentration	RfD	Reference dose
mg/kg	Milligram per kilogram	SE	Secular equilibrium
mg/kg-day	Milligram per kilogram per day	USEPA	U.S. Environmental Protection Agency
mg/m^3	Milligram per cubic meter		

Reference:

U.S. Environmental Protection Agency (USEPA). 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Incidental Soil Ingestion																	
Uranium-238	1.1	pCi/g	1.0E+04	pCi/g	1.3E-10	risk/pCi/g	1.4E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	9.2E+03	pCi/g	1.5E-10	risk/pCi/g	1.4E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	1.9E+04	pCi/g	1.7E-10	risk/pCi/g	3.2E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	8.8E+04	pCi/g	5.7E-09	risk/pCi/g	5.0E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							5E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.0E-02	mg/kg-day	1.0E+00	mg/kg-day	0.030	1.8E-01	mg/kg-day	1.0E+00	mg/kg-day	0.18
Arsenic	5.9	mg/kg	2.1E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-05	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	0.051	8.9E-05	mg/kg-day	3.0E-04	mg/kg-day	0.30
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.5E-04	mg/kg-day	2.0E-01	mg/kg-day	0.0018	2.1E-03	mg/kg-day	2.0E-01	mg/kg-day	0.011
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.9E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0069	4.2E-06	mg/kg-day	1.0E-04	mg/kg-day	0.042
Chromium	8.2	mg/kg	1.31E-04	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	6.6E-05	3.5E-05	mg/kg-day	3.0E-03	mg/kg-day	0.012	2.1E-04	mg/kg-day	3.0E-03	mg/kg-day	0.071
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-05	mg/kg-day	3.0E-04	mg/kg-day	0.075	1.4E-04	mg/kg-day	3.0E-04	mg/kg-day	0.45
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.7E-05	mg/kg-day	4.0E-02	mg/kg-day	0.0012	2.9E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0072
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.5E-02	mg/kg-day	7.0E-01	mg/kg-day	0.092	3.9E-01	mg/kg-day	7.0E-01	mg/kg-day	0.56
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.9E-04	mg/kg-day	2.4E-02	mg/kg-day	0.041	6.0E-03	mg/kg-day	2.4E-02	mg/kg-day	0.25
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.4E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00047	1.4E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0029
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0025	7.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.015
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.5E-07	mg/kg-day	1.0E-05	mg/kg-day	0.065	3.9E-06	mg/kg-day	1.0E-05	mg/kg-day	0.39
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.7E-05	mg/kg-day	2.0E-04	mg/kg-day	0.13	1.6E-04	mg/kg-day	2.0E-04	mg/kg-day	0.81
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.015	4.4E-04	mg/kg-day	5.0E-03	mg/kg-day	0.088
Metals Cancer Total							1E-04	**Metals Noncancer Total**				0.5	**Metals Noncancer Total**				3
Exposure Route Cancer Total							6E-04	**Exposure Route Noncancer Total**				0.5	**Exposure Route Noncancer Total**				3

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**	**Child Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Child**
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: External Exposure																	
Uranium-238	1.1	pCi/g	5.6E+01	pCi/g	1.2E-10	risk/year pCi/g	7.0E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	4.9E+01	pCi/g	2.5E-10	risk/year pCi/g	1.3E-08	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	1.0E+02	pCi/g	8.5E-10	risk/year pCi/g	8.6E-08	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	4.7E+02	pCi/g	8.4E-06	risk/year pCi/g	4.0E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							4E-03	**Exposure Route Noncancer Total**				--	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure																	
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	5.9	mg/kg	1.2E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-06	8.9E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0030	5.4E-06	mg/kg-day	3.0E-04	mg/kg-day	0.018
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.2E-08	mg/kg-day	1.0E-04	mg/kg-day	0.00032	1.9E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0019
Chromium	8.2	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							2E-06	**Metals Noncancer Total**				0.003	**Metals Noncancer Total**				0.02
Exposure Route Cancer Total							2E-06	**Exposure Route Noncancer Total**				0.003	**Exposure Route Noncancer Total**				0.02

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí téél (Full-Time Resident)																	
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**	**Child Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Child**
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Inhalation of Particulates																	
Uranium-238	1.1	pCi/g	9.6E-02	pCi	2.4E-08	risk/pCi	2.3E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	8.4E-02	pCi	2.8E-08	risk/pCi	2.3E-09	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	1.7E-01	pCi	3.4E-08	risk/pCi	5.9E-09	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	8.1E-01	pCi	5.9E-08	risk/pCi	4.8E-08	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							6E-08	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	9.0E-07	mg/m^3	5.0E-03	mg/m^3	0.00018	9.0E-07	mg/m^3	5.0E-03	mg/m^3	0.00018
Arsenic	5.9	mg/kg	7.7E-07	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	3.3E-09	7.7E-10	mg/m^3	1.5E-05	mg/m^3	0.000051	7.7E-10	mg/m^3	1.5E-05	mg/m^3	0.000051
Barium	82	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.1E-08	mg/m^3	5.0E-04	mg/m^3	0.000021	1.1E-08	mg/m^3	5.0E-04	mg/m^3	0.000021
Cadmium	0.16	mg/kg	2.1E-08	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	3.7E-11	2.1E-11	mg/m^3	1.0E-05	mg/m^3	0.0000021	2.1E-11	mg/m^3	1.0E-05	mg/m^3	0.0000021
Chromium	8.2	mg/kg	1.8E-06	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	1.5E-07	1.1E-09	mg/m^3	1.0E-04	mg/m^3	0.000011	1.1E-09	mg/m^3	1.0E-04	mg/m^3	0.000011
Cobalt	5.2	mg/kg	6.8E-07	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	6.1E-09	6.8E-10	mg/m^3	6.0E-06	mg/m^3	0.00011	6.8E-10	mg/m^3	6.0E-06	mg/m^3	0.00011
Copper	11	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	15,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	230	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.0E-08	mg/m^3	5.0E-05	mg/m^3	0.00060	3.0E-08	mg/m^3	5.0E-05	mg/m^3	0.00060
Molybdenum	0.6	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	7.2E-11	mg/m^3	2.0E-03	mg/m^3	0.000000036	7.2E-11	mg/m^3	2.0E-03	mg/m^3	0.000000036
Selenium	2.9	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.8E-10	mg/m^3	2.0E-02	mg/m^3	0.000000019	3.8E-10	mg/m^3	2.0E-02	mg/m^3	0.000000019
Thallium	0.15	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	6.2	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	8.1E-10	mg/m^3	4.0E-05	mg/m^3	0.000020	8.1E-10	mg/m^3	4.0E-05	mg/m^3	0.000020
Vanadium	17	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.2E-09	mg/m^3	1.0E-04	mg/m^3	0.000022	2.2E-09	mg/m^3	1.0E-04	mg/m^3	0.000022
Metals Cancer Total							2E-07	**Metals Noncancer Total**				0.0010	**Metals Noncancer Total**				0.0010
Exposure Route Cancer Total							2E-07	**Exposure Route Noncancer Total**				0.0010	**Exposure Route Noncancer Total**				0.0010
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Plant Consumption																	
Uranium-238	1.1	pCi/g	7.8E+04	pCi/g	8.7E-11	risk/pCi/g	6.8E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	6.9E+04	pCi/g	9.6E-11	risk/pCi/g	6.6E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	3.6E+04	pCi/g	1.2E-10	risk/pCi/g	4.3E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	1.0E+06	pCi/g	3.7E-09	risk/pCi/g	3.8E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.3E-02	mg/kg-day	1.0E+00	mg/kg-day	0.083	2.1E-01	mg/kg-day	1.0E+00	mg/kg-day	0.21
Arsenic	5.9	mg/kg	8.3E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-04	7.7E-05	mg/kg-day	3.0E-04	mg/kg-day	0.26	2.0E-04	mg/kg-day	3.0E-04	mg/kg-day	0.67
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-03	mg/kg-day	2.0E-01	mg/kg-day	0.009	5.0E-03	mg/kg-day	2.0E-01	mg/kg-day	0.025
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.4E-06	mg/kg-day	1.0E-04	mg/kg-day	0.094	2.6E-05	mg/kg-day	1.0E-04	mg/kg-day	0.26
Chromium	8.2	mg/kg	2.29E-04	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-04	9.9E-05	mg/kg-day	3.0E-03	mg/kg-day	0.033	2.6E-04	mg/kg-day	3.0E-03	mg/kg-day	0.088
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.4E-05	mg/kg-day	3.0E-04	mg/kg-day	0.31	2.5E-04	mg/kg-day	3.0E-04	mg/kg-day	0.83
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-03	mg/kg-day	4.0E-02	mg/kg-day	0.047	5.0E-03	mg/kg-day	4.0E-02	mg/kg-day	0.12
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-01	mg/kg-day	7.0E-01	mg/kg-day	0.26	*4.7E-01*	mg/kg-day	7.0E-01	mg/kg-day	0.66
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.5E-02	mg/kg-day	2.4E-02	mg/kg-day	1.1	6.7E-02	mg/kg-day	2.4E-02	mg/kg-day	2.8
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0121	1.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.032
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.2E-05	mg/kg-day	5.0E-03	mg/kg-day	0.010	1.4E-04	mg/kg-day	5.0E-03	mg/kg-day	0.028
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-06	mg/kg-day	1.0E-05	mg/kg-day	0.15	4.2E-06	mg/kg-day	1.0E-05	mg/kg-day	0.42
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.1E-05	mg/kg-day	2.0E-04	mg/kg-day	0.40	2.2E-04	mg/kg-day	2.0E-04	mg/kg-day	1.1
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.0E-04	mg/kg-day	5.0E-03	mg/kg-day	0.041	5.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.112
Metals Cancer Total							2E-04	**Metals Noncancer Total**				3	**Metals Noncancer Total**				7
Exposure Route Cancer Total							4E-03	**Exposure Route Noncancer Total**				3	**Exposure Route Noncancer Total**				7

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Animal Consumption																	
Uranium-238	1.1	pCi/g	8.9E+04	pCi/g	8.7E-11	risk/pCi/g	7.7E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	7.9E+04	pCi/g	9.6E-11	risk/pCi/g	7.5E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	7.8E+01	pCi/g	1.2E-10	risk/pCi/g	9.3E-09	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	2.0E+06	pCi/g	3.7E-09	risk/pCi/g	7.2E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							7E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.8E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0048	1.3E-02	mg/kg-day	1.0E+00	mg/kg-day	0.0131
Arsenic	5.9	mg/kg	6.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.7E-06	5.8E-06	mg/kg-day	3.0E-04	mg/kg-day	0.019	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	0.051
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-05	mg/kg-day	2.0E-01	mg/kg-day	0.000053	2.9E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00014
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.7E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0037	9.6E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0096
Chromium	8.2	mg/kg	5.03E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.5E-05	2.2E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0072	5.8E-05	mg/kg-day	3.0E-03	mg/kg-day	0.019
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.0E-05	mg/kg-day	3.0E-04	mg/kg-day	0.17	1.4E-04	mg/kg-day	3.0E-04	mg/kg-day	0.45
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.9E-05	mg/kg-day	4.0E-02	mg/kg-day	0.0025	2.6E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0066
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-01	mg/kg-day	7.0E-01	mg/kg-day	0.20	3.6E-01	mg/kg-day	7.0E-01	mg/kg-day	0.51
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.6E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0032	2.0E-04	mg/kg-day	2.4E-02	mg/kg-day	0.0085
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.5E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00050	6.6E-06	mg/kg-day	5.0E-03	mg/kg-day	0.0013
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-04	mg/kg-day	5.0E-03	mg/kg-day	0.045	6.1E-04	mg/kg-day	5.0E-03	mg/kg-day	0.12
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.7E-06	mg/kg-day	1.0E-05	mg/kg-day	0.27	7.4E-06	mg/kg-day	1.0E-05	mg/kg-day	0.74
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.7E-07	mg/kg-day	2.0E-04	mg/kg-day	0.0043	2.4E-06	mg/kg-day	2.0E-04	mg/kg-day	0.012
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0037	5.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.010
Metals Cancer Total							3E-05	**Metals Noncancer Total**				0.7	**Metals Noncancer Total**				2
Exposure Route Cancer Total							7E-03	**Exposure Route Noncancer Total**				0.7	**Exposure Route Noncancer Total**				2
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Ingestion																	
Uranium-238	1.1	pCi/g	3.6E+04	pCi/g	8.7E-11	risk/pCi/g	3.1E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	3.2E+04	pCi/g	9.6E-11	risk/pCi/g	3.1E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	2.0E+04	pCi/g	1.2E-10	risk/pCi/g	2.3E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	5.6E+05	pCi/g	3.7E-09	risk/pCi/g	2.1E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							2E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.9E-02	mg/kg-day	1.0E+00	mg/kg-day	0.049	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	5.9	mg/kg	4.2E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-05	4.5E-05	mg/kg-day	3.0E-04	mg/kg-day	0.15	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-03	mg/kg-day	2.0E-01	mg/kg-day	0.0062	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.4E-06	mg/kg-day	1.0E-04	mg/kg-day	0.064	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	8.2	mg/kg	7.2E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	3.6E-05	6.0E-05	mg/kg-day	3.0E-03	mg/kg-day	0.020	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.7E-05	mg/kg-day	3.0E-04	mg/kg-day	0.19	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-03	mg/kg-day	4.0E-02	mg/kg-day	0.030	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-01	mg/kg-day	7.0E-01	mg/kg-day	0.15	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-02	mg/kg-day	2.4E-02	mg/kg-day	0.70	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.0E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0080	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.2E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0064	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.5E-07	mg/kg-day	1.0E-05	mg/kg-day	0.095	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.1E-05	mg/kg-day	2.0E-04	mg/kg-day	0.26	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.3E-04	mg/kg-day	5.0E-03	mg/kg-day	0.026	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-04	**Metals Noncancer Total**				2	**Metals Noncancer Total**				--
Exposure Route Cancer Total							2E-03	**Exposure Route Noncancer Total**				2	**Exposure Route Noncancer Total**				--

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí téél (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Dermal																	
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	5.9	mg/kg	3.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.3E-06	3.8E-06	mg/kg-day	3.0E-04	mg/kg-day	0.013	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.0E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0070	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	8.2	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							5E-06	**Metals Noncancer Total**				0.02	**Metals Noncancer Total**				--
Exposure Route Cancer Total							5E-06	**Exposure Route Noncancer Total**				0.02	**Exposure Route Noncancer Total**				--
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Inhalation																	
Uranium-238	1.1	pCi/g	2.5E+02	pCi	2.4E-08	risk/pCi	6.0E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	2.2E+02	pCi	2.8E-08	risk/pCi	6.2E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	9.0E+01	pCi	3.4E-08	risk/pCi	3.1E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	5.9E+03	pCi	5.9E-08	risk/pCi	3.5E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	5.0E-04	mg/m^3	5.0E-03	mg/m^3	0.099	--	mg/m^3	5.0E-03	mg/m^3	--
Arsenic	5.9	mg/kg	4.2E-04	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	1.8E-06	4.7E-07	mg/m^3	1.5E-05	mg/m^3	0.031	--	mg/m^3	1.5E-05	mg/m^3	--
Barium	82	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.2E-05	mg/m^3	5.0E-04	mg/m^3	0.025	--	mg/m^3	5.0E-04	mg/m^3	--
Cadmium	0.16	mg/kg	5.9E-05	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	1.1E-07	6.4E-08	mg/m^3	1.0E-05	mg/m^3	0.0064	--	mg/m^3	1.0E-05	mg/m^3	--
Chromium	8.2	mg/kg	7.3E-04	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	6.1E-05	6.1E-07	mg/m^3	1.0E-04	mg/m^3	0.0061	--	mg/m^3	1.0E-04	mg/m^3	--
Cobalt	5.2	mg/kg	5.7E-04	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	5.1E-06	6.2E-07	mg/m^3	6.0E-06	mg/m^3	0.10	--	mg/m^3	6.0E-06	mg/m^3	--
Copper	11	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	15,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	230	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.7E-04	mg/m^3	5.0E-05	mg/m^3	3.4	--	mg/m^3	5.0E-05	mg/m^3	--
Molybdenum	0.6	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.0E-07	mg/m^3	2.0E-03	mg/m^3	0.00020	--	mg/m^3	2.0E-03	mg/m^3	--
Selenium	2.9	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.2E-07	mg/m^3	2.0E-02	mg/m^3	0.000016	--	mg/m^3	2.0E-02	mg/m^3	--
Thallium	0.15	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	6.2	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	5.3E-07	mg/m^3	4.0E-05	mg/m^3	0.013	--	mg/m^3	4.0E-05	mg/m^3	--
Vanadium	17	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.3E-06	mg/m^3	1.0E-04	mg/m^3	0.013	--	mg/m^3	1.0E-04	mg/m^3	--
Metals Cancer Total							7E-05	**Metals Noncancer Total**				4	**Metals Noncancer Total**				--
Exposure Route Cancer Total							4E-04	**Exposure Route Noncancer Total**				4	**Exposure Route Noncancer Total**				--
Surface Soil (0-6 inches bgs) Receptor Cancer Risk Total							**2E-02**	**Receptor/Media Noncancer Hazard Total**				**9**	**Receptor/Media Noncancer Hazard Total**				**10**

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Incidental Soil Ingestion																	
Uranium-238	1.1	pCi/g	1.0E+04	pCi/g	1.3E-10	risk/pCi/g	1.4E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	9.2E+03	pCi/g	1.5E-10	risk/pCi/g	1.4E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	1.9E+04	pCi/g	1.7E-10	risk/pCi/g	3.2E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	8.8E+04	pCi/g	5.7E-09	risk/pCi/g	5.0E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							5E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.0E-02	mg/kg-day	1.0E+00	mg/kg-day	0.030	1.8E-01	mg/kg-day	1.0E+00	mg/kg-day	0.18
Arsenic	5.9	mg/kg	2.1E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-05	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	0.051	8.9E-05	mg/kg-day	3.0E-04	mg/kg-day	0.30
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.5E-04	mg/kg-day	2.0E-01	mg/kg-day	0.0018	2.1E-03	mg/kg-day	2.0E-01	mg/kg-day	0.011
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.9E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0069	4.2E-06	mg/kg-day	1.0E-04	mg/kg-day	0.042
Chromium	8.2	mg/kg	1.31E-04	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	6.6E-05	3.5E-05	mg/kg-day	3.0E-03	mg/kg-day	0.012	2.1E-04	mg/kg-day	3.0E-03	mg/kg-day	0.071
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-05	mg/kg-day	3.0E-04	mg/kg-day	0.075	1.4E-04	mg/kg-day	3.0E-04	mg/kg-day	0.45
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.7E-05	mg/kg-day	4.0E-02	mg/kg-day	0.0012	2.9E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0072
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.5E-02	mg/kg-day	7.0E-01	mg/kg-day	0.092	3.9E-01	mg/kg-day	7.0E-01	mg/kg-day	0.56
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.9E-04	mg/kg-day	2.4E-02	mg/kg-day	0.041	6.0E-03	mg/kg-day	2.4E-02	mg/kg-day	0.25
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.4E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00047	1.4E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0029
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0025	7.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.015
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.5E-07	mg/kg-day	1.0E-05	mg/kg-day	0.065	3.9E-06	mg/kg-day	1.0E-05	mg/kg-day	0.39
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.7E-05	mg/kg-day	2.0E-04	mg/kg-day	0.13	1.6E-04	mg/kg-day	2.0E-04	mg/kg-day	0.81
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.3E-05	mg/kg-day	5.0E-03	mg/kg-day	0.015	4.4E-04	mg/kg-day	5.0E-03	mg/kg-day	0.088
Metals Cancer Total							1E-04	**Metals Noncancer Total**				0.5	**Metals Noncancer Total**				3
Exposure Route Cancer Total							6E-04	**Exposure Route Noncancer Total**				0.5	**Exposure Route Noncancer Total**				3

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**	**Child Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Child**
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: External Exposure																	
Uranium-238	1.1	pCi/g	5.6E+01	pCi/g	1.2E-10	risk/year pCi/g	7.0E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	4.9E+01	pCi/g	2.5E-10	risk/year pCi/g	1.3E-08	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	1.0E+02	pCi/g	8.5E-10	risk/year pCi/g	8.6E-08	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	4.7E+02	pCi/g	8.4E-06	risk/year pCi/g	4.0E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							4E-03	**Exposure Route Noncancer Total**				--	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure																	
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	5.9	mg/kg	1.2E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-06	8.9E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0030	5.4E-06	mg/kg-day	3.0E-04	mg/kg-day	0.018
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.2E-08	mg/kg-day	1.0E-04	mg/kg-day	0.00032	1.9E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0019
Chromium	8.2	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							2E-06	**Metals Noncancer Total**				0.003	**Metals Noncancer Total**				0.02
Exposure Route Cancer Total							2E-06	**Exposure Route Noncancer Total**				0.003	**Exposure Route Noncancer Total**				0.02

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**	**Child Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Child**
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Inhalation of Particulates																	
Uranium-238	1.1	pCi/g	9.6E-02	pCi	2.4E-08	risk/pCi	2.3E-09	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	8.4E-02	pCi	2.8E-08	risk/pCi	2.3E-09	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	1.7E-01	pCi	3.4E-08	risk/pCi	5.9E-09	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	8.1E-01	pCi	5.9E-08	risk/pCi	4.8E-08	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							6E-08	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	9.0E-07	mg/m^3	5.0E-03	mg/m^3	0.00018	9.0E-07	mg/m^3	5.0E-03	mg/m^3	0.00018
Arsenic	5.9	mg/kg	7.7E-07	µg/m^3	4.3E-03	(µg/m^3)$^{-1}$	3.3E-09	7.7E-10	mg/m^3	1.5E-05	mg/m^3	0.000051	7.7E-10	mg/m^3	1.5E-05	mg/m^3	0.000051
Barium	82	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	1.1E-08	mg/m^3	5.0E-04	mg/m^3	0.000021	1.1E-08	mg/m^3	5.0E-04	mg/m^3	0.000021
Cadmium	0.16	mg/kg	2.1E-08	µg/m^3	1.8E-03	(µg/m^3)$^{-1}$	3.7E-11	2.1E-11	mg/m^3	1.0E-05	mg/m^3	0.0000021	2.1E-11	mg/m^3	1.0E-05	mg/m^3	0.0000021
Chromium	8.2	mg/kg	1.8E-06	µg/m^3	8.4E-02	(µg/m^3)$^{-1}$	1.5E-07	1.1E-09	mg/m^3	1.0E-04	mg/m^3	0.0000107	1.1E-09	mg/m^3	1.0E-04	mg/m^3	0.0000107
Cobalt	5.2	mg/kg	6.8E-07	µg/m^3	9.0E-03	(µg/m^3)$^{-1}$	6.1E-09	6.8E-10	mg/m^3	6.0E-06	mg/m^3	0.00011	6.8E-10	mg/m^3	6.0E-06	mg/m^3	0.00011
Copper	11	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	15,000	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	230	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	3.0E-08	mg/m^3	5.0E-05	mg/m^3	0.00060	3.0E-08	mg/m^3	5.0E-05	mg/m^3	0.00060
Molybdenum	0.6	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	7.2E-11	mg/m^3	2.0E-03	mg/m^3	0.000000036	7.2E-11	mg/m^3	2.0E-03	mg/m^3	0.000000036
Selenium	2.9	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	3.8E-10	mg/m^3	2.0E-02	mg/m^3	0.000000019	3.8E-10	mg/m^3	2.0E-02	mg/m^3	0.000000019
Thallium	0.15	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	6.2	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	8.1E-10	mg/m^3	4.0E-05	mg/m^3	0.000020	8.1E-10	mg/m^3	4.0E-05	mg/m^3	0.000020
Vanadium	17	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	2.2E-09	mg/m^3	1.0E-04	mg/m^3	0.000022	2.2E-09	mg/m^3	1.0E-04	mg/m^3	0.000022
Metals Cancer Total							2E-07	**Metals Noncancer Total**				0.001	**Metals Noncancer Total**				0.001
Exposure Route Cancer Total							2E-07	**Exposure Route Noncancer Total**				0.001	**Exposure Route Noncancer Total**				0.001
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Plant Consumption																	
Uranium-238	1.1	pCi/g	7.8E+04	pCi/g	8.7E-11	risk/pCi/g	6.8E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	6.9E+04	pCi/g	9.6E-11	risk/pCi/g	6.6E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	3.6E+04	pCi/g	1.2E-10	risk/pCi/g	4.3E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	1.0E+06	pCi/g	3.7E-09	risk/pCi/g	3.8E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	8.3E-02	mg/kg-day	1.0E+00	mg/kg-day	0.083	2.1E-01	mg/kg-day	1.0E+00	mg/kg-day	0.21
Arsenic	5.9	mg/kg	8.3E-05	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	1.2E-04	7.7E-05	mg/kg-day	3.0E-04	mg/kg-day	0.26	2.0E-04	mg/kg-day	3.0E-04	mg/kg-day	0.67
Barium	82	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	1.9E-03	mg/kg-day	2.0E-01	mg/kg-day	0.009	5.0E-03	mg/kg-day	2.0E-01	mg/kg-day	0.025
Cadmium	0.16	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	9.4E-06	mg/kg-day	1.0E-04	mg/kg-day	0.094	2.6E-05	mg/kg-day	1.0E-04	mg/kg-day	0.26
Chromium	8.2	mg/kg	2.3E-04	mg/kg-day	5.0E-01	(mg/kg-day)$^{-1}$	1.1E-04	9.9E-05	mg/kg-day	3.0E-03	mg/kg-day	0.033	2.6E-04	mg/kg-day	3.0E-03	mg/kg-day	0.088
Cobalt	5.2	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	9.4E-05	mg/kg-day	3.0E-04	mg/kg-day	0.31	2.5E-04	mg/kg-day	3.0E-04	mg/kg-day	0.83
Copper	11	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	1.9E-03	mg/kg-day	4.0E-02	mg/kg-day	0.047	5.0E-03	mg/kg-day	4.0E-02	mg/kg-day	0.12
Iron	15,000	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	1.8E-01	mg/kg-day	7.0E-01	mg/kg-day	0.26	*4.7E-01*	mg/kg-day	7.0E-01	mg/kg-day	0.66
Manganese	230	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	2.5E-02	mg/kg-day	2.4E-02	mg/kg-day	1.1	6.7E-02	mg/kg-day	2.4E-02	mg/kg-day	2.8
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	6.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.012	1.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.032
Selenium	2.9	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	5.2E-05	mg/kg-day	5.0E-03	mg/kg-day	0.010	1.4E-04	mg/kg-day	5.0E-03	mg/kg-day	0.028
Thallium	0.15	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	1.5E-06	mg/kg-day	1.0E-05	mg/kg-day	0.15	4.2E-06	mg/kg-day	1.0E-05	mg/kg-day	0.42
Uranium	6.2	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	8.1E-05	mg/kg-day	2.0E-04	mg/kg-day	0.40	2.2E-04	mg/kg-day	2.0E-04	mg/kg-day	1.1
Vanadium	17	mg/kg	--	mg/kg-day	--	(mg/kg-day)$^{-1}$	--	2.0E-04	mg/kg-day	5.0E-03	mg/kg-day	0.041	5.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.11
Metals Cancer Total							2E-04	**Metals Noncancer Total**				3	**Metals Noncancer Total**				7
Exposure Route Cancer Total							4E-03	**Exposure Route Noncancer Total**				3	**Exposure Route Noncancer Total**				7

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí tééh (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Animal Consumption																	
Uranium-238	1.1	pCi/g	8.9E+04	pCi/g	8.7E-11	risk/pCi/g	7.7E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	7.9E+04	pCi/g	9.6E-11	risk/pCi/g	7.5E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	7.8E+01	pCi/g	1.2E-10	risk/pCi/g	9.3E-09	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	2.0E+06	pCi/g	3.7E-09	risk/pCi/g	7.2E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							7E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.8E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0048	1.3E-02	mg/kg-day	1.0E+00	mg/kg-day	0.013
Arsenic	5.9	mg/kg	6.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.7E-06	5.8E-06	mg/kg-day	3.0E-04	mg/kg-day	0.019	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	0.051
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-05	mg/kg-day	2.0E-01	mg/kg-day	0.000053	2.9E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00014
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.7E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0037	9.6E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0096
Chromium	8.2	mg/kg	5.0E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.5E-05	2.2E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0072	5.8E-05	mg/kg-day	3.0E-03	mg/kg-day	0.019
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.0E-05	mg/kg-day	3.0E-04	mg/kg-day	0.17	1.4E-04	mg/kg-day	3.0E-04	mg/kg-day	0.45
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.9E-05	mg/kg-day	4.0E-02	mg/kg-day	0.0025	2.6E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0066
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-01	mg/kg-day	7.0E-01	mg/kg-day	0.20	3.6E-01	mg/kg-day	7.0E-01	mg/kg-day	0.51
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.6E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0032	2.0E-04	mg/kg-day	2.4E-02	mg/kg-day	0.0085
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.5E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00050	6.6E-06	mg/kg-day	5.0E-03	mg/kg-day	0.0013
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-04	mg/kg-day	5.0E-03	mg/kg-day	0.045	6.1E-04	mg/kg-day	5.0E-03	mg/kg-day	0.12
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.7E-06	mg/kg-day	1.0E-05	mg/kg-day	0.27	7.4E-06	mg/kg-day	1.0E-05	mg/kg-day	0.74
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.7E-07	mg/kg-day	2.0E-04	mg/kg-day	0.0043	2.4E-06	mg/kg-day	2.0E-04	mg/kg-day	0.012
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0037	5.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.010
Metals Cancer Total							3E-05	**Metals Noncancer Total**				0.7	**Metals Noncancer Total**				2
Exposure Route Cancer Total							7E-03	**Exposure Route Noncancer Total**				0.7	**Exposure Route Noncancer Total**				2
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Ingestion																	
Uranium-238	1.1	pCi/g	3.6E+04	pCi/g	8.7E-11	risk/pCi/g	3.1E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	3.2E+04	pCi/g	9.6E-11	risk/pCi/g	3.1E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	2.0E+04	pCi/g	1.2E-10	risk/pCi/g	2.3E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	5.6E+05	pCi/g	3.7E-09	risk/pCi/g	2.1E-03	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							2E-03	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.9E-02	mg/kg-day	1.0E+00	mg/kg-day	0.049	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	5.9	mg/kg	4.2E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-05	4.5E-05	mg/kg-day	3.0E-04	mg/kg-day	0.15	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-03	mg/kg-day	2.0E-01	mg/kg-day	0.0062	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.4E-06	mg/kg-day	1.0E-04	mg/kg-day	0.064	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	8.2	mg/kg	7.2E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	3.6E-05	6.0E-05	mg/kg-day	3.0E-03	mg/kg-day	0.020	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.7E-05	mg/kg-day	3.0E-04	mg/kg-day	0.19	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-03	mg/kg-day	4.0E-02	mg/kg-day	0.030	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-01	mg/kg-day	7.0E-01	mg/kg-day	0.15	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-02	mg/kg-day	2.4E-02	mg/kg-day	0.70	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.0E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0080	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.2E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0064	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.5E-07	mg/kg-day	1.0E-05	mg/kg-day	0.095	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.1E-05	mg/kg-day	2.0E-04	mg/kg-day	0.26	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.3E-04	mg/kg-day	5.0E-03	mg/kg-day	0.026	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-04	**Metals Noncancer Total**				2	**Metals Noncancer Total**				--
Exposure Route Cancer Total							2E-03	**Exposure Route Noncancer Total**				2	**Exposure Route Noncancer Total**				--

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí téél (Full-Time Resident)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Dermal																	
Aluminum	6,900	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	5.9	mg/kg	3.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.3E-06	3.8E-06	mg/kg-day	3.0E-04	mg/kg-day	0.013	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	82	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.16	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.0E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0070	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	8.2	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	230	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.6	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.15	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	6.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	17	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							5E-06	**Metals Noncancer Total**				0.02	**Metals Noncancer Total**				--
Exposure Route Cancer Total							5E-06	**Exposure Route Noncancer Total**				0.02	**Exposure Route Noncancer Total**				--
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Inhalation																	
Uranium-238	1.1	pCi/g	2.5E+02	pCi	2.4E-08	risk/pCi	6.0E-06	--	--	--	--	--	--	--	--	--	--
Uranium-234	0.97	pCi/g	2.2E+02	pCi	2.8E-08	risk/pCi	6.2E-06	--	--	--	--	--	--	--	--	--	--
Thorium-230	2.0	pCi/g	9.0E+01	pCi	3.4E-08	risk/pCi	3.1E-06	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	9.3	pCi/g	5.9E+03	pCi	5.9E-08	risk/pCi	3.5E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	6,900	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	5.0E-04	mg/m^3	5.0E-03	mg/m^3	0.099	--	mg/m^3	5.0E-03	mg/m^3	--
Arsenic	5.9	mg/kg	4.2E-04	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	1.8E-06	4.7E-07	mg/m^3	1.5E-05	mg/m^3	0.031	--	mg/m^3	1.5E-05	mg/m^3	--
Barium	82	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.2E-05	mg/m^3	5.0E-04	mg/m^3	0.025	--	mg/m^3	5.0E-04	mg/m^3	--
Cadmium	0.16	mg/kg	5.9E-05	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	1.1E-07	6.4E-08	mg/m^3	1.0E-05	mg/m^3	0.0064	--	mg/m^3	1.0E-05	mg/m^3	--
Chromium	8.2	mg/kg	7.3E-04	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	6.1E-05	6.1E-07	mg/m^3	1.0E-04	mg/m^3	0.0061	--	mg/m^3	1.0E-04	mg/m^3	--
Cobalt	5.2	mg/kg	5.7E-04	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	5.1E-06	6.2E-07	mg/m^3	6.0E-06	mg/m^3	0.10	--	mg/m^3	6.0E-06	mg/m^3	--
Copper	11	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	15,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	230	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.7E-04	mg/m^3	5.0E-05	mg/m^3	3.4	--	mg/m^3	5.0E-05	mg/m^3	--
Molybdenum	0.6	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.0E-07	mg/m^3	2.0E-03	mg/m^3	0.00020	--	mg/m^3	2.0E-03	mg/m^3	--
Selenium	2.9	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.2E-07	mg/m^3	2.0E-02	mg/m^3	0.000016	--	mg/m^3	2.0E-02	mg/m^3	--
Thallium	0.15	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	6.2	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	5.3E-07	mg/m^3	4.0E-05	mg/m^3	0.013	--	mg/m^3	4.0E-05	mg/m^3	--
Vanadium	17	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.3E-06	mg/m^3	1.0E-04	mg/m^3	0.013	--	mg/m^3	1.0E-04	mg/m^3	--
Metals Cancer Total							7E-05	**Metals Noncancer Total**				4	**Metals Noncancer Total**				--
Exposure Route Cancer Total							4E-04	**Exposure Route Noncancer Total**				4	**Exposure Route Noncancer Total**				--
Subsurface Soil (0-72 inches bgs) Receptor Cancer Risk Total							**2E-02**	**Receptor/Media Noncancer Hazard Total**				**9**	**Receptor/Media Noncancer Hazard Total**				**10**

Table C-5.3. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on the Navajo Nation

Notes:

[a] COPCs are the constituents of interest with a maximum detected concentration exceeding the COPC screening level (see Table C-1).

[b] EPCs are provided on Table C-4.

[c] The intakes are the EPC multiplied by the exposure parameters and any applicable contaminant-specific inputs (see Table C-3 for exposure inputs, Table 4 of the NAUM risk assessment methodology [USEPA 2024b] report for contaminant-specific inputs, and Appendix B of the NAUM risk assessment methodology [USEPA 2024b] report for equations).

[d] The toxicity values are provided in Table 4 of the NAUM risk assessment methodology (USEPA 2024b).

[e] The cancer risk for each contaminant for each exposure pathway is calculated by multiplying the cancer intake value with the toxicity value as follows: For contaminant *i* : $Risk_i = Cancer\ Intake_i \times Toxicity\ Factor_i$

[f] The noncancer hazard for each contaminant for each exposure pathway is calculated by dividing the noncancer intake value by the toxicity value as follows: For contaminant *i* : $Hazard_i = Noncancer\ Intake_i / Toxicity\ Factor_i$

--	Not applicable	mg/m^3	Milligram per cubic meter
$\mu g/m^3$	Microgram per cubic meter	NAUM	Navajo abandoned uranium mine
bgs	Below ground surface	pCi	Picocurie
COPC	Contaminant of potential concern	pCi/g	Picocurie per gram
EPC	Exposure point concentration	RfC	Reference concentration
Kerr-McGee	Kerr-McGee Corporation	RfD	Reference dose
mg/kg	Milligram per kilogram	SE	Secular equilibrium
mg/kg-day	Milligram per kilogram per day	USEPA	U.S. Environmental Protection Agency

Reference:

U.S. Environmental Protection Agency (USEPA). 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-5.4. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on United Nuclear Corporation Property

Kerr-McGee Ponds on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult
Exposure Medium: Surface Soil (0-6 inches bgs)												
Exposure Route: Incidental Soil Ingestion												
Uranium-238	2.4	pCi/g	6.0E+02	pCi/g	1.3E-10	risk/pCi/g	8.0E-08	--	--	--	--	--
Uranium-234	2.4	pCi/g	6.0E+02	pCi/g	1.5E-10	risk/pCi/g	8.9E-08	--	--	--	--	--
Thorium-230	3.4	pCi/g	8.5E+02	pCi/g	1.7E-10	risk/pCi/g	1.4E-07	--	--	--	--	--
Radium-226 in SE	13	pCi/g	3.3E+03	pCi/g	5.7E-09	risk/pCi/g	1.8E-05	--	--	--	--	--
Radionuclide Cancer Total							2E-05	**Radionuclide Noncancer Total**				--
Aluminum	6,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0023
Arsenic	6.0	mg/kg	4.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.6E-07	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0041
Barium	83	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.8E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00014
Cadmium	0.11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.8E-08	mg/kg-day	1.0E-04	mg/kg-day	0.00038
Chromium	8.5	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	2.9E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0097
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0059
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.8E-06	mg/kg-day	4.0E-02	mg/kg-day	0.000094
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.1E-03	mg/kg-day	7.0E-01	mg/kg-day	0.0073
Manganese	220	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.5E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0031
Molybdenum	0.57	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.0E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000039
Selenium	4.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00027
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.8E-08	mg/kg-day	1.0E-05	mg/kg-day	0.0048
Uranium	7.7	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.6E-06	mg/kg-day	2.0E-04	mg/kg-day	0.013
Vanadium	19	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.5E-06	mg/kg-day	5.0E-03	mg/kg-day	0.0013
Metals Cancer Total							7E-07	**Metals Noncancer Total**				0.05
Exposure Route Cancer Total							2E-05	**Exposure Route Noncancer Total**				0.05

Table C-5.4. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on United Nuclear Corporation Property

Kerr-McGee Ponds on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult
Exposure Medium: Surface Soil (0-6 inches bgs)												
Exposure Route: External Exposure												
Uranium-238	2.4	pCi/g	4.9E+00	pCi/g	1.2E-10	risk/year pCi/g	6.1E-10	--	--	--	--	--
Uranium-234	2.4	pCi/g	4.9E+00	pCi/g	2.5E-10	risk/year pCi/g	1.2E-09	--	--	--	--	--
Thorium-230	3.4	pCi/g	7.0E+00	pCi/g	8.5E-10	risk/year pCi/g	5.9E-09	--	--	--	--	--
Radium-226 in SE	13	pCi/g	2.7E+01	pCi/g	8.4E-06	risk/year pCi/g	2.2E-04	--	--	--	--	--
Radionuclide Cancer Total							2E-04	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							2E-04	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure												
Aluminum	6,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	6.0	mg/kg	9.3E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-07	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	0.00087
Barium	83	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.4E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000064
Chromium	8.5	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	11	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	220	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.57	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	4.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	7.7	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	19	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-07	**Metals Noncancer Total**				0.0009
Exposure Route Cancer Total							1E-07	**Exposure Route Noncancer Total**				0.0009

Table C-5.4. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on United Nuclear Corporation Property

Kerr-McGee Ponds on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult
Exposure Medium: Surface Soil (0-6 inches bgs)												
Exposure Route: Inhalation of Particulates												
Uranium-238	2.4	pCi/g	6.1E-03	pCi	2.4E-08	risk/pCi	1.4E-10	--	--	--	--	--
Uranium-234	2.4	pCi/g	6.1E-03	pCi	2.8E-08	risk/pCi	1.7E-10	--	--	--	--	--
Thorium-230	3.4	pCi/g	8.6E-03	pCi	3.4E-08	risk/pCi	2.9E-10	--	--	--	--	--
Radium-226 in SE	13	pCi/g	3.3E-02	pCi	5.9E-08	risk/pCi	1.9E-09	--	--	--	--	--
Radionuclide Cancer Total							3E-09	**Radionuclide Noncancer Total**				--
Aluminum	6,600	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	9.1E-08	mg/m^3	5.0E-03	mg/m^3	0.000018
Arsenic	6.0	mg/kg	3.0E-08	µg/m^3	4.3E-03	(µg/m^3)$^{-1}$	1.3E-10	8.3E-11	mg/m^3	1.5E-05	mg/m^3	0.0000055
Barium	83	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	1.1E-09	mg/m^3	5.0E-04	mg/m^3	0.0000023
Cadmium	0.11	mg/kg	5.4E-10	µg/m^3	1.8E-03	(µg/m^3)$^{-1}$	9.8E-13	1.5E-12	mg/m^3	1.0E-05	mg/m^3	0.00000015
Chromium	8.5	mg/kg	4.5E-09	µg/m^3	8.4E-02	(µg/m^3)$^{-1}$	3.8E-10	2.0E-09	mg/m^3	1.0E-04	mg/m^3	0.000020
Cobalt	5.2	mg/kg	2.6E-08	µg/m^3	9.0E-03	(µg/m^3)$^{-1}$	2.3E-10	7.2E-11	mg/m^3	6.0E-06	mg/m^3	0.000012
Copper	11	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Iron	15,000	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Manganese	220	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	3.0E-09	mg/m^3	5.0E-05	mg/m^3	0.000061
Molybdenum	0.57	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	7.9E-12	mg/m^3	2.0E-03	mg/m^3	0.0000000039
Selenium	4.0	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	5.5E-11	mg/m^3	2.0E-02	mg/m^3	0.0000000028
Thallium	0.14	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Uranium	7.7	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	1.1E-10	mg/m^3	4.0E-05	mg/m^3	0.0000027
Vanadium	19	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	2.6E-10	mg/m^3	1.0E-04	mg/m^3	0.0000026
Metals Cancer Total							7E-10	**Metals Noncancer Total**				0.0001
Exposure Route Cancer Total							3E-09	**Exposure Route Noncancer Total**				0.0001
Surface Soil (0-6 inches bgs) Receptor Cancer Risk Total							**2E-04**	**Receptor/Media Noncancer Hazard Total**				**0.05**

Table C-5.4. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on United Nuclear Corporation Property

Kerr-McGee Ponds on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult
Exposure Medium: Subsurface Soil (0-72 inches bgs)												
Exposure Route: Incidental Soil Ingestion												
Uranium-238	52	pCi/g	1.3E+04	pCi/g	1.3E-10	risk/pCi/g	1.7E-06	--	--	--	--	--
Uranium-234	49	pCi/g	1.2E+04	pCi/g	1.5E-10	risk/pCi/g	1.8E-06	--	--	--	--	--
Thorium-230	3.4	pCi/g	8.5E+02	pCi/g	1.7E-10	risk/pCi/g	1.4E-07	--	--	--	--	--
Radium-226 in SE	12	pCi/g	3.0E+03	pCi/g	5.7E-09	risk/pCi/g	1.7E-05	--	--	--	--	--
Radionuclide Cancer Total							2E-05	**Radionuclide Noncancer Total**				--
Aluminum	6,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0023
Arsenic	5.8	mg/kg	4.3E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.4E-07	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0040
Barium	75	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.6E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00013
Cadmium	0.093	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.2E-08	mg/kg-day	1.0E-04	mg/kg-day	0.00032
Chromium	8.1	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	2.8E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0092
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0059
Copper	10	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.4E-06	mg/kg-day	4.0E-02	mg/kg-day	0.000084
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.1E-03	mg/kg-day	7.0E-01	mg/kg-day	0.0073
Manganese	220	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.5E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0031
Molybdenum	0.63	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.2E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000043
Selenium	3.7	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.3E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00025
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.8E-08	mg/kg-day	1.0E-05	mg/kg-day	0.0048
Uranium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.6E-06	mg/kg-day	2.0E-04	mg/kg-day	0.0428
Vanadium	18	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.2E-06	mg/kg-day	5.0E-03	mg/kg-day	0.0012
Metals Cancer Total							6E-07	**Metals Noncancer Total**				0.08
Exposure Route Cancer Total							2E-05	**Exposure Route Noncancer Total**				0.08

Table C-5.4. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on United Nuclear Corporation Property

Kerr-McGee Ponds on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f]** Adult
Exposure Medium: Subsurface Soil (0-72 inches bgs)												
Exposure Route: External Exposure												
Uranium-238	52	pCi/g	1.1E+02	pCi/g	1.2E-10	risk/year pCi/g	1.3E-08	--	--	--	--	--
Uranium-234	49	pCi/g	1.0E+02	pCi/g	2.5E-10	risk/year pCi/g	2.5E-08	--	--	--	--	--
Thorium-230	3.4	pCi/g	7.0E+00	pCi/g	8.5E-10	risk/year pCi/g	5.9E-09	--	--	--	--	--
Radium-226 in SE	12	pCi/g	2.5E+01	pCi/g	8.4E-06	risk/year pCi/g	2.1E-04	--	--	--	--	--
						Radionuclide Cancer Total	2E-04				**Radionuclide Noncancer Total**	--
						Exposure Route Cancer Total	2E-04				**Exposure Route Noncancer Total**	--
Exposure Route: Dermal Exposure												
Aluminum	6,600	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	5.8	mg/kg	9.0E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-07	2.5E-07	mg/kg-day	3.0E-04	mg/kg-day	0.00084
Barium	75	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.093	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.4E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000054
Chromium	8.1	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	5.2	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	10	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	220	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.63	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	3.7	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.14	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	18	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
						Metals Cancer Total	1E-07				**Metals Noncancer Total**	0.0009
						Exposure Route Cancer Total	1E-07				**Exposure Route Noncancer Total**	0.0009

Table C-5.4. Human Health Risk and Hazard Calculations - Kerr-McGee Ponds on United Nuclear Corporation Property

Kerr-McGee Ponds on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult
Exposure Medium: Subsurface Soil (0-72 inches bgs)												
Exposure Route: Inhalation of Particulates												
Uranium-238	52	pCi/g	1.3E-01	pCi	2.4E-08	risk/pCi	3.1E-09	--	--	--	--	--
Uranium-234	49	pCi/g	1.2E-01	pCi	2.8E-08	risk/pCi	3.4E-09	--	--	--	--	--
Thorium-230	3.4	pCi/g	8.6E-03	pCi	3.4E-08	risk/pCi	2.9E-10	--	--	--	--	--
Radium-226 in SE	12	pCi/g	3.0E-02	pCi	5.9E-08	risk/pCi	1.8E-09	--	--	--	--	--
Radionuclide Cancer Total							9E-09	**Radionuclide Noncancer Total**				--
Aluminum	6,600	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	9.1E-08	mg/m^3	5.0E-03	mg/m^3	0.000018
Arsenic	5.8	mg/kg	2.9E-08	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	1.2E-10	8.0E-11	mg/m^3	1.5E-05	mg/m^3	0.0000053
Barium	75	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.0E-09	mg/m^3	5.0E-04	mg/m^3	0.0000021
Cadmium	0.093	mg/kg	4.6E-10	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	8.3E-13	1.3E-12	mg/m^3	1.0E-05	mg/m^3	0.00000013
Chromium	8.1	mg/kg	4.3E-09	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	3.6E-10	1.9E-09	mg/m^3	1.0E-04	mg/m^3	0.000019
Cobalt	5.2	mg/kg	2.6E-08	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	2.3E-10	7.2E-11	mg/m^3	6.0E-06	mg/m^3	0.000012
Copper	10	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Iron	15,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Manganese	220	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.0E-09	mg/m^3	5.0E-05	mg/m^3	0.000061
Molybdenum	0.63	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	8.7E-12	mg/m^3	2.0E-03	mg/m^3	0.0000000044
Selenium	3.7	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	5.1E-11	mg/m^3	2.0E-02	mg/m^3	0.0000000026
Thallium	0.14	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Uranium	25	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.5E-10	mg/m^3	4.0E-05	mg/m^3	0.0000086
Vanadium	18	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.5E-10	mg/m^3	1.0E-04	mg/m^3	0.0000025
Metals Cancer Total							7E-10	**Metals Noncancer Total**				0.0001
Exposure Route Cancer Total							9E-09	**Exposure Route Noncancer Total**				0.0001
Subsurface Soil (0-72 inches bgs) Receptor Cancer Risk Total							**2E-04**	**Receptor/Media Noncancer Hazard Total**				**0.08**

Notes:

[a] COPCs are the constituents of interest with a maximum detected concentration exceeding the COPC screening level (see Table C-1).

[b] EPCs are provided on Table C-4.

[c] The intakes are the EPC multiplied by the exposure parameters and any applicable contaminant-specific inputs (see Table C-3 for exposure inputs, Table 4 of the NAUM risk assessment methodology [USEPA 2024b] report for contaminant-specific inputs, and Appendix B of the NAUM risk assessment methodology [USEPA 2024b] report for equations).

[d] The toxicity values are provided in Table 4 of the NAUM risk assessment methodology (USEPA 2024b).

[e] The cancer risk for each contaminant for each exposure pathway is calculated by multiplying the cancer intake value with the toxicity value as follows:

For contaminant *i* : $Risk_i = Cancer\ Intake_i \times Toxicity\ Factor_i$

[f] The noncancer hazard for each contaminant for each exposure pathway is calculated by dividing the noncancer intake value by the toxicity value as follows:

For contaminant *i* : $Hazard_i = Noncancer\ Intake_i / Toxicity\ Factor_i$

--	Not applicable	NAUM	Navajo abandoned uranium mine
$\mu g/m^3$	Microgram per cubic meter	pCi	Picocurie
bgs	Below ground surface	pCi/g	Picocurie per gram
COPC	Contaminant of potential concern	RfC	Reference concentration
EPC	Exposure point concentration	RfD	Reference dose
mg/kg	Milligram per kilogram	SE	Secular equilbrium
mg/kg-day	Milligram per kilogram per day	UNC	United Nuclear Corporation
mg/m^3	Milligram per cubic meter	USEPA	U.S. Environmental Protection Agency

Reference:

U.S. Environmental Protection Agency (USEPA). 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Incidental Soil Ingestion																	
Uranium-238	--	pCi/g	--	pCi/g	1.3E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	1.5E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	1.7E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.3	pCi/g	4.4E+01	pCi/g	5.7E-09	risk/pCi/g	2.5E-07	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-07	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.1E-05	mg/kg-day	1.0E+00	mg/kg-day	0.000071	4.4E-04	mg/kg-day	1.0E+00	mg/kg-day	0.00044
Arsenic	11	mg/kg	1.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-07	1.0E-07	mg/kg-day	3.0E-04	mg/kg-day	0.00034	6.2E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0021
Barium	74	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-06	mg/kg-day	2.0E-01	mg/kg-day	0.0000056	6.9E-06	mg/kg-day	2.0E-01	mg/kg-day	0.000034
Cadmium	0.064	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.6E-10	mg/kg-day	1.0E-04	mg/kg-day	0.000010	6.0E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000060
Chromium	6.7	mg/kg	3.9E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-07	1.0E-07	mg/kg-day	3.0E-03	mg/kg-day	0.000034	6.2E-07	mg/kg-day	3.0E-03	mg/kg-day	0.00021
Cobalt	4.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.0E-08	mg/kg-day	3.0E-04	mg/kg-day	0.00020	3.7E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0012
Copper	5.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.7E-08	mg/kg-day	4.0E-02	mg/kg-day	0.0000019	4.7E-07	mg/kg-day	4.0E-02	mg/kg-day	0.000012
Iron	12,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-04	mg/kg-day	7.0E-01	mg/kg-day	0.00026	1.1E-03	mg/kg-day	7.0E-01	mg/kg-day	0.0016
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.0E-06	mg/kg-day	2.4E-02	mg/kg-day	0.00013	1.9E-05	mg/kg-day	2.4E-02	mg/kg-day	0.00078
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-08	mg/kg-day	5.0E-03	mg/kg-day	0.0000024	7.5E-08	mg/kg-day	5.0E-03	mg/kg-day	0.000015
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-08	mg/kg-day	5.0E-03	mg/kg-day	0.0000045	1.4E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000028
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-09	mg/kg-day	1.0E-05	mg/kg-day	0.00014	8.6E-09	mg/kg-day	1.0E-05	mg/kg-day	0.00086
Uranium	2.9	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.4E-08	mg/kg-day	2.0E-04	mg/kg-day	0.00022	2.7E-07	mg/kg-day	2.0E-04	mg/kg-day	0.0013
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.8E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000075	2.3E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00047
Metals Cancer Total							4E-07	**Metals Noncancer Total**				0.001	**Metals Noncancer Total**				0.009
Exposure Route Cancer Total							7E-07	**Exposure Route Noncancer Total**				0.001	**Exposure Route Noncancer Total**				0.009

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																	
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**	**Child Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Child**
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: External Exposure																	
Uranium-238	--	pCi/g	--	pCi/g	1.2E-10	risk/year pCi/g	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	2.5E-10	risk/year pCi/g	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	8.5E-10	risk/year pCi/g	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.3	pCi/g	3.0E-01	pCi/g	8.4E-06	risk/year pCi/g	2.5E-06	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-06	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							3E-06	**Exposure Route Noncancer Total**				--	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure																	
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	11	mg/kg	2.0E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-07	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	0.00048	8.6E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0029
Barium	74	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.064	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000011	6.4E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000064
Chromium	6.7	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	4.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	12,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							3E-07	**Metals Noncancer Total**				0.0005	**Metals Noncancer Total**				0.003
Exposure Route Cancer Total							3E-07	**Exposure Route Noncancer Total**				0.0005	**Exposure Route Noncancer Total**				0.003

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																	
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**	**Child Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Child**
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Inhalation of Particulates																	
Uranium-238	--	pCi/g	--	pCi	2.4E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi	2.8E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi	3.4E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.3	pCi/g	1.1E-01	pCi	5.9E-08	risk/pCi	6.7E-09	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							7E-09	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	6.1E-07	mg/m^3	5.0E-03	mg/m^3	0.00012	6.1E-07	mg/m^3	5.0E-03	mg/m^3	0.00012
Arsenic	11	mg/kg	1.4E-06	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	6.1E-09	1.4E-09	mg/m^3	1.5E-05	mg/m^3	0.000095	1.4E-09	mg/m^3	1.5E-05	mg/m^3	0.000095
Barium	74	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	9.6E-09	mg/m^3	5.0E-04	mg/m^3	0.000019	9.6E-09	mg/m^3	5.0E-04	mg/m^3	0.000019
Cadmium	0.064	mg/kg	8.3E-09	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	1.5E-11	8.3E-12	mg/m^3	1.0E-05	mg/m^3	0.00000083	8.3E-12	mg/m^3	1.0E-05	mg/m^3	0.00000083
Chromium	6.7	mg/kg	1.4E-06	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	1.2E-07	8.7E-10	mg/m^3	1.0E-04	mg/m^3	0.0000087	8.7E-10	mg/m^3	1.0E-04	mg/m^3	0.0000087
Cobalt	4.0	mg/kg	5.2E-07	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	4.7E-09	5.2E-10	mg/m^3	6.0E-06	mg/m^3	0.000087	5.2E-10	mg/m^3	6.0E-06	mg/m^3	0.000087
Copper	5	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	12,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	200	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.6E-08	mg/m^3	5.0E-05	mg/m^3	0.00052	2.6E-08	mg/m^3	5.0E-05	mg/m^3	0.00052
Molybdenum	0.81	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.1E-10	mg/m^3	2.0E-03	mg/m^3	0.000000053	1.1E-10	mg/m^3	2.0E-03	mg/m^3	0.000000053
Selenium	1.5	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.0E-10	mg/m^3	2.0E-02	mg/m^3	0.000000010	2.0E-10	mg/m^3	2.0E-02	mg/m^3	0.000000010
Thallium	0.092	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	2.90	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.8E-10	mg/m^3	4.0E-05	mg/m^3	0.0000094	3.8E-10	mg/m^3	4.0E-05	mg/m^3	0.0000094
Vanadium	25	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.3E-09	mg/m^3	1.0E-04	mg/m^3	0.000033	3.3E-09	mg/m^3	1.0E-04	mg/m^3	0.000033
Metals Cancer Total							1E-07	**Metals Noncancer Total**				0.0009	**Metals Noncancer Total**				0.0009
Exposure Route Cancer Total							1E-07	**Exposure Route Noncancer Total**				0.0009	**Exposure Route Noncancer Total**				0.0009
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Plant Consumption																	
Uranium-238	--	pCi/g	--	pCi/g	8.7E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	9.6E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	1.2E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.3	pCi/g	9.4E+03	pCi/g	3.7E-09	risk/pCi/g	3.5E-05	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-05	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.7E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0037	9.9E-03	mg/kg-day	1.0E+00	mg/kg-day	0.010
Arsenic	11	mg/kg	1.0E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-05	9.1E-06	mg/kg-day	3.0E-04	mg/kg-day	0.030	2.4E-05	mg/kg-day	3.0E-04	mg/kg-day	0.081
Barium	74	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.6E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00048	2.5E-04	mg/kg-day	2.0E-01	mg/kg-day	0.0013
Cadmium	0.064	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0019	5.0E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0050
Chromium	6.7	mg/kg	1.3E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	6.3E-06	5.4E-06	mg/kg-day	3.0E-03	mg/kg-day	0.0018	1.4E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0048
Cobalt	4.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.4E-06	mg/kg-day	3.0E-04	mg/kg-day	0.015	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	0.039
Copper	5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.0E-05	mg/kg-day	4.0E-02	mg/kg-day	0.0010	1.1E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0027
Iron	12,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.5E-03	mg/kg-day	7.0E-01	mg/kg-day	0.014	*2.5E-02*	mg/kg-day	7.0E-01	mg/kg-day	0.036
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.0E-03	mg/kg-day	2.4E-02	mg/kg-day	0.043	2.8E-03	mg/kg-day	2.4E-02	mg/kg-day	0.12
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.1E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00083	1.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0023
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00033	4.2E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00084
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.7E-08	mg/kg-day	1.0E-05	mg/kg-day	0.0067	1.8E-07	mg/kg-day	1.0E-05	mg/kg-day	0.018
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.5E-06	mg/kg-day	2.0E-04	mg/kg-day	0.013	6.7E-06	mg/kg-day	2.0E-04	mg/kg-day	0.033
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0041	5.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.011
Metals Cancer Total							2E-05	**Metals Noncancer Total**				0.1	**Metals Noncancer Total**				0.4
Exposure Route Cancer Total							6E-05	**Exposure Route Noncancer Total**				0.1	**Exposure Route Noncancer Total**				0.4

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Animal Consumption																	
Uranium-238	--	pCi/g	--	pCi/g	8.7E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	9.6E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	1.2E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.3	pCi/g	1.4E+02	pCi/g	3.7E-09	risk/pCi/g	5.3E-07	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							5E-07	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.4E-04	mg/kg-day	1.0E+00	mg/kg-day	0.00034	8.9E-04	mg/kg-day	1.0E+00	mg/kg-day	0.00089
Arsenic	11	mg/kg	1.3E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-06	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0037	3.0E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0099
Barium	74	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.6E-07	mg/kg-day	2.0E-01	mg/kg-day	0.0000048	2.5E-06	mg/kg-day	2.0E-01	mg/kg-day	0.000013
Cadmium	0.064	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.0E-10	mg/kg-day	1.0E-04	mg/kg-day	0.0000070	1.8E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000018
Chromium	6.7	mg/kg	4.2E-06	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-06	1.8E-06	mg/kg-day	3.0E-03	mg/kg-day	0.00061	4.9E-06	mg/kg-day	3.0E-03	mg/kg-day	0.0016
Cobalt	4.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.0E-06	mg/kg-day	3.0E-04	mg/kg-day	0.013	1.1E-05	mg/kg-day	3.0E-04	mg/kg-day	0.036
Copper	5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.7E-06	mg/kg-day	4.0E-02	mg/kg-day	0.00012	1.3E-05	mg/kg-day	4.0E-02	mg/kg-day	0.00032
Iron	12,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-02	mg/kg-day	7.0E-01	mg/kg-day	0.016	3.0E-02	mg/kg-day	7.0E-01	mg/kg-day	0.043
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.8E-06	mg/kg-day	2.4E-02	mg/kg-day	0.00028	1.8E-05	mg/kg-day	2.4E-02	mg/kg-day	0.00075
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.7E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000075	9.7E-07	mg/kg-day	5.0E-03	mg/kg-day	0.00019
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000045	6.2E-07	mg/kg-day	5.0E-03	mg/kg-day	0.00012
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-07	mg/kg-day	1.0E-05	mg/kg-day	0.017	4.7E-07	mg/kg-day	1.0E-05	mg/kg-day	0.047
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.1E-08	mg/kg-day	2.0E-04	mg/kg-day	0.00020	1.1E-07	mg/kg-day	2.0E-04	mg/kg-day	0.00054
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.0E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00060	8.0E-06	mg/kg-day	5.0E-03	mg/kg-day	0.0016
Metals Cancer Total							4E-06	**Metals Noncancer Total**				0.05	**Metals Noncancer Total**				0.1
Exposure Route Cancer Total							5E-06	**Exposure Route Noncancer Total**				0.05	**Exposure Route Noncancer Total**				0.1
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Ingestion																	
Uranium-238	--	pCi/g	--	pCi/g	8.7E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	9.6E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	1.2E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.3	pCi/g	7.5E+04	pCi/g	3.7E-09	risk/pCi/g	2.8E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.3E-02	mg/kg-day	1.0E+00	mg/kg-day	0.033	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	11	mg/kg	7.7E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-04	8.4E-05	mg/kg-day	3.0E-04	mg/kg-day	0.28	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	74	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.0E-03	mg/kg-day	2.0E-01	mg/kg-day	0.0052	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.064	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.4E-06	mg/kg-day	1.0E-04	mg/kg-day	0.024	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	6.7	mg/kg	5.7E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-05	4.8E-05	mg/kg-day	3.0E-03	mg/kg-day	0.016	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	4.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.4E-05	mg/kg-day	3.0E-04	mg/kg-day	0.15	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.6E-04	mg/kg-day	4.0E-02	mg/kg-day	0.014	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	12,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.4E-02	mg/kg-day	7.0E-01	mg/kg-day	0.12	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-02	mg/kg-day	2.4E-02	mg/kg-day	0.57	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.011	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0033	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.7E-07	mg/kg-day	1.0E-05	mg/kg-day	0.057	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-05	mg/kg-day	2.0E-04	mg/kg-day	0.12	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-04	mg/kg-day	5.0E-03	mg/kg-day	0.037	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-04	**Metals Noncancer Total**				1	**Metals Noncancer Total**				--
Exposure Route Cancer Total							4E-04	**Exposure Route Noncancer Total**				1	**Exposure Route Noncancer Total**				--

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Dermal																	
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	11	mg/kg	6.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.7E-06	7.0E-06	mg/kg-day	3.0E-04	mg/kg-day	0.023	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	74	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.064	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.7E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0027	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	6.7	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	4.0	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	12,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	200	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-05	**Metals Noncancer Total**				0.03	**Metals Noncancer Total**				--
Exposure Route Cancer Total							1E-05	**Exposure Route Noncancer Total**				0.03	**Exposure Route Noncancer Total**				--
Exposure Medium: Surface Soil (0-6 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Inhalation																	
Uranium-238	--	pCi/g	--	pCi	2.4E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi	2.8E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi	3.4E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.3	pCi/g	8.1E+02	pCi	5.9E-08	risk/pCi	4.8E-05	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							5E-05	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.4E-04	mg/m^3	5.0E-03	mg/m^3	0.068	--	mg/m^3	5.0E-03	mg/m^3	--
Arsenic	11	mg/kg	7.8E-04	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	3.4E-06	8.6E-07	mg/m^3	1.5E-05	mg/m^3	0.057	--	mg/m^3	1.5E-05	mg/m^3	--
Barium	74	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.0E-05	mg/m^3	5.0E-04	mg/m^3	0.021	--	mg/m^3	5.0E-04	mg/m^3	--
Cadmium	0.064	mg/kg	2.2E-05	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	4.0E-08	2.4E-08	mg/m^3	1.0E-05	mg/m^3	0.0024	--	mg/m^3	1.0E-05	mg/m^3	--
Chromium	6.7	mg/kg	5.9E-04	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	4.9E-05	5.0E-07	mg/m^3	1.0E-04	mg/m^3	0.0050	--	mg/m^3	1.0E-04	mg/m^3	--
Cobalt	4.0	mg/kg	4.0E-04	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	3.6E-06	4.4E-07	mg/m^3	6.0E-06	mg/m^3	0.073	--	mg/m^3	6.0E-06	mg/m^3	--
Copper	5.1	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	12,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	200	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.4E-04	mg/m^3	5.0E-05	mg/m^3	2.8	--	mg/m^3	5.0E-05	mg/m^3	--
Molybdenum	0.81	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	5.7E-07	mg/m^3	2.0E-03	mg/m^3	0.00028	--	mg/m^3	2.0E-03	mg/m^3	--
Selenium	1.5	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.7E-07	mg/m^3	2.0E-02	mg/m^3	0.0000083	--	mg/m^3	2.0E-02	mg/m^3	--
Thallium	0.092	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	2.90	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.4E-07	mg/m^3	4.0E-05	mg/m^3	0.0060	--	mg/m^3	4.0E-05	mg/m^3	--
Vanadium	25	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.9E-06	mg/m^3	1.0E-04	mg/m^3	0.019	--	mg/m^3	1.0E-04	mg/m^3	--
Metals Cancer Total							6E-05	**Metals Noncancer Total**				3	**Metals Noncancer Total**				--
Exposure Route Cancer Total							1E-04	**Exposure Route Noncancer Total**				3	**Exposure Route Noncancer Total**				--
Surface Soil (0-6 inches bgs) Receptor Cancer Risk Total							**6E-04**	**Receptor/Media Noncancer Hazard Total**				**5**	**Receptor/Media Noncancer Hazard Total**				**1**

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Incidental Soil Ingestion																	
Uranium-238	--	pCi/g	--	pCi/g	1.3E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	1.5E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	1.7E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.5	pCi/g	5.1E+01	pCi/g	5.7E-09	risk/pCi/g	2.9E-07	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-07	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.1E-05	mg/kg-day	1.0E+00	mg/kg-day	0.000071	4.4E-04	mg/kg-day	1.0E+00	mg/kg-day	0.00044
Arsenic	11	mg/kg	1.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-07	1.0E-07	mg/kg-day	3.0E-04	mg/kg-day	0.00034	6.2E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0021
Barium	75	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-06	mg/kg-day	2.0E-01	mg/kg-day	0.0000056	7.0E-06	mg/kg-day	2.0E-01	mg/kg-day	0.000035
Cadmium	0.073	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000011	6.8E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000068
Chromium	6.7	mg/kg	3.9E-07	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-07	1.0E-07	mg/kg-day	3.0E-03	mg/kg-day	0.000034	6.2E-07	mg/kg-day	3.0E-03	mg/kg-day	0.00021
Cobalt	4.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.8E-08	mg/kg-day	3.0E-04	mg/kg-day	0.00023	4.2E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0014
Copper	5.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	7.7E-08	mg/kg-day	4.0E-02	mg/kg-day	0.0000019	4.7E-07	mg/kg-day	4.0E-02	mg/kg-day	0.000012
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-04	mg/kg-day	7.0E-01	mg/kg-day	0.00032	1.4E-03	mg/kg-day	7.0E-01	mg/kg-day	0.0020
Manganese	400	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.0E-06	mg/kg-day	2.4E-02	mg/kg-day	0.00025	3.7E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0016
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-08	mg/kg-day	5.0E-03	mg/kg-day	0.0000024	7.5E-08	mg/kg-day	5.0E-03	mg/kg-day	0.000015
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-08	mg/kg-day	5.0E-03	mg/kg-day	0.0000045	1.4E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000028
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-09	mg/kg-day	1.0E-05	mg/kg-day	0.00014	8.6E-09	mg/kg-day	1.0E-05	mg/kg-day	0.00086
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.4E-08	mg/kg-day	2.0E-04	mg/kg-day	0.00022	2.7E-07	mg/kg-day	2.0E-04	mg/kg-day	0.0013
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.8E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000075	2.3E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00047
Metals Cancer Total							4E-07	**Metals Noncancer Total**				0.002	**Metals Noncancer Total**				0.01
Exposure Route Cancer Total							7E-07	**Exposure Route Noncancer Total**				0.002	**Exposure Route Noncancer Total**				0.01

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																	
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**	**Child Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Child**
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: External Exposure																	
Uranium-238	--	pCi/g	--	pCi/g	1.2E-10	risk/year pCi/g	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	2.5E-10	risk/year pCi/g	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	8.5E-10	risk/year pCi/g	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.5	pCi/g	3.5E-01	pCi/g	8.4E-06	risk/year pCi/g	2.9E-06	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-06	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							3E-06	**Exposure Route Noncancer Total**				--	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure																	
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	11	mg/kg	2.0E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-07	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	0.00048	8.6E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0029
Barium	75	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.073	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000012	7.3E-09	mg/kg-day	1.0E-04	mg/kg-day	0.00007
Chromium	6.7	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	4.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	5.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	400	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							3E-07	**Metals Noncancer Total**				0.0005	**Metals Noncancer Total**				0.003
Exposure Route Cancer Total							3E-07	**Exposure Route Noncancer Total**				0.0005	**Exposure Route Noncancer Total**				0.003

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																	
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**	**Child Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Child**
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Inhalation of Particulates																	
Uranium-238	--	pCi/g	--	pCi	2.4E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi	2.8E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi	3.4E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.5	pCi/g	5.1E-04	pCi	5.9E-08	risk/pCi	3.0E-11	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-11	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.4E-09	mg/m^3	5.0E-03	mg/m^3	0.00000049	2.4E-09	mg/m^3	5.0E-03	mg/m^3	0.00000049
Arsenic	11	mg/kg	5.7E-09	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	2.5E-11	5.7E-12	mg/m^3	1.5E-05	mg/m^3	0.00000038	5.7E-12	mg/m^3	1.5E-05	mg/m^3	0.00000038
Barium	75	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.9E-11	mg/m^3	5.0E-04	mg/m^3	0.000000078	3.9E-11	mg/m^3	5.0E-04	mg/m^3	0.000000078
Cadmium	0.073	mg/kg	3.8E-11	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	6.8E-14	3.8E-14	mg/m^3	1.0E-05	mg/m^3	0.0000000038	3.8E-14	mg/m^3	1.0E-05	mg/m^3	0.0000000038
Chromium	6.7	mg/kg	5.6E-09	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	4.7E-10	3.5E-12	mg/m^3	1.0E-04	mg/m^3	0.000000035	3.5E-12	mg/m^3	1.0E-04	mg/m^3	0.000000035
Cobalt	4.5	mg/kg	2.3E-09	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	2.1E-11	2.3E-12	mg/m^3	6.0E-06	mg/m^3	0.00000039	2.3E-12	mg/m^3	6.0E-06	mg/m^3	0.00000039
Copper	5	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	15,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	400	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.1E-10	mg/m^3	5.0E-05	mg/m^3	0.0000042	2.1E-10	mg/m^3	5.0E-05	mg/m^3	0.0000042
Molybdenum	0.81	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	4.2E-13	mg/m^3	2.0E-03	mg/m^3	0.00000000021	4.2E-13	mg/m^3	2.0E-03	mg/m^3	0.00000000021
Selenium	1.5	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	7.8E-13	mg/m^3	2.0E-02	mg/m^3	0.000000000039	7.8E-13	mg/m^3	2.0E-02	mg/m^3	0.000000000039
Thallium	0.092	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	2.90	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.5E-12	mg/m^3	4.0E-05	mg/m^3	0.000000038	1.5E-12	mg/m^3	4.0E-05	mg/m^3	0.000000038
Vanadium	25	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.3E-11	mg/m^3	1.0E-04	mg/m^3	0.00000013	1.3E-11	mg/m^3	1.0E-04	mg/m^3	0.00000013
Metals Cancer Total							5E-10	**Metals Noncancer Total**				0.000006	**Metals Noncancer Total**				0.000006
Exposure Route Cancer Total							5E-10	**Exposure Route Noncancer Total**				0.000006	**Exposure Route Noncancer Total**				0.000006
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Plant Consumption																	
Uranium-238	--	pCi/g	--	pCi/g	8.7E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	9.6E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	1.2E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.5	pCi/g	1.1E+04	pCi/g	3.7E-09	risk/pCi/g	4.0E-05	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							4E-05	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.7E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0037	9.9E-03	mg/kg-day	1.0E+00	mg/kg-day	0.010
Arsenic	11	mg/kg	1.0E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-05	9.1E-06	mg/kg-day	3.0E-04	mg/kg-day	0.030	2.4E-05	mg/kg-day	3.0E-04	mg/kg-day	0.081
Barium	75	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.8E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00049	2.6E-04	mg/kg-day	2.0E-01	mg/kg-day	0.0013
Cadmium	0.073	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.1E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0021	5.7E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0057
Chromium	6.7	mg/kg	1.3E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	6.3E-06	5.4E-06	mg/kg-day	3.0E-03	mg/kg-day	0.0018	1.4E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0048
Cobalt	4.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.0E-06	mg/kg-day	3.0E-04	mg/kg-day	0.017	1.3E-05	mg/kg-day	3.0E-04	mg/kg-day	0.044
Copper	5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.0E-05	mg/kg-day	4.0E-02	mg/kg-day	0.0010	1.1E-04	mg/kg-day	4.0E-02	mg/kg-day	0.0027
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.2E-02	mg/kg-day	7.0E-01	mg/kg-day	0.017	*3.2E-02*	mg/kg-day	7.0E-01	mg/kg-day	0.045
Manganese	400	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.0E-03	mg/kg-day	2.4E-02	mg/kg-day	0.085	5.6E-03	mg/kg-day	2.4E-02	mg/kg-day	0.23
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.1E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00083	1.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0023
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00033	4.2E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00084
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	6.7E-08	mg/kg-day	1.0E-05	mg/kg-day	0.0067	1.8E-07	mg/kg-day	1.0E-05	mg/kg-day	0.018
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.5E-06	mg/kg-day	2.0E-04	mg/kg-day	0.013	6.7E-06	mg/kg-day	2.0E-04	mg/kg-day	0.033
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0041	5.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.011
Metals Cancer Total							2E-05	**Metals Noncancer Total**				0.2	**Metals Noncancer Total**				0.5
Exposure Route Cancer Total							6E-05	**Exposure Route Noncancer Total**				0.2	**Exposure Route Noncancer Total**				0.5

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Animal Consumption																	
Uranium-238	--	pCi/g	--	pCi/g	8.7E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	9.6E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	1.2E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.5	pCi/g	1.7E+02	pCi/g	3.7E-09	risk/pCi/g	6.1E-07	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							6E-07	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.4E-04	mg/kg-day	1.0E+00	mg/kg-day	0.00034	8.9E-04	mg/kg-day	1.0E+00	mg/kg-day	0.00089
Arsenic	11	mg/kg	1.3E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-06	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0037	3.0E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0099
Barium	75	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.8E-07	mg/kg-day	2.0E-01	mg/kg-day	0.0000049	2.6E-06	mg/kg-day	2.0E-01	mg/kg-day	0.000013
Cadmium	0.073	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.0E-10	mg/kg-day	1.0E-04	mg/kg-day	0.0000080	2.0E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000020
Chromium	6.7	mg/kg	4.2E-06	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-06	1.8E-06	mg/kg-day	3.0E-03	mg/kg-day	0.00061	4.9E-06	mg/kg-day	3.0E-03	mg/kg-day	0.0016
Cobalt	4.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.5E-06	mg/kg-day	3.0E-04	mg/kg-day	0.015	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	0.041
Copper	5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.7E-06	mg/kg-day	4.0E-02	mg/kg-day	0.00012	1.3E-05	mg/kg-day	4.0E-02	mg/kg-day	0.00032
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-02	mg/kg-day	7.0E-01	mg/kg-day	0.020	3.8E-02	mg/kg-day	7.0E-01	mg/kg-day	0.054
Manganese	400	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.4E-05	mg/kg-day	2.4E-02	mg/kg-day	0.00057	3.6E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0015
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.7E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000075	9.7E-07	mg/kg-day	5.0E-03	mg/kg-day	0.00019
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000045	6.2E-07	mg/kg-day	5.0E-03	mg/kg-day	0.00012
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-07	mg/kg-day	1.0E-05	mg/kg-day	0.017	4.7E-07	mg/kg-day	1.0E-05	mg/kg-day	0.047
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.1E-08	mg/kg-day	2.0E-04	mg/kg-day	0.00020	1.1E-07	mg/kg-day	2.0E-04	mg/kg-day	0.00054
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.0E-06	mg/kg-day	5.0E-03	mg/kg-day	0.00060	8.0E-06	mg/kg-day	5.0E-03	mg/kg-day	0.0016
Metals Cancer Total							4E-06	**Metals Noncancer Total**				0.06	**Metals Noncancer Total**				0.2
Exposure Route Cancer Total							5E-06	**Exposure Route Noncancer Total**				0.06	**Exposure Route Noncancer Total**				0.2
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Ingestion																	
Uranium-238	--	pCi/g	--	pCi/g	8.7E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	9.6E-11	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	1.2E-10	risk/pCi/g	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.5	pCi/g	8.7E+04	pCi/g	3.7E-09	risk/pCi/g	3.2E-04	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							3E-04	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.3E-02	mg/kg-day	1.0E+00	mg/kg-day	0.033	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	11	mg/kg	7.7E-05	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-04	8.4E-05	mg/kg-day	3.0E-04	mg/kg-day	0.28	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	75	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-03	mg/kg-day	2.0E-01	mg/kg-day	0.0053	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.073	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.7E-06	mg/kg-day	1.0E-04	mg/kg-day	0.027	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	6.700	mg/kg	5.7E-05	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-05	4.8E-05	mg/kg-day	3.0E-03	mg/kg-day	0.016	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	4.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.0E-05	mg/kg-day	3.0E-04	mg/kg-day	0.17	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.6E-04	mg/kg-day	4.0E-02	mg/kg-day	0.014	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.1E-01	mg/kg-day	7.0E-01	mg/kg-day	0.15	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	400	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.7E-02	mg/kg-day	2.4E-02	mg/kg-day	1.1	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.011	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.7E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0033	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.7E-07	mg/kg-day	1.0E-05	mg/kg-day	0.057	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.3E-05	mg/kg-day	2.0E-04	mg/kg-day	0.12	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-04	mg/kg-day	5.0E-03	mg/kg-day	0.037	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-04	**Metals Noncancer Total**				2	**Metals Noncancer Total**				--
Exposure Route Cancer Total							5E-04	**Exposure Route Noncancer Total**				2	**Exposure Route Noncancer Total**				--

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																	
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult	Child Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Child
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Dermal																	
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	11	mg/kg	6.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.7E-06	7.0E-06	mg/kg-day	3.0E-04	mg/kg-day	0.023	--	mg/kg-day	3.0E-04	mg/kg-day	--
Barium	75	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.073	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.1E-07	mg/kg-day	1.0E-04	mg/kg-day	0.0031	--	mg/kg-day	1.0E-04	mg/kg-day	--
Chromium	6.7	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	4.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	400	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.81	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	1.5	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.092	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	2.90	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	25	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-05	**Metals Noncancer Total**				0.03	**Metals Noncancer Total**				--
Exposure Route Cancer Total							1E-05	**Exposure Route Noncancer Total**				0.03	**Exposure Route Noncancer Total**				--
Exposure Medium: Subsurface Soil (0-72 inches bgs)																	
Exposure Route: Other Diné Lifeways Plant Inhalation																	
Uranium-238	--	pCi/g	--	pCi	2.4E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi	2.8E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi	3.4E-08	risk/pCi	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.5	pCi/g	9.3E+02	pCi	5.9E-08	risk/pCi	5.5E-05	--	--	--	--	--	--	--	--	--	--
Radionuclide Cancer Total							6E-05	**Radionuclide Noncancer Total**				--	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.4E-04	mg/m^3	5.0E-03	mg/m^3	0.068	--	mg/m^3	5.0E-03	mg/m^3	--
Arsenic	11	mg/kg	7.8E-04	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	3.4E-06	8.6E-07	mg/m^3	1.5E-05	mg/m^3	0.057	--	mg/m^3	1.5E-05	mg/m^3	--
Barium	75	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.1E-05	mg/m^3	5.0E-04	mg/m^3	0.021	--	mg/m^3	5.0E-04	mg/m^3	--
Cadmium	0.073	mg/kg	2.6E-05	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	4.6E-08	2.8E-08	mg/m^3	1.0E-05	mg/m^3	0.0028	--	mg/m^3	1.0E-05	mg/m^3	--
Chromium	6.7	mg/kg	5.9E-04	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	4.9E-05	5.0E-07	mg/m^3	1.0E-04	mg/m^3	0.0050	--	mg/m^3	1.0E-04	mg/m^3	--
Cobalt	4.5	mg/kg	4.5E-04	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	4.1E-06	5.0E-07	mg/m^3	6.0E-06	mg/m^3	0.083	--	mg/m^3	6.0E-06	mg/m^3	--
Copper	5	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Iron	15,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Manganese	400	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.8E-04	mg/m^3	5.0E-05	mg/m^3	5.6	--	mg/m^3	5.0E-05	mg/m^3	--
Molybdenum	0.81	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	5.7E-07	mg/m^3	2.0E-03	mg/m^3	0.00028	--	mg/m^3	2.0E-03	mg/m^3	--
Selenium	1.5	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.7E-07	mg/m^3	2.0E-02	mg/m^3	0.0000083	--	mg/m^3	2.0E-02	mg/m^3	--
Thallium	0.092	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--	--	mg/m^3	--	mg/m^3	--
Uranium	2.90	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	2.4E-07	mg/m^3	4.0E-05	mg/m^3	0.0060	--	mg/m^3	4.0E-05	mg/m^3	--
Vanadium	25	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.9E-06	mg/m^3	1.0E-04	mg/m^3	0.019	--	mg/m^3	1.0E-04	mg/m^3	--
Metals Cancer Total							6E-05	**Metals Noncancer Total**				6	**Metals Noncancer Total**				--
Exposure Route Cancer Total							1E-04	**Exposure Route Noncancer Total**				6	**Exposure Route Noncancer Total**				--
Subsurface Soil (0-72 inches bgs) Receptor Cancer Risk Total							**7E-04**	**Receptor/Media Noncancer Hazard Total**				**8**	**Receptor/Media Noncancer Hazard Total**				**0.7**

Table C-5.5. Human Health Risk and Hazard Calculations - Arroyos on the Navajo Nation

Notes:

[a] COPCs are the constituents of interest with a maximum detected concentration exceeding the COPC screening level (see Table C-1).

[b] EPCs are provided on Table C-4.

[c] The intakes are the EPC multiplied by the exposure parameters and any applicable contaminant-specific inputs (see Table C-3 for exposure inputs, Table 4 of the NAUM risk assessment methodology [USEPA 2024b] report for contaminant-specific inputs, and Appendix B of the NAUM risk assessment methodology [USEPA 2024b] report for equations).

[d] The toxicity values are provided in Table 4 of the NAUM risk assessment methodology (USEPA 2024b).

[e] The cancer risk for each contaminant for each exposure pathway is calculated by multiplying the cancer intake value with the toxicity value as follows: For contaminant *i* : $Risk_i = Cancer\ Intake_i \times Toxicity\ Factor_i$

[f] The noncancer hazard for each contaminant for each exposure pathway is calculated by dividing the noncancer intake value by the toxicity value as follows: For contaminant *i* : $Hazard_i = Noncancer\ Intake_i / Toxicity\ Factor_i$

--	Not applicable	NAUM	Navajo abandoned uranium mine
µg/m^3	Microgram per cubic meter	pCi	Picocurie
bgs	Below ground surface	pCi/g	Picocurie per gram
COPC	Contaminant of potential concern	RfC	Reference concentration
EPC	Exposure point concentration	RfD	Reference dose
mg/kg	Milligram per kilogram	SE	Secular equilbrium
mg/kg-day	Milligram per kilogram per day	USEPA	U.S. Environmental Protection Agency
mg/m^3	Milligram per cubic meter		

Reference:

U.S. Environmental Protection Agency (USEPA). 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-5.6. Human Health Risk and Hazard Calculations - Arroyos on United Nuclear Corporation Property

Arroyos on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult
Exposure Medium: Surface Soil (0-6 inches bgs)												
Exposure Route: Incidental Soil Ingestion												
Uranium-238	--	pCi/g	--	pCi/g	1.3E-10	risk/pCi/g	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	1.5E-10	risk/pCi/g	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	1.7E-10	risk/pCi/g	--	--	--	--	--	--
Radium-226 in SE	1.1	pCi/g	2.8E+02	pCi/g	5.7E-09	risk/pCi/g	1.6E-06	--	--	--	--	--
Radionuclide Cancer Total							2E-06	**Radionuclide Noncancer Total**				--
Aluminum	4,400	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0015
Arsenic	4.6	mg/kg	3.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-07	9.5E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0032
Barium	48	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.6E-05	mg/kg-day	2.0E-01	mg/kg-day	0.000082
Cadmium	0.054	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-08	mg/kg-day	1.0E-04	mg/kg-day	0.00018
Chromium	5.0	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	1.7E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0057
Cobalt	4.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0050
Copper	4.7	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.6E-06	mg/kg-day	4.0E-02	mg/kg-day	0.000040
Iron	13,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	4.5E-03	mg/kg-day	7.0E-01	mg/kg-day	0.0064
Manganese	240	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	8.2E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0034
Molybdenum	0.28	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.6E-08	mg/kg-day	5.0E-03	mg/kg-day	0.000019
Selenium	1.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.8E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000075
Thallium	0.057	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.0E-08	mg/kg-day	1.0E-05	mg/kg-day	0.0020
Uranium	0.091	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.1E-08	mg/kg-day	2.0E-04	mg/kg-day	0.00016
Vanadium	0.53	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000036
Metals Cancer Total							5E-07	**Metals Noncancer Total**				0.03
Exposure Route Cancer Total							2E-06	**Exposure Route Noncancer Total**				0.03

Table C-5.6. Human Health Risk and Hazard Calculations - Arroyos on United Nuclear Corporation Property

Arroyos on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**
Exposure Medium: Surface Soil (0-6 inches bgs)												
Exposure Route: External Exposure												
Uranium-238	--	pCi/g	--	pCi/g	1.2E-10	risk/year pCi/g	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	2.5E-10	risk/year pCi/g	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	8.5E-10	risk/year pCi/g	--	--	--	--	--	--
Radium-226 in SE	1.1	pCi/g	2.3E+00	pCi/g	8.4E-06	risk/year pCi/g	1.9E-05	--	--	--	--	--
Radionuclide Cancer Total							2E-05	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							2E-05	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure												
Aluminum	4,400	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	4.6	mg/kg	7.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-07	2.0E-07	mg/kg-day	3.0E-04	mg/kg-day	0.00067
Barium	48	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.054	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.1E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000031
Chromium	5.0	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	4.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	4.7	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	13,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	240	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.28	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	1.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.057	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	0.091	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	0.53	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-07	**Metals Noncancer Total**				0.0007
Exposure Route Cancer Total							1E-07	**Exposure Route Noncancer Total**				0.0007

Table C-5.6. Human Health Risk and Hazard Calculations - Arroyos on United Nuclear Corporation Property

Arroyos on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult
Exposure Medium: Surface Soil (0-6 inches bgs)												
Exposure Route: Inhalation of Particulates												
Uranium-238	--	pCi/g	--	pCi	2.4E-08	risk/pCi	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi	2.8E-08	risk/pCi	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi	3.4E-08	risk/pCi	--	--	--	--	--	--
Radium-226 in SE	1.1	pCi/g	2.8E-03	pCi	5.9E-08	risk/pCi	1.6E-10	--	--	--	--	--
						Radionuclide Cancer Total	2E-10				**Radionuclide Noncancer Total**	--
Aluminum	4,400	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	6.1E-08	mg/m^3	5.0E-03	mg/m^3	0.000012
Arsenic	4.6	mg/kg	2.3E-08	$\mu g/m^3$	4.3E-03	$(\mu g/m^3)^{-1}$	9.8E-11	6.4E-11	mg/m^3	1.5E-05	mg/m^3	0.0000042
Barium	48	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	6.6E-10	mg/m^3	5.0E-04	mg/m^3	0.0000013
Cadmium	0.054	mg/kg	2.7E-10	$\mu g/m^3$	1.8E-03	$(\mu g/m^3)^{-1}$	4.8E-13	7.5E-13	mg/m^3	1.0E-05	mg/m^3	0.000000075
Chromium	5.0	mg/kg	2.6E-09	$\mu g/m^3$	8.4E-02	$(\mu g/m^3)^{-1}$	2.2E-10	1.2E-09	mg/m^3	1.0E-04	mg/m^3	0.000012
Cobalt	4.4	mg/kg	2.2E-08	$\mu g/m^3$	9.0E-03	$(\mu g/m^3)^{-1}$	2.0E-10	6.1E-11	mg/m^3	6.0E-06	mg/m^3	0.000010
Copper	4.7	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Iron	13,000	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Manganese	240	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.3E-09	mg/m^3	5.0E-05	mg/m^3	0.000066
Molybdenum	0.28	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	3.9E-12	mg/m^3	2.0E-03	mg/m^3	0.0000000019
Selenium	1.1	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.5E-11	mg/m^3	2.0E-02	mg/m^3	0.00000000076
Thallium	0.057	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Uranium	0.091	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	1.3E-12	mg/m^3	4.0E-05	mg/m^3	0.000000031
Vanadium	0.53	mg/kg	--	$\mu g/m^3$	--	$(\mu g/m^3)^{-1}$	--	7.3E-12	mg/m^3	1.0E-04	mg/m^3	0.000000073
						Metals Cancer Total	5E-10				**Metals Noncancer Total**	0.0001
						Exposure Route Cancer Total	7E-10				**Exposure Route Noncancer Total**	0.0001
						Surface Soil (0-6 inches bgs) Receptor Cancer Risk Total	**2E-05**				**Receptor/Media Noncancer Hazard Total**	**0.03**

Table C-5.6. Human Health Risk and Hazard Calculations - Arroyos on United Nuclear Corporation Property

Arroyos on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	EPC[b]	Units	Cancer Intake[c]	Units	Slope Factor/ Unit Risk[d]	Units	Cancer Risk[e]	Adult Noncancer Intake[c]	Units	RfD/ RfC[d]	Units	Noncancer Hazard[f] Adult
Exposure Medium: Subsurface Soil (0-72 inches bgs)												
Exposure Route: Incidental Soil Ingestion												
Uranium-238	--	pCi/g	--	pCi/g	1.3E-10	risk/pCi/g	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	1.5E-10	risk/pCi/g	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	1.7E-10	risk/pCi/g	--	--	--	--	--	--
Radium-226 in SE	1.1	pCi/g	2.8E+02	pCi/g	5.7E-09	risk/pCi/g	1.6E-06	--	--	--	--	--
Radionuclide Cancer Total							2E-06	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.6E-03	mg/kg-day	1.0E+00	mg/kg-day	0.0016
Arsenic	4.8	mg/kg	3.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.3E-07	9.9E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0033
Barium	62	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	0.00011
Cadmium	0.055	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.9E-08	mg/kg-day	1.0E-04	mg/kg-day	0.00019
Chromium	5.0	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	1.7E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0057
Cobalt	4.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0050
Copper	5.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	1.8E-06	mg/kg-day	4.0E-02	mg/kg-day	0.000046
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	5.1E-03	mg/kg-day	7.0E-01	mg/kg-day	0.0073
Manganese	280	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.6E-05	mg/kg-day	2.4E-02	mg/kg-day	0.0040
Molybdenum	0.28	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	9.6E-08	mg/kg-day	5.0E-03	mg/kg-day	0.000019
Selenium	1.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.8E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000075
Thallium	0.059	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.0E-08	mg/kg-day	1.0E-05	mg/kg-day	0.0020
Uranium	0.091	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.1E-08	mg/kg-day	2.0E-04	mg/kg-day	0.00016
Vanadium	0.62	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	2.1E-07	mg/kg-day	5.0E-03	mg/kg-day	0.000042
Metals Cancer Total							5E-07	**Metals Noncancer Total**				0.03
Exposure Route Cancer Total							2E-06	**Exposure Route Noncancer Total**				0.03

Table C-5.6. Human Health Risk and Hazard Calculations - Arroyos on United Nuclear Corporation Property

Arroyos on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f]** **Adult**
Exposure Medium: Subsurface Soil (0-72 inches bgs)												
Exposure Route: External Exposure												
Uranium-238	--	pCi/g	--	pCi/g	1.2E-10	risk/year pCi/g	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi/g	2.5E-10	risk/year pCi/g	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi/g	8.5E-10	risk/year pCi/g	--	--	--	--	--	--
Radium-226 in SE	1.1	pCi/g	2.3E+00	pCi/g	8.4E-06	risk/year pCi/g	1.9E-05	--	--	--	--	--
Radionuclide Cancer Total							2E-05	**Radionuclide Noncancer Total**				--
Exposure Route Cancer Total							2E-05	**Exposure Route Noncancer Total**				--
Exposure Route: Dermal Exposure												
Aluminum	4,700	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E+00	mg/kg-day	--
Arsenic	4.8	mg/kg	7.4E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-07	2.1E-07	mg/kg-day	3.0E-04	mg/kg-day	0.00069
Barium	62	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-01	mg/kg-day	--
Cadmium	0.055	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	3.2E-09	mg/kg-day	1.0E-04	mg/kg-day	0.000032
Chromium	5.0	mg/kg	--	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-03	mg/kg-day	--
Cobalt	4.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	3.0E-04	mg/kg-day	--
Copper	5.4	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	4.0E-02	mg/kg-day	--
Iron	15,000	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	7.0E-01	mg/kg-day	--
Manganese	280	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.4E-02	mg/kg-day	--
Molybdenum	0.28	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Selenium	1.1	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Thallium	0.059	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	1.0E-05	mg/kg-day	--
Uranium	0.091	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	2.0E-04	mg/kg-day	--
Vanadium	0.62	mg/kg	--	mg/kg-day	--	$(mg/kg\text{-}day)^{-1}$	--	--	mg/kg-day	5.0E-03	mg/kg-day	--
Metals Cancer Total							1E-07	**Metals Noncancer Total**				0.0007
Exposure Route Cancer Total							1E-07	**Exposure Route Noncancer Total**				0.0007

Table C-5.6. Human Health Risk and Hazard Calculations - Arroyos on United Nuclear Corporation Property

Arroyos on United Nuclear Corporation Property - UNC Outdoor Worker												
COPC[a]	**EPC[b]**	**Units**	**Cancer Intake[c]**	**Units**	**Slope Factor/ Unit Risk[d]**	**Units**	**Cancer Risk[e]**	**Adult Noncancer Intake[c]**	**Units**	**RfD/ RfC[d]**	**Units**	**Noncancer Hazard[f] Adult**
Exposure Medium: Subsurface Soil (0-72 inches bgs)												
Exposure Route: Inhalation of Particulates												
Uranium-238	--	pCi/g	--	pCi	2.4E-08	risk/pCi	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	pCi	2.8E-08	risk/pCi	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	pCi	3.4E-08	risk/pCi	--	--	--	--	--	--
Radium-226 in SE	1.1	pCi/g	2.8E-03	pCi	5.9E-08	risk/pCi	1.6E-10	--	--	--	--	--
Radionuclide Cancer Total							2E-10	**Radionuclide Noncancer Total**				--
Aluminum	4,700	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	6.5E-08	mg/m^3	5.0E-03	mg/m^3	0.000013
Arsenic	4.8	mg/kg	2.4E-08	µg/m^3	4.3E-03	(µg/m^3)$^{-1}$	1.0E-10	6.6E-11	mg/m^3	1.5E-05	mg/m^3	0.0000044
Barium	62	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	8.6E-10	mg/m^3	5.0E-04	mg/m^3	0.0000017
Cadmium	0.055	mg/kg	2.7E-10	µg/m^3	1.8E-03	(µg/m^3)$^{-1}$	4.9E-13	7.6E-13	mg/m^3	1.0E-05	mg/m^3	0.000000076
Chromium	5.0	mg/kg	2.6E-09	µg/m^3	8.4E-02	(µg/m^3)$^{-1}$	2.2E-10	1.2E-09	mg/m^3	1.0E-04	mg/m^3	0.000012
Cobalt	4.4	mg/kg	2.2E-08	µg/m^3	9.0E-03	(µg/m^3)$^{-1}$	2.0E-10	6.1E-11	mg/m^3	6.0E-06	mg/m^3	0.000010
Copper	5.4	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Iron	15,000	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Manganese	280	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	3.9E-09	mg/m^3	5.0E-05	mg/m^3	0.000077
Molybdenum	0.28	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	3.9E-12	mg/m^3	2.0E-03	mg/m^3	0.0000000019
Selenium	1.1	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	1.5E-11	mg/m^3	2.0E-02	mg/m^3	0.00000000076
Thallium	0.059	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	--	mg/m^3	--	mg/m^3	--
Uranium	0.091	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	1.3E-12	mg/m^3	4.0E-05	mg/m^3	0.000000031
Vanadium	0.62	mg/kg	--	µg/m^3	--	(µg/m^3)$^{-1}$	--	8.6E-12	mg/m^3	1.0E-04	mg/m^3	0.000000086
Metals Cancer Total							5E-10	**Metals Noncancer Total**				0.0001
Exposure Route Cancer Total							7E-10	**Exposure Route Noncancer Total**				0.0001
Subsurface Soil (0-72 inches bgs) Receptor Cancer Risk Total							**2E-05**	**Receptor/Media Noncancer Hazard Total**				**0.03**

Notes:

[a] COPCs are the constituents of interest with a maximum detected concentration exceeding the COPC screening level (see Table C-1).

[b] EPCs are provided on Table C-4.

[c] The intakes are the EPC multiplied by the exposure parameters and any applicable contaminant-specific inputs (see Table C-3 for exposure inputs, Table 4 of the NAUM risk assessment methodology [USEPA 2024b] report for contaminant-specific inputs, and Appendix B of the NAUM risk assessment methodology [USEPA 2024b] report for equations).

[d] The toxicity values are provided in Table 4 of the NAUM risk assessment methodology (USEPA 2024b).

[e] The cancer risk for each contaminant for each exposure pathway is calculated by multiplying the cancer intake value with the toxicity value as follows: For contaminant *i* : $Risk_i$ = $Cancer\ Intake_i$ x $Toxicity\ Factor_i$

[f] The noncancer hazard for each contaminant for each exposure pathway is calculated by dividing the noncancer intake value by the toxicity value as follows: For contaminant *i* : $Hazard_i$ = $Noncancer\ Intake_i$ / $Toxicity\ Factor_i$

--	Not applicable	NAUM	Navajo abandoned uranium mine
µg/m^3	Microgram per cubic meter	pCi	Picocurie
bgs	Below ground surface	pCi/g	Picocurie per gram
COPC	Contaminant of potential concern	RfC	Reference concentration
EPC	Exposure point concentration	RfD	Reference dose
Kerr-McGee	Kerr-McGee Corporation	SE	Secular equilbrium
mg/kg	Milligram per kilogram	UNC	United Nuclear Corporation
mg/kg-day	Milligram per kilogram per day	USEPA	U.S. Environmental Protection Agency
mg/m^3	Milligram per cubic meter		

Reference:

U.S. Environmental Protection Agency (USEPA). 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-6. Human Health Risk and Hazard Summary by Exposure Pathway

Church Rock Mine No. 1 - Kee'da'whíí téél (Full-Time Resident)																													
COPC	EPC	Units	Incidental Soil Ingestion			External Exposure / Dermal Contact			Inhalation of Particulates			Plant Consumption			Animal Consumption			ODL Plant Ingestion			ODL Plant Dermal			ODL Plant Inhalation			Total Risk or Hazard		
			Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard
Surface Soil (0-6 inches bgs)																													
Uranium-238	1.1	pCi/g	1.4E-06	--	--	7.0E-09	--	--	2.3E-09	--	--	6.8E-06	--	--	7.7E-06	--	--	3.1E-06	--	--	--	--	--	6.0E-06	--	--	3E-05	--	--
Uranium-234	1.2	pCi/g	1.7E-06	--	--	1.5E-08	--	--	2.9E-09	--	--	8.1E-06	--	--	9.3E-06	--	--	3.8E-06	--	--	--	--	--	7.7E-06	--	--	3E-05	--	--
Thorium-230	1.7	pCi/g	2.7E-06	--	--	7.3E-08	--	--	5.0E-09	--	--	3.6E-06	--	--	7.9E-09	--	--	2.0E-06	--	--	--	--	--	2.6E-06	--	--	1E-05	--	--
Radium-226 in SE	6.7	pCi/g	3.6E-04	--	--	2.9E-03	--	--	3.5E-08	--	--	2.7E-03	--	--	5.2E-03	--	--	1.5E-03	--	--	--	--	--	2.5E-04	--	--	1E-02	--	--
Aluminum	4,600	mg/kg	--	0.020	0.12	--	--	--	--	0.00012	0.00012	--	0.055	0.14	--	0.0032	0.0087	--	0.033	--	--	--	--	--	0.066	--	--	0.2	0.3
Arsenic	4.9	mg/kg	2.6E-05	0.042	0.25	1.5E-06	0.0025	0.015	2.7E-09	0.000042	0.000042	1.0E-04	0.21	0.56	8.1E-06	0.016	0.0425	5.2E-05	0.13	--	4.4E-06	0.011	--	1.5E-06	0.026	--	2E-04	0.4	0.9
Barium	110	mg/kg	--	0.0024	0.014	--	--	--	--	0.000029	0.000029	--	0.013	0.034	--	0.000072	0.00019	--	0.0083	--	--	--	--	--	0.033	--	--	0.06	0.05
Cadmium	0.14	mg/kg	--	0.0060	0.036	--	0.00028	0.0017	3.3E-11	0.0000018	0.0000018	--	0.083	0.22	--	0.0032	0.0084	--	0.056	--	--	0.0062	--	9.3E-08	0.0056	--	9E-08	0.2	0.3
Chromium	6.0	mg/kg	4.8E-05	0.0086	0.052	--	--	--	1.1E-07	0.0000078	0.0000078	8.4E-05	0.024	0.06	1.8E-05	0.0053	0.0141	2.6E-05	0.015	--	--	--	--	4.5E-05	0.0009	--	2E-04	0.1	0.1
Cobalt	6.1	mg/kg	--	0.087	0.53	--	--	--	7.1E-09	0.00013	0.00013	--	0.37	0.98	--	0.20	0.53	--	0.22	--	--	--	--	6.0E-06	0.12	--	6E-06	1	2
Copper	12	mg/kg	--	0.0013	0.0078	--	--	--	--	--	--	--	0.051	0.14	--	0.0027	0.0072	--	0.033	--	--	--	--	--	--	--	--	0.09	0.2
Iron	11,000	mg/kg	--	0.068	0.41	--	--	--	--	--	--	--	0.19	0.49	--	0.14	0.38	--	0.11	--	--	--	--	--	--	--	--	0.5	1
Manganese	160	mg/kg	--	0.029	0.17	--	--	--	--	0.00042	0.00042	--	0.73	1.9	--	0.0022	0.0059	--	0.49	--	--	--	--	--	2.3	--	--	4	2
Molybdenum	0.32	mg/kg	--	0.00028	0.0017	--	--	--	--	0.000000021	0.000000021	--	0.0070	0.019	--	0.00029	0.00077	--	0.0047	--	--	--	--	--	0.00012	--	--	0.01	0.02
Selenium	3.4	mg/kg	--	0.0029	0.018	--	--	--	--	0.000000022	0.000000022	--	0.012	0.033	--	0.052	0.14	--	0.0075	--	--	--	--	--	0.000019	--	--	0.08	0.2
Thallium	0.14	mg/kg	--	0.060	0.36	--	--	--	--	--	--	--	0.14	0.39	--	0.25	0.69	--	0.088	--	--	--	--	--	--	--	--	0.5	1
Uranium	7.3	mg/kg	--	0.16	0.95	--	--	--	--	0.000024	0.000024	--	0.47	1.3	--	0.0051	0.014	--	0.30	--	--	--	--	--	0.016	--	--	1.0	2
Vanadium	14	mg/kg	--	0.012	0.07	--	--	--	--	0.000018	0.000018	--	0.034	0.092	--	0.0031	0.0084	--	0.021	--	--	--	--	--	0.011	--	--	0.08	0.2
Exposure Pathway Risk/Hazard Total			**4E-04**	**0.5**	**3**	**3E-03**	**0.003**	**0.02**	**2E-07**	**0.0008**	**0.0008**	**3E-03**	**2**	**6**	**5E-03**	**0.7**	**2**	**2E-03**	**2**	**--**	**4E-06**	**0.02**	**--**	**3E-04**	**3**	**--**	**1E-02**	**8**	**10**
Subsurface Soil (0-72 inches bgs)																													
Uranium-238	1.1	pCi/g	1.4E-06	--	--	7.0E-09	--	--	2.3E-09	--	--	6.8E-06	--	--	7.7E-06	--	--	3.1E-06	--	--	--	--	--	6.0E-06	--	--	3E-05	--	--
Uranium-234	1.2	pCi/g	1.7E-06	--	--	1.5E-08	--	--	2.9E-09	--	--	8.1E-06	--	--	9.3E-06	--	--	3.8E-06	--	--	--	--	--	7.7E-06	--	--	3E-05	--	--
Thorium-230	1.7	pCi/g	2.7E-06	--	--	7.3E-08	--	--	5.0E-09	--	--	3.6E-06	--	--	7.9E-09	--	--	2.0E-06	--	--	--	--	--	2.6E-06	--	--	1E-05	--	--
Radium-226 in SE	17	pCi/g	9.2E-04	--	--	7.3E-03	--	--	8.8E-08	--	--	6.9E-03	--	--	1.3E-02	--	--	3.8E-03	--	--	--	--	--	6.3E-04	--	--	3E-02	--	--
Aluminum	4,600	mg/kg	--	0.020	0.12	--	--	--	--	0.00012	0.00012	--	0.055	0.14	--	0.0032	0.0087	--	0.033	--	--	--	--	--	0.066	--	--	0.2	0.3
Arsenic	4.8	mg/kg	2.6E-05	0.042	0.24	1.5E-06	0.0024	0.015	2.7E-09	0.000042	0.000042	1.0E-04	0.21	0.54	7.9E-06	0.016	0.042	5.1E-05	0.12	--	4.3E-06	0.010	--	1.5E-06	0.025	--	2E-04	0.4	0.8
Barium	110	mg/kg	--	0.0024	0.014	--	--	--	--	0.000029	0.000029	--	0.013	0.03	--	0.000072	0.00019	--	0.0083	--	--	--	--	--	0.033	--	--	0.06	0.05
Cadmium	0.14	mg/kg	--	0.0060	0.036	--	0.00028	0.0017	3.3E-11	0.0000018	0.0000018	--	0.083	0.22	--	0.0032	0.0084	--	0.056	--	--	0.0062	--	9.3E-08	0.0056	--	9E-08	0.2	0.3
Chromium	6.0	mg/kg	4.8E-05	0.0086	0.052	--	--	--	1.1E-07	0.0000078	0.0000078	8.4E-05	0.024	0.06	1.8E-05	0.0053	0.0141	2.6E-05	0.015	--	--	--	--	4.5E-05	0.0009	--	2E-04	0.1	0.1
Cobalt	6.1	mg/kg	--	0.087	0.53	--	--	--	7.1E-09	0.00013	0.00013	--	0.37	0.98	--	0.20	0.53	--	0.22	--	--	--	--	6.0E-06	0.12	--	6E-06	1	2
Copper	12	mg/kg	--	0.0013	0.0078	--	--	--	--	--	--	--	0.051	0.14	--	0.0027	0.0072	--	0.033	--	--	--	--	--	--	--	--	0.09	0.2
Iron	11,000	mg/kg	--	0.068	0.41	--	--	--	--	--	--	--	0.19	0.49	--	0.14	0.38	--	0.11	--	--	--	--	--	--	--	--	0.5	1
Manganese	160	mg/kg	--	0.029	0.17	--	--	--	--	0.00042	0.00042	--	0.73	1.9	--	0.0022	0.0059	--	0.49	--	--	--	--	--	2.3	--	--	4	2
Molybdenum	0.32	mg/kg	--	0.00028	0.0017	--	--	--	--	0.000000021	0.000000021	--	0.0070	0.019	--	0.00029	0.00077	--	0.0047	--	--	--	--	--	0.00012	--	--	0.01	0.02
Selenium	3.1	mg/kg	--	0.0027	0.016	--	--	--	--	0.000000020	0.000000020	--	0.011	0.030	--	0.048	0.13	--	0.0068	--	--	--	--	--	0.000017	--	--	0.07	0.2
Thallium	0.14	mg/kg	--	0.060	0.36	--	--	--	--	--	--	--	0.14	0.39	--	0.25	0.69	--	0.088	--	--	--	--	--	--	--	--	0.5	1
Uranium	7.3	mg/kg	--	0.16	0.95	--	--	--	--	0.000024	0.000024	--	0.47	1.3	--	0.0051	0.014	--	0.30	--	--	--	--	--	0.016	--	--	1	2
Vanadium	14	mg/kg	--	0.012	0.073	--	--	--	--	0.000018	0.000018	--	0.034	0.092	--	0.0031	0.0084	--	0.021	--	--	--	--	--	0.011	--	--	0.08	0.2
Exposure Pathway Risk/Hazard Total			**1E-03**	**0.5**	**3**	**7E-03**	**0.003**	**0.02**	**2E-07**	**0.0008**	**0.0008**	**7E-03**	**2**	**6**	**1E-02**	**0.7**	**2**	**4E-03**	**2**	**--**	**4E-06**	**0.02**	**--**	**7E-04**	**3**	**--**	**3E-02**	**8**	**10**

Table C-6. Human Health Risk and Hazard Summary by Exposure Pathway

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)																													
COPC	EPC	Units	Incidental Soil Ingestion			External Exposure / Dermal Contact			Inhalation of Particulates			Plant Consumption			Animal Consumption			ODL Plant Ingestion			ODL Plant Dermal			ODL Plant Inhalation			Total Risk or Hazard		
			Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard
Surface Soil (0-6 inches bgs)																													
Uranium-238	1.3	pCi/g	1.7E-06	--	--	8.2E-09	--	--	2.7E-09	--	--	8.0E-06	--	--	9.1E-06	--	--	3.7E-06	--	--	--	--	--	7.1E-06	--	--	3E-05	--	--
Uranium-234	1.4	pCi/g	2.0E-06	--	--	1.8E-08	--	--	3.4E-09	--	--	9.5E-06	--	--	1.1E-05	--	--	4.4E-06	--	--	--	--	--	9.0E-06	--	--	4E-05	--	--
Thorium-230	3.6	pCi/g	5.7E-06	--	--	1.6E-07	--	--	1.1E-08	--	--	7.7E-06	--	--	1.7E-08	--	--	4.2E-06	--	--	--	--	--	5.5E-06	--	--	2E-05	--	--
Radium-226 in SE	9.3	pCi/g	5.0E-04	--	--	4.0E-03	--	--	4.8E-08	--	--	3.8E-03	--	--	7.2E-03	--	--	2.1E-03	--	--	--	--	--	3.5E-04	--	--	2E-02	--	--
Aluminum	6,300	mg/kg	--	0.027	0.16	--	--	--	--	0.00016	0.00016	--	0.076	0.20	--	0.0044	0.0120	--	0.045	--	--	--	--	--	0.091	--	--	0.2	0.4
Arsenic	6.6	mg/kg	3.6E-05	0.057	0.33	2.1E-06	0.0033	0.020	3.7E-09	0.000057	0.000057	1.4E-04	0.29	0.75	1.1E-05	0.022	0.0572	7.0E-05	0.17	--	5.9E-06	0.014	--	2.0E-06	0.035	--	3E-04	0.6	1.0
Barium	160	mg/kg	--	0.0034	0.021	--	--	--	--	0.000042	0.000042	--	0.018	0.049	--	0.000104	0.00028	--	0.0120	--	--	--	--	--	0.048	--	--	0.08	0.07
Cadmium	0.13	mg/kg	--	0.0056	0.034	--	0.00026	0.0016	3.0E-11	0.0000017	0.0000017	--	0.077	0.21	--	0.0030	0.0078	--	0.052	--	--	0.0057	--	8.7E-08	0.0052	--	9E-08	0.1	0.3
Chromium	10	mg/kg	8.0E-05	0.0143	0.087	--	--	--	1.8E-07	0.000013	0.000013	1.4E-04	0.040	0.11	3.1E-05	0.0088	0.0235	4.4E-05	0.024	--	--	--	--	7.5E-05	0.0075	--	4E-04	0.1	0.2
Cobalt	6.9	mg/kg	--	0.099	0.60	--	--	--	8.1E-09	0.00015	0.00015	--	0.41	1.10	--	0.22	0.60	--	0.25	--	--	--	--	6.8E-06	0.14	--	7E-06	1	2
Copper	13	mg/kg	--	0.0014	0.0085	--	--	--	--	--	--	--	0.055	0.15	--	0.0029	0.0078	--	0.036	--	--	--	--	--	--	--	--	0.10	0.2
Iron	16,000	mg/kg	--	0.098	0.59	--	--	--	--	--	--	--	0.27	0.71	--	0.21	0.55	--	0.16	--	--	--	--	--	--	--	--	0.7	2
Manganese	200	mg/kg	--	0.036	0.22	--	--	--	--	0.00052	0.00052	--	0.92	2.4	--	0.0028	0.0074	--	0.61	--	--	--	--	--	2.9	--	--	4	3
Molybdenum	0.31	mg/kg	--	0.00027	0.0016	--	--	--	--	0.000000020	0.000000020	--	0.0068	0.018	--	0.00028	0.00074	--	0.0045	--	--	--	--	--	0.00011	--	--	0.01	0.02
Selenium	3.0	mg/kg	--	0.0026	0.016	--	--	--	--	0.000000020	0.000000020	--	0.011	0.029	--	0.046	0.13	--	0.0066	--	--	--	--	--	0.000017	--	--	0.07	0.2
Thallium	0.16	mg/kg	--	0.069	0.42	--	--	--	--	--	--	--	0.16	0.45	--	0.29	0.78	--	0.101	--	--	--	--	--	--	--	--	0.6	2
Uranium	3.6	mg/kg	--	0.08	0.47	--	--	--	--	0.000012	0.000012	--	0.23	0.6	--	0.0025	0.007	--	0.15	--	--	--	--	--	0.008	--	--	0.5	1
Vanadium	16	mg/kg	--	0.014	0.08	--	--	--	--	0.000021	0.000021	--	0.038	0.106	--	0.0035	0.0096	--	0.024	--	--	--	--	--	0.012	--	--	0.09	0.2
Exposure Pathway Risk/Hazard Total			**6E-04**	**0.5**	**3.0**	**4E-03**	**0.004**	**0.02**	**3E-07**	**0.001**	**0.001**	**4E-03**	**3**	**7**	**7E-03**	**0.8**	**2**	**2E-03**	**2**	**--**	**6E-06**	**0.02**	**--**	**5E-04**	**3**	**--**	**2E-02**	**8**	**10**
Subsurface Soil (0-72 inches bgs)																													
Uranium-238	1.3	pCi/g	1.7E-06	--	--	8.2E-09	--	--	2.7E-09	--	--	8.0E-06	--	--	9.1E-06	--	--	3.7E-06	--	--	--	--	--	7.1E-06	--	--	3E-05	--	--
Uranium-234	1.4	pCi/g	2.0E-06	--	--	1.8E-08	--	--	3.4E-09	--	--	9.5E-06	--	--	1.1E-05	--	--	4.4E-06	--	--	--	--	--	9.0E-06	--	--	4E-05	--	--
Thorium-230	3.6	pCi/g	5.7E-06	--	--	1.6E-07	--	--	1.1E-08	--	--	7.7E-06	--	--	1.7E-08	--	--	4.2E-06	--	--	--	--	--	5.5E-06	--	--	2E-05	--	--
Radium-226 in SE	43	pCi/g	2.3E-03	--	--	1.8E-02	--	--	2.2E-07	--	--	1.7E-02	--	--	3.3E-02	--	--	9.5E-03	--	--	--	--	--	1.6E-03	--	--	8E-02	--	--
Aluminum	6,300	mg/kg	--	0.027	0.16	--	--	--	--	0.00016	0.00016	--	0.076	0.20	--	0.0044	0.012	--	0.045	--	--	--	--	--	0.091	--	--	0.2	0.4
Arsenic	6.3	mg/kg	3.4E-05	0.055	0.32	2.0E-06	0.0032	0.019	3.5E-09	0.000055	0.000055	1.3E-04	0.27	0.71	1.0E-05	0.021	0.055	6.7E-05	0.16	--	5.7E-06	0.014	--	2.0E-06	0.033	--	3E-04	0.6	1
Barium	160	mg/kg	--	0.0034	0.021	--	--	--	--	0.000042	0.000042	--	0.018	0.05	--	0.00010	0.00028	--	0.012	--	--	--	--	--	0.048	--	--	0.08	0.07
Cadmium	0.13	mg/kg	--	0.0056	0.034	--	0.00026	0.0016	3.0E-11	0.0000017	0.0000017	--	0.077	0.21	--	0.0030	0.0078	--	0.052	--	--	0.0057	--	8.7E-08	0.0052	--	9E-08	0.1	0.3
Chromium	10	mg/kg	8.0E-05	0.0143	0.087	--	--	--	1.8E-07	0.000013	0.000013	1.4E-04	0.040	0.11	3.1E-05	0.0088	0.0235	4.4E-05	0.024	--	--	--	--	7.5E-05	0.0075	--	4E-04	0.1	0.2
Cobalt	6.9	mg/kg	--	0.099	0.60	--	--	--	8.1E-09	0.00015	0.00015	--	0.41	1.1	--	0.22	0.60	--	0.25	--	--	--	--	6.8E-06	0.14	--	7E-06	1	2
Copper	13	mg/kg	--	0.0014	0.0085	--	--	--	--	--	--	--	0.055	0.15	--	0.0029	0.0078	--	0.036	--	--	--	--	--	--	--	--	0.1	0.2
Iron	16,000	mg/kg	--	0.098	0.59	--	--	--	--	--	--	--	0.27	0.71	--	0.21	0.55	--	0.16	--	--	--	--	--	--	--	--	0.7	2
Manganese	200	mg/kg	--	0.036	0.22	--	--	--	--	0.00052	0.00052	--	0.92	2.4	--	0.0028	0.0074	--	0.61	--	--	--	--	--	2.9	--	--	4	3
Molybdenum	0.51	mg/kg	--	0.00044	0.0027	--	--	--	--	0.000000033	0.000000033	--	0.011	0.030	--	0.00046	0.0012	--	0.0074	--	--	--	--	--	0.00019	--	--	0.02	0.03
Selenium	5.4	mg/kg	--	0.0046	0.028	--	--	--	--	0.000000035	0.000000035	--	0.019	0.052	--	0.083	0.23	--	0.012	--	--	--	--	--	0.000030	--	--	0.1	0.3
Thallium	0.16	mg/kg	--	0.069	0.42	--	--	--	--	--	--	--	0.16	0.45	--	0.29	0.78	--	0.10	--	--	--	--	--	--	--	--	0.6	2
Uranium	42	mg/kg	--	0.90	5.5	--	--	--	--	0.00014	0.00014	--	2.7	7.6	--	0.029	0.080	--	1.7	--	--	--	--	--	0.089	--	--	5	10
Vanadium	18	mg/kg	--	0.015	0.094	--	--	--	--	0.000023	0.000023	--	0.043	0.12	--	0.0040	0.011	--	0.027	--	--	--	--	--	0.014	--	--	0.10	0.2
Exposure Pathway Risk/Hazard Total			**2E-03**	**1**	**8**	**2E-02**	**0.003**	**0.02**	**4E-07**	**0.001**	**0.001**	**2E-02**	**5**	**14**	**3E-02**	**0.9**	**2**	**1E-02**	**3**	**--**	**6E-06**	**0.02**	**--**	**2E-03**	**3**	**--**	**8E-02**	**10**	**20**

Table C-6. Human Health Risk and Hazard Summary by Exposure Pathway

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí tééh (Full-Time Resident)																													
COPC	EPC	Units	Incidental Soil Ingestion			External Exposure / Dermal Contact			Inhalation of Particulates			Plant Consumption			Animal Consumption			ODL Plant Ingestion			ODL Plant Dermal			ODL Plant Inhalation			Total Risk or Hazard		
			Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard
Surface Soil (0-6 inches bgs)																													
Uranium-238	1.1	pCi/g	1.4E-06	--	--	7.0E-09	--	--	2.3E-09	--	--	6.8E-06	--	--	7.7E-06	--	--	3.1E-06	--	--	--	--	--	6.0E-06	--	--	3E-05	--	--
Uranium-234	1.0	pCi/g	1.4E-06	--	--	1.3E-08	--	--	2.3E-09	--	--	6.6E-06	--	--	7.5E-06	--	--	3.1E-06	--	--	--	--	--	6.2E-06	--	--	2E-05	--	--
Thorium-230	2.0	pCi/g	3.2E-06	--	--	8.6E-08	--	--	5.9E-09	--	--	4.3E-06	--	--	9.3E-09	--	--	2.3E-06	--	--	--	--	--	3.1E-06	--	--	1E-05	--	--
Radium-226 in SE	9.3	pCi/g	5.0E-04	--	--	4.0E-03	--	--	4.8E-08	--	--	3.8E-03	--	--	7.2E-03	--	--	2.1E-03	--	--	--	--	--	3.5E-04	--	--	2E-02	--	--
Aluminum	6,900	mg/kg	--	0.030	0.18	--	--	--	--	0.00018	0.00018	--	0.083	0.21	--	0.0048	0.0131	--	0.049	--	--	--	--	--	0.099	--	--	0.3	0.4
Arsenic	5.9	mg/kg	3.2E-05	0.051	0.30	1.9E-06	0.0030	0.018	3.3E-09	0.000051	0.000051	1.2E-04	0.26	0.67	9.7E-06	0.019	0.0511	6.3E-05	0.15	--	5.3E-06	0.013	--	1.8E-06	0.031	--	2E-04	0.5	1
Barium	82	mg/kg	--	0.0018	0.011	--	--	--	--	0.000021	0.000021	--	0.009	0.025	--	0.000053	0.00014	--	0.0062	--	--	--	--	--	0.025	--	--	0.04	0.04
Cadmium	0.16	mg/kg	--	0.0069	0.042	--	0.00032	0.0019	3.7E-11	0.0000021	0.0000021	--	0.094	0.26	--	0.0037	0.0096	--	0.064	--	--	0.0070	--	1.1E-07	0.0064	--	1E-07	0.2	0.3
Chromium	8.2	mg/kg	6.6E-05	0.0118	0.071	--	--	--	1.5E-07	0.000011	0.000011	1.1E-04	0.033	0.09	2.5E-05	0.0072	0.0192	3.6E-05	0.020	--	--	--	--	6.1E-05	0.0061	--	3E-04	0.1	0.2
Cobalt	5.2	mg/kg	--	0.075	0.45	--	--	--	6.1E-09	0.00011	0.00011	--	0.31	0.83	--	0.17	0.45	--	0.19	--	--	--	--	5.1E-06	0.10	--	5E-06	0.8	2
Copper	11	mg/kg	--	0.0012	0.0072	--	--	--	--	--	--	--	0.047	0.12	--	0.0025	0.0066	--	0.030	--	--	--	--	--	--	--	--	0.08	0.1
Iron	15,000	mg/kg	--	0.092	0.56	--	--	--	--	--	--	--	0.26	0.66	--	0.20	0.51	--	0.15	--	--	--	--	--	--	--	--	0.7	2
Manganese	230	mg/kg	--	0.041	0.25	--	--	--	--	0.00060	0.00060	--	1.05	2.8	--	0.0032	0.0085	--	0.70	--	--	--	--	--	3.4	--	--	5	3
Molybdenum	0.55	mg/kg	--	0.00047	0.0029	--	--	--	--	0.000000036	0.000000036	--	0.0121	0.032	--	0.00050	0.00132	--	0.0080	--	--	--	--	--	0.00020	--	--	0.02	0.04
Selenium	2.9	mg/kg	--	0.0025	0.015	--	--	--	--	0.000000019	0.000000019	--	0.010	0.028	--	0.045	0.12	--	0.0064	--	--	--	--	--	0.000016	--	--	0.06	0.2
Thallium	0.15	mg/kg	--	0.065	0.39	--	--	--	--	--	--	--	0.15	0.42	--	0.27	0.74	--	0.095	--	--	--	--	--	--	--	--	0.6	2
Uranium	6.2	mg/kg	--	0.13	0.81	--	--	--	--	0.000020	0.000020	--	0.40	1.1	--	0.0043	0.012	--	0.26	--	--	--	--	--	0.013	--	--	0.8	2
Vanadium	17	mg/kg	--	0.015	0.09	--	--	--	--	0.000022	0.000022	--	0.041	0.112	--	0.0037	0.0102	--	0.026	--	--	--	--	--	0.013	--	--	0.1	0.2
Exposure Pathway Risk/Hazard Total			6E-04	0.5	3	4E-03	0.003	0.02	2E-07	0.001	0.001	4E-03	3	7	7E-03	0.7	2	2E-03	2	--	5E-06	0.02	--	4E-04	4	--	**2E-02**	**9**	**10**
Subsurface Soil (0-66 inches bgs)																													
Uranium-238	1.1	pCi/g	1.4E-06	--	--	7.0E-09	--	--	2.3E-09	--	--	6.8E-06	--	--	7.7E-06	--	--	3.1E-06	--	--	--	--	--	6.0E-06	--	--	3E-05	--	--
Uranium-234	1.0	pCi/g	1.4E-06	--	--	1.3E-08	--	--	2.3E-09	--	--	6.6E-06	--	--	7.5E-06	--	--	3.1E-06	--	--	--	--	--	6.2E-06	--	--	2E-05	--	--
Thorium-230	2.0	pCi/g	3.2E-06	--	--	8.6E-08	--	--	5.9E-09	--	--	4.3E-06	--	--	9.3E-09	--	--	2.3E-06	--	--	--	--	--	3.1E-06	--	--	1E-05	--	--
Radium-226 in SE	9.3	pCi/g	5.0E-04	--	--	4.0E-03	--	--	4.8E-08	--	--	3.8E-03	--	--	7.2E-03	--	--	2.1E-03	--	--	--	--	--	3.5E-04	--	--	2E-02	--	--
Aluminum	6,900	mg/kg	--	0.030	0.18	--	--	--	--	0.00018	0.00018	--	0.083	0.21	--	0.0048	0.0131	--	0.049	--	--	--	--	--	0.099	--	--	0.3	0.4
Arsenic	5.9	mg/kg	3.2E-05	0.051	0.30	1.9E-06	0.0030	0.018	3.3E-09	0.000051	0.000051	1.2E-04	0.26	0.67	9.7E-06	0.019	0.051	6.3E-05	0.15	--	5.3E-06	0.013	--	1.8E-06	0.031	--	2E-04	0.5	1
Barium	82	mg/kg	--	0.0018	0.011	--	--	--	--	0.000021	0.000021	--	0.009	0.03	--	0.000053	0.00014	--	0.0062	--	--	--	--	--	0.025	--	--	0.04	0.04
Cadmium	0.16	mg/kg	--	0.0069	0.042	--	0.00032	0.0019	3.7E-11	0.0000021	0.0000021	--	0.094	0.26	--	0.0037	0.0096	--	0.064	--	--	0.0070	--	1.1E-07	0.0064	--	1E-07	0.2	0.3
Chromium	8.2	mg/kg	6.6E-05	0.0118	0.071	--	--	--	1.5E-07	0.000011	0.000011	1.1E-04	0.033	0.09	2.5E-05	0.0072	0.0192	3.6E-05	0.020	--	--	--	--	6.1E-05	0.0061	--	3E-04	0.1	0.2
Cobalt	5.2	mg/kg	--	0.075	0.45	--	--	--	6.1E-09	0.00011	0.00011	--	0.31	0.83	--	0.17	0.45	--	0.19	--	--	--	--	5.1E-06	0.10	--	5E-06	0.8	2
Copper	11	mg/kg	--	0.0012	0.0072	--	--	--	--	--	--	--	0.047	0.12	--	0.0025	0.0066	--	0.030	--	--	--	--	--	--	--	--	0.08	0.1
Iron	15,000	mg/kg	--	0.092	0.56	--	--	--	--	--	--	--	0.26	0.66	--	0.20	0.51	--	0.15	--	--	--	--	--	--	--	--	0.7	2
Manganese	230	mg/kg	--	0.041	0.25	--	--	--	--	0.00060	0.00060	--	1.05	2.8	--	0.0032	0.0085	--	0.70	--	--	--	--	--	3.4	--	--	5	3
Molybdenum	0.55	mg/kg	--	0.00047	0.0029	--	--	--	--	0.000000036	0.000000036	--	0.0121	0.032	--	0.00050	0.00132	--	0.0080	--	--	--	--	--	0.00020	--	--	0.02	0.04
Selenium	2.9	mg/kg	--	0.0025	0.015	--	--	--	--	0.000000019	0.000000019	--	0.010	0.028	--	0.045	0.12	--	0.0064	--	--	--	--	--	0.000016	--	--	0.06	0.2
Thallium	0.15	mg/kg	--	0.065	0.39	--	--	--	--	--	--	--	0.15	0.42	--	0.27	0.74	--	0.095	--	--	--	--	--	--	--	--	0.6	2
Uranium	6.2	mg/kg	--	0.13	0.81	--	--	--	--	0.000020	0.000020	--	0.40	1.1	--	0.0043	0.012	--	0.26	--	--	--	--	--	0.013	--	--	0.8	2
Vanadium	17	mg/kg	--	0.015	0.088	--	--	--	--	0.000022	0.000022	--	0.041	0.112	--	0.0037	0.0102	--	0.026	--	--	--	--	--	0.013	--	--	0.1	0.2
Exposure Pathway Risk/Hazard Total			6E-04	0.5	3	4E-03	0.003	0.02	2E-07	0.001	0.001	4E-03	3	7	7E-03	0.7	2	2E-03	2	0	5E-06	0.020	0	4E-04	4	0	**2E-02**	**9**	**10**

Table C-6. Human Health Risk and Hazard Summary by Exposure Pathway

Kerr-McGee Ponds on United Nuclear Corporation Property - UNC Outdoor Worker																													
COPC	EPC	Units	Incidental Soil Ingestion			External Exposure / Dermal Contact			Inhalation of Particulates			Plant Consumption			Animal Consumption			ODL Plant Ingestion			ODL Plant Dermal			ODL Plant Inhalation			Total Risk or Hazard		
			Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard
Surface Soil (0-6 inches bgs)																													
Uranium-238	2.4	pCi/g	8.0E-08	--	--	6.1E-10	--	--	1.4E-10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8E-08	--	--
Uranium-234	2.4	pCi/g	8.9E-08	--	--	1.2E-09	--	--	1.7E-10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9E-08	--	--
Thorium-230	3.4	pCi/g	1.4E-07	--	--	5.9E-09	--	--	2.9E-10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1E-07	--	--
Radium-226 in SE	13.0	pCi/g	1.8E-05	--	--	2.2E-04	--	--	1.9E-09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-04	--	--
Aluminum	6,600	mg/kg	--	0.002	--	--	--	--	--	0.000018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.002	--
Arsenic	6.0	mg/kg	6.6E-07	0.004	--	1.4E-07	0.0009	--	1.3E-10	0.0000055	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8E-07	0.005	--
Barium	83	mg/kg	--	0.0001	--	--	--	--	--	0.0000023	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0001	--
Cadmium	0.11	mg/kg	--	0.0004	--	--	0.00006	--	9.8E-13	0.00000015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1E-12	0.0004	--
Chromium	8.5	mg/kg	--	0.0097	--	--	--	--	3.8E-10	0.000020	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4E-10	0.0100	--
Cobalt	5.2	mg/kg	--	0.006	--	--	--	--	2.3E-10	0.000012	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-10	0.006	--
Copper	11	mg/kg	--	0.0001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00009	--
Iron	15,000	mg/kg	--	0.007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.007	--
Manganese	220	mg/kg	--	0.003	--	--	--	--	--	0.000061	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.003	--
Molybdenum	0.57	mg/kg	--	0.00004	--	--	--	--	--	0.0000000039	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00004	--
Selenium	4.0	mg/kg	--	0.0003	--	--	--	--	--	0.0000000028	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0003	--
Thallium	0.14	mg/kg	--	0.005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.005	--
Uranium	7.7	mg/kg	--	0.01	--	--	--	--	--	0.0000027	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01	--
Vanadium	19	mg/kg	--	0.001	--	--	--	--	--	0.0000026	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.001	--
Exposure Pathway Risk/Hazard Total			2E-05	0.05	--	2E-04	0.0009	--	3E-09	0.0001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**2E-04**	**0.05**	**--**
Subsurface Soil (0-72 inches bgs)																													
Uranium-238	52	pCi/g	1.7E-06	--	--	1.3E-08	--	--	3.1E-09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-06	--	--
Uranium-234	49	pCi/g	1.8E-06	--	--	2.5E-08	--	--	3.4E-09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-06	--	--
Thorium-230	3.4	pCi/g	1.4E-07	--	--	5.9E-09	--	--	2.9E-10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1E-07	--	--
Radium-226 in SE	12	pCi/g	1.7E-05	--	--	2.1E-04	--	--	1.8E-09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-04	--	--
Aluminum	6,600	mg/kg	--	0.002	--	--	--	--	--	0.000018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.002	--
Arsenic	5.8	mg/kg	6.4E-07	0.004	--	1.3E-07	0.0008	--	1.2E-10	0.0000053	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8E-07	0.005	--
Barium	75	mg/kg	--	0.0001	--	--	--	--	--	0.0000021	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0001	--
Cadmium	0.093	mg/kg	--	0.0003	--	--	0.00005	--	8.3E-13	0.00000013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8E-13	0.0004	--
Chromium	8.1	mg/kg	--	0.0092	--	--	--	--	3.6E-10	0.000019	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4E-10	0.0090	--
Cobalt	5.2	mg/kg	--	0.006	--	--	--	--	2.3E-10	0.000012	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-10	0.006	--
Copper	10	mg/kg	--	0.0001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00008	--
Iron	15,000	mg/kg	--	0.007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.007	--
Manganese	220	mg/kg	--	0.003	--	--	--	--	--	0.000061	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.003	--
Molybdenum	0.63	mg/kg	--	0.00004	--	--	--	--	--	0.0000000044	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00004	--
Selenium	3.7	mg/kg	--	0.0003	--	--	--	--	--	0.0000000026	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0003	--
Thallium	0.14	mg/kg	--	0.005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.005	--
Uranium	25	mg/kg	--	0.04	--	--	--	--	--	0.0000086	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.04	--
Vanadium	18	mg/kg	--	0.001	--	--	--	--	--	0.0000025	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.001	--
Exposure Pathway Risk/Hazard Total			2E-05	0.08	--	2E-04	0.0009	--	9E-09	0.0001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**2E-04**	**0.08**	**--**

Table C-6. Human Health Risk and Hazard Summary by Exposure Pathway

Arroyos on the Navajo Nation - Kǫǫ eí doo nahaazáh dah (Difficult Access Open Space)																													
COPC	EPC	Units	Incidental Soil Ingestion			External Exposure / Dermal Contact			Inhalation of Particulates			Plant Consumption			Animal Consumption			ODL Plant Ingestion			ODL Plant Dermal			ODL Plant Inhalation			Total Risk or Hazard		
			Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard
Surface Soil (0-6 inches bgs)																													
Uranium-238	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.3	pCi/g	2.5E-07	--	--	2.5E-06	--	--	6.7E-09	--	--	3.5E-05	--	--	5.3E-07	--	--	2.8E-04	--	--	--	--	--	4.8E-05	--	--	4E-04	--	--
Aluminum	4,700	mg/kg	--	0.000071	0.00044	--	--	--	--	0.00012	0.00012	--	0.0037	0.010	--	0.00034	0.00089	--	0.033	--	--	--	--	--	0.068	--	--	0.1	0.01
Arsenic	11	mg/kg	2.1E-07	0.00034	0.0021	3.0E-07	0.00048	0.0029	6.1E-09	0.00010	0.00010	1.6E-05	0.030	0.081	2.0E-06	0.0037	0.010	1.2E-04	0.28	--	0.000010	0.023	--	3.4E-06	0.057	--	1E-04	0.4	0.1
Barium	74	mg/kg	--	0.0000056	0.000034	--	--	--	--	0.000019	0.000019	--	0.00048	0.0013	--	0.0000048	0.000013	--	0.0052	--	--	--	--	--	0.021	--	--	0.03	0.001
Cadmium	0.064	mg/kg	--	0.000010	0.000060	--	0.000011	0.000064	1.5E-11	0.00000083	0.00000083	--	0.0019	0.0050	--	0.0000070	0.000018	--	0.024	--	--	0.0027	--	4.0E-08	0.0024	--	4E-08	0.03	0.005
Chromium	6.7	mg/kg	1.9E-07	0.000034	0.000208	--	--	--	1.2E-07	0.0000087	0.0000087	6.3E-06	0.0018	0.0048	2.1E-06	0.0006090	0.001624	2.9E-05	0.016	--	--	--	--	4.9E-05	0.0050	--	9E-05	0.02	0.007
Cobalt	4.0	mg/kg	--	0.00020	0.0012	--	--	--	4.7E-09	0.000087	0.000087	--	0.015	0.039	--	0.013	0.036	--	0.15	--	--	--	--	3.6E-06	0.073	--	4E-06	0.2	0.08
Copper	5.1	mg/kg	--	0.0000019	0.000012	--	--	--	--	--	--	--	0.0010	0.0027	--	0.00012	0.00032	--	0.014	--	--	--	--	--	--	--	--	0.02	0.003
Iron	12,000	mg/kg	--	0.00026	0.0016	--	--	--	--	--	--	--	0.014	0.036	--	0.016	0.043	--	0.12	--	--	--	--	--	--	--	--	0.2	0.08
Manganese	200	mg/kg	--	0.00013	0.00078	--	--	--	--	0.00052	0.00052	--	0.043	0.12	--	0.00028	0.00075	--	0.57	--	--	--	--	--	2.8	--	--	3	0.1
Molybdenum	0.81	mg/kg	--	0.0000024	0.000015	--	--	--	--	0.000000053	0.000000053	--	0.00083	0.0023	--	0.000075	0.00019	--	0.0110	--	--	--	--	--	0.00028	--	--	0.01	0.002
Selenium	1.5	mg/kg	--	0.0000045	0.000028	--	--	--	--	0.000000010	0.000000010	--	0.00033	0.00084	--	0.000045	0.00012	--	0.0033	--	--	--	--	--	0.0000083	--	--	0.004	0.001
Thallium	0.092	mg/kg	--	0.00014	0.00086	--	--	--	--	--	--	--	0.0067	0.018	--	0.017	0.047	--	0.057	--	--	--	--	--	--	--	--	0.08	0.07
Uranium	2.9	mg/kg	--	0.000218	0.00135	--	--	--	--	0.0000094	0.0000094	--	0.0126	0.0334	--	0.000203	0.00054	--	0.12	--	--	--	--	--	0.0060	--	--	0.10	0.040
Vanadium	25	mg/kg	--	0.000075	0.00047	--	--	--	--	0.000033	0.000033	--	0.0041	0.011	--	0.00060	0.0016	--	0.037	--	--	--	--	--	0.019	--	--	0.06	0.01
Exposure Pathway Risk/Hazard Total			7E-07	0.001	0.009	3E-06	0.0005	0.003	1E-07	0.000895	0.000895	6E-05	0.1	0.4	5E-06	0.05	0.1	4E-04	1	--	1E-05	0.03	--	1E-04	3	--	**6E-04**	**5**	**0.5**
Subsurface Soil (0-36 inches bgs)																													
Uranium-238	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.5	pCi/g	2.9E-07	--	--	2.9E-06	--	--	3.0E-11	--	--	4.0E-05	--	--	6.1E-07	--	--	3.2E-04	--	--	--	--	--	5.5E-05	--	--	4E-04	--	--
Aluminum	4,700	mg/kg	--	0.000071	0.00044	--	--	--	--	0.00000049	0.00000049	--	0.0037	0.010	--	0.00034	0.00089	--	0.033	--	--	--	--	--	0.068	--	--	0.1	0.01
Arsenic	11	mg/kg	2.1E-07	0.00034	0.0021	3.0E-07	0.00048	0.0029	2.5E-11	0.00000038	0.00000038	1.6E-05	0.030	0.081	2.0E-06	0.0037	0.010	1.2E-04	0.28	--	0.000010	0.023	--	3.4E-06	0.057	--	1E-04	0.4	0.1
Barium	75	mg/kg	--	0.0000056	0.000035	--	--	--	--	0.000000078	0.000000078	--	0.00049	0.0013	--	0.0000049	0.000013	--	0.0053	--	--	--	--	--	0.021	--	--	0.03	0.001
Cadmium	0.073	mg/kg	--	0.000011	0.000068	--	0.000012	0.000073	6.8E-14	0.0000000038	0.0000000038	--	0.0021	0.0057	--	0.0000080	0.000020	--	0.027	--	--	0.0031	--	4.6E-08	0.0028	--	5E-08	0.03	0.006
Chromium	6.7	mg/kg	1.9E-07	0.000034	0.000208	--	--	--	4.7E-10	0.000000035	0.000000035	6.3E-06	0.0018	0.0048	2.1E-06	0.0006090	0.001624	2.9E-05	0.016	--	--	--	--	4.9E-05	0.0050	--	9E-05	0.02	0.007
Cobalt	4.5	mg/kg	--	0.00023	0.0014	--	--	--	2.1E-11	0.00000039	0.00000039	--	0.017	0.044	--	0.015	0.041	--	0.17	--	--	--	--	4.1E-06	0.083	--	4E-06	0.3	0.09
Copper	5.1	mg/kg	--	0.0000019	0.000012	--	--	--	--	--	--	--	0.0010	0.0027	--	0.00012	0.00032	--	0.014	--	--	--	--	--	--	--	--	0.02	0.003
Iron	15,000	mg/kg	--	0.00032	0.0020	--	--	--	--	--	--	--	0.017	0.045	--	0.020	0.054	--	0.15	--	--	--	--	--	--	--	--	0.2	0.1
Manganese	400	mg/kg	--	0.00025	0.0016	--	--	--	--	0.0000042	0.0000042	--	0.085	0.23	--	0.00057	0.0015	--	1.1	--	--	--	--	--	5.6	--	--	7	0.2
Molybdenum	0.81	mg/kg	--	0.0000024	0.000015	--	--	--	--	0.00000000021	0.00000000021	--	0.00083	0.0023	--	0.000075	0.00019	--	0.011	--	--	--	--	--	0.00028	--	--	0.01	0.002
Selenium	1.5	mg/kg	--	0.0000045	0.000028	--	--	--	--	0.000000000039	0.000000000039	--	0.00033	0.00084	--	0.000045	0.00012	--	0.0033	--	--	--	--	--	0.0000083	--	--	0.004	0.001
Thallium	0.092	mg/kg	--	0.00014	0.00086	--	--	--	--	--	--	--	0.0067	0.018	--	0.017	0.047	--	0.057	--	--	--	--	--	--	--	--	0.08	0.07
Uranium	2.9	mg/kg	--	0.000218	0.00135	--	--	--	--	0.0000000377	0.0000000377	--	0.0126	0.0334	--	0.000203	0.00054	--	0.117	--	--	--	--	--	0.0060	--	--	0.10	0.040
Vanadium	25	mg/kg	--	0.000075	0.00047	--	--	--	--	0.00000013	0.00000013	--	0.0041	0.011	--	0.00060	0.0016	--	0.037	--	--	--	--	--	0.019	--	--	0.06	0.01
Exposure Pathway Risk/Hazard Total			7E-07	0.002	0.010	3E-06	0.0005	0.003	5E-10	0.000006	0.000006	6E-05	0.2	0.5	5E-06	0.06	0.2	5E-04	2	--	1E-05	0.03	--	1E-04	6	--	**6E-04**	**8**	**0.7**

Table C-6. Human Health Risk and Hazard Summary by Exposure Pathway

COPC	EPC	Units	Incidental Soil Ingestion			External Exposure / Dermal Contact			Inhalation of Particulates			Plant Consumption			Animal Consumption			ODL Plant Ingestion			ODL Plant Dermal			ODL Plant Inhalation			Total Risk or Hazard		
			Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard	Cancer Risk	Adult Hazard	Child Hazard
Arroyos on United Nuclear Corporation Property - UNC Outdoor Worker																													
Surface Soil (0-6 inches bgs)																													
Uranium-238	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.3E+00	pCi/g	1.6E-06	--	--	1.9E-05	--	--	1.6E-10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-05	--	--
Aluminum	4.7E+03	mg/kg	--	0.0015	--	--	--	--	--	0.000012	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.002	--
Arsenic	1.1E+01	mg/kg	5.1E-07	0.0032	--	1.1E-07	0.00067	--	9.8E-11	0.0000042	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6E-07	0.004	--
Barium	7.4E+01	mg/kg	--	0.000082	--	--	--	--	--	0.0000013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00008	--
Cadmium	6.4E-02	mg/kg	--	0.00018	--	--	0.000031	--	4.8E-13	0.000000075	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5E-13	0.0002	--
Chromium	6.7E+00	mg/kg	--	0.00571	--	--	--	--	2.2E-10	0.000012	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-10	0.0060	--
Cobalt	4.0E+00	mg/kg	--	0.0050	--	--	--	--	2.0E-10	0.000010	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-10	0.005	--
Copper	5.1E+00	mg/kg	--	0.000040	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00004	--
Iron	1.2E+04	mg/kg	--	0.0064	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.006	--
Manganese	2.0E+02	mg/kg	--	0.0034	--	--	--	--	--	0.000066	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.003	--
Molybdenum	8.1E-01	mg/kg	--	0.000019	--	--	--	--	--	0.0000000019	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00002	--
Selenium	1.5E+00	mg/kg	--	0.000075	--	--	--	--	--	0.00000000076	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00008	--
Thallium	9.2E-02	mg/kg	--	0.0020	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.002	--
Uranium	2.9E+00	mg/kg	--	0.00016	--	--	--	--	--	0.000000031	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0002	--
Vanadium	2.5E+01	mg/kg	--	0.000036	--	--	--	--	--	0.000000073	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0000	--
Exposure Pathway Risk/Hazard Total			2E-06	0.03	--	2E-05	0.0007	--	7E-10	0.00011	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**2E-05**	**0.03**	**--**
Subsurface Soil (0-36 inches bgs)																													
Uranium-238	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Uranium-234	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thorium-230	--	pCi/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium-226 in SE	1.5E+00	pCi/g	1.6E-06	--	--	1.9E-05	--	--	1.6E-10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-05	--	--
Aluminum	4.7E+03	mg/kg	--	0.0016	--	--	--	--	--	0.000013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.002	--
Arsenic	1.1E+01	mg/kg	5.3E-07	0.0033	--	1.1E-07	0.00069	--	1.0E-10	0.0000044	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6E-07	0.004	--
Barium	7.5E+01	mg/kg	--	0.00011	--	--	--	--	--	0.0000017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0001	--
Cadmium	7.3E-02	mg/kg	--	0.00019	--	--	0.000032	--	4.9E-13	0.000000076	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5E-13	0.0002	--
Chromium	6.7E+00	mg/kg	--	0.00571	--	--	--	--	2.2E-10	0.000011514	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-10	0.0060	--
Cobalt	4.5E+00	mg/kg	--	0.0050	--	--	--	--	2.0E-10	0.000010	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2E-10	0.005	--
Copper	5.1E+00	mg/kg	--	0.000046	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00005	--
Iron	1.5E+04	mg/kg	--	0.0073	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.007	--
Manganese	4.0E+02	mg/kg	--	0.0040	--	--	--	--	--	0.000077	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.004	--
Molybdenum	8.1E-01	mg/kg	--	0.000019	--	--	--	--	--	0.0000000019	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00002	--
Selenium	1.5E+00	mg/kg	--	0.000075	--	--	--	--	--	0.00000000076	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00008	--
Thallium	9.2E-02	mg/kg	--	0.0020	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.002	--
Uranium	2.9E+00	mg/kg	--	0.00016	--	--	--	--	--	0.000000031	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0002	--
Vanadium	2.5E+01	mg/kg	--	0.000042	--	--	--	--	--	0.000000086	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00004	--
Exposure Pathway Risk/Hazard Total			2E-06	0.03	--	2E-05	0.0007	--	7E-10	0.0001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**2E-05**	**0.03**	**--**

Notes:

--	Not applicable
bgs	Below ground surface
COPC	Contaminant of potential concern
EPC	Exposure point concentration
Kerr-McGee	Kerr-McGee Corporation
mg/kg	Milligram per kilogram
ODL	Other Diné Lifeways
pCi/g	Picocurie per gram
SE	Secular equilibrium

Table C-7: Human Health Risk and Hazard Summary and Identification of Candidate Contaminants of Concern

Church Rock Mine No. 1 - Kee'da'whíí téeh (Full-Time Resident)					
COPC[a]	**Units**	**Exposure Point Concentration**	**Cancer Risk**[b,c,d]	**Noncancer Hazard**[b,d,e,f]	
				Adult	**Child**
Surface Soil (0-6 inches bgs)					
Radionuclides[g]					
Uranium-238	pCi/g	1.1	*2.5E-05*	--	--
Uranium-234	pCi/g	1.2	*3.1E-05*	--	--
Thorium-230	pCi/g	1.7	*1.1E-05*	--	--
Radium-226 in SE	pCi/g	6.7	**1.3E-02**	--	--
		Radionuclide Total	**1E-02**	--	--
Metals[h]					
Aluminum	mg/kg	4,600	--	0.18	0.27
Arsenic	mg/kg	4.9	**2.0E-04**	0.44	0.86
Barium	mg/kg	110	--	0.056	0.048
Cadmium	mg/kg	0.14	9.3E-08	0.16	0.27
Chromium	mg/kg	6.0	**2.2E-04**	0.054	0.13
Cobalt	mg/kg	6.10	*6.0E-06*	0.99	**2.0**
Copper	mg/kg	12	--	0.088	0.15
Iron	mg/kg	11,000	--	0.51	**1.3**
Manganese	mg/kg	160	--	**3.6**	**2.1**
Molybdenum	mg/kg	0.32	--	0.012	0.021
Selenium	mg/kg	3.4	--	0.075	0.19
Thallium	mg/kg	0.14	--	0.54	**1.4**
Uranium	mg/kg	7.3	--	0.96	**2.3**
Vanadium	mg/kg	14	--	0.080	0.17
		Metal Total	**4E-04**	**8**	**10**
		Cumulative Risk/Hazard Total	**1E-02**	**8**	**10**
Subsurface Soil (0-72 inches bgs)					
Radionuclides[g]					
Uranium-238	pCi/g	1.1	*2.5E-05*	--	--
Uranium-234	pCi/g	1.2	*3.1E-05*	--	--
Thorium-230	pCi/g	1.7	*1.1E-05*	--	--
Radium-226 in SE	pCi/g	17	**3.3E-02**	--	--
		Radionuclide Total	**3E-02**	--	--
Metals[h]					
Aluminum	mg/kg	4,600	--	0.18	0.27
Arsenic	mg/kg	4.8	**1.9E-04**	0.43	0.84
Barium	mg/kg	110	--	0.06	0.05
Cadmium	mg/kg	0.14	9.3E-08	0.16	0.27
Chromium	mg/kg	6.0	**2.2E-04**	0.054	0.13
Cobalt	mg/kg	6.1	*6.0E-06*	0.99	**2.0**
Copper	mg/kg	12	--	0.09	0.15
Iron	mg/kg	11,000	--	0.51	**1.3**
Manganese	mg/kg	160	--	**3.59**	**2.1**
Molybdenum	mg/kg	0.32	--	0.012	0.021
Selenium	mg/kg	3.1	--	0.068	0.18
Thallium	mg/kg	0.14	--	0.54	**1.4**
Uranium	mg/kg	7.3	--	0.96	**2.3**
Vanadium	mg/kg	14	--	0.08	0.17
		Metal Total	**4E-04**	**8**	**10**
		Cumulative Risk/Hazard Total	**3E-02**	**8**	**10**

Table C-7: Human Health Risk and Hazard Summary and Identification of Candidate Contaminants of Concern

Church Rock Mine No. 1 East - Kee'da'whíí tééh (Full-Time Resident)					
COPC[a]	**Units**	**Exposure Point Concentration**	**Cancer Risk**[b,c,d]	**Noncancer Hazard**[b,d,e]	
				Adult	**Child**
Surface Soil (0-6 inches bgs)					
Radionuclides[g]					
Uranium-238	pCi/g	1.3	*3.0E-05*	--	--
Uranium-234	pCi/g	1.4	*3.6E-05*	--	--
Thorium-230	pCi/g	3.6	*2.3E-05*	--	--
Radium-226 in SE	pCi/g	9.3	**1.8E-02**	--	--
Radionuclide Total			**2E-02**	--	--
Metals[h]					
Aluminum	mg/kg	6,300	--	0.24	0.37
Arsenic	mg/kg	6.6	**2.7E-04**	0.59	**1.2**
Barium	mg/kg	160	--	0.082	0.070
Cadmium	mg/kg	0.13	8.7E-08	0.15	0.25
Chromium	mg/kg	10	**3.7E-04**	0.10	0.22
Cobalt	mg/kg	6.9	*6.8E-06*	**1.1**	**2.3**
Copper	mg/kg	13	--	0.10	0.16
Iron	mg/kg	16,000	--	0.74	**1.9**
Manganese	mg/kg	200	--	**4.5**	**2.6**
Molybdenum	mg/kg	0.31	--	0.012	0.020
Selenium	mg/kg	3.0	--	0.066	0.17
Thallium	mg/kg	0.16	--	0.62	**1.6**
Uranium	mg/kg	3.6	--	0.47	**1.1**
Vanadium	mg/kg	16	--	0.092	0.20
Metal Total			**6E-04**	**8**	**10**
Cumulative Risk/Hazard Total			**2E-02**	**8**	**10**
Subsurface Soil (0-72 inches bgs)					
Radionuclides[g]					
Uranium-238	pCi/g	1.3	*3.0E-05*	--	--
Uranium-234	pCi/g	1.4	*3.6E-05*	--	--
Thorium-230	pCi/g	3.6	*2.3E-05*	--	--
Radium-226 in SE	pCi/g	43	**8.3E-02**	--	--
Radionuclide Total			**8E-02**	--	--
Metals[h]					
Aluminum	mg/kg	6,300	--	0.24	0.37
Arsenic	mg/kg	6.3	**2.5E-04**	0.56	**1.1**
Barium	mg/kg	160	--	0.082	0.070
Cadmium	mg/kg	0.13	8.7E-08	0.15	0.25
Chromium	mg/kg	10	**3.7E-04**	0.10	0.2
Cobalt	mg/kg	6.9	*6.8E-06*	**1.1**	**2.3**
Copper	mg/kg	13	--	0.10	0.16
Iron	mg/kg	16,000	--	0.74	**1.9**
Manganese	mg/kg	200	--	**4.5**	**2.6**
Molybdenum	mg/kg	0.51	--	0.020	0.033
Selenium	mg/kg	5.4	--	0.12	0.31
Thallium	mg/kg	0.16	--	0.62	**1.6**
Uranium	mg/kg	42	--	**5.5**	**13**
Vanadium	mg/kg	18	--	0.10	0.22
Metal Total			**6E-04**	**10**	**20**
Cumulative Risk/Hazard Total			**8E-02**	**10**	**20**

Table C-7: Human Health Risk and Hazard Summary and Identification of Candidate Contaminants of Concern

Kerr-McGee Ponds on the Navajo Nation - Kee'da'whíí téél (Full-Time Resident)					
COPC[a]	**Units**	**Exposure Point Concentration**	**Cancer Risk**[b,c,d]	**Noncancer Hazard**[b,d,e]	
				Adult	**Child**
Surface Soil (0-6 inches bgs)					
Radionuclides[g]					
Uranium-238	pCi/g	1.1	*2.5E-05*	--	--
Uranium-234	pCi/g	1.0	*2.5E-05*	--	--
Thorium-230	pCi/g	2.0	*1.3E-05*	--	--
Radium-226 in SE	pCi/g	9.3	**1.8E-02**	--	--
		Radionuclide Total	**2E-02**	--	--
Metals[h]					
Aluminum	mg/kg	6,900	--	0.27	0.41
Arsenic	mg/kg	5.9	**2.4E-04**	0.52	1.0
Barium	mg/kg	82	--	0.042	0.036
Cadmium	mg/kg	0.16	1.1E-07	0.18	0.31
Chromium	mg/kg	8.2	**3.0E-04**	0.078	0.18
Cobalt	mg/kg	5.2	*5.2E-06*	0.85	**1.7**
Copper	mg/kg	11	--	0.081	0.14
Iron	mg/kg	15,000	--	0.70	**1.7**
Manganese	mg/kg	230	--	**5.2**	**3.0**
Molybdenum	mg/kg	0.55	--	0.021	0.036
Selenium	mg/kg	2.9	--	0.064	0.16
Thallium	mg/kg	0.15	--	0.58	**1.5**
Uranium	mg/kg	6.2	--	0.81	**1.9**
Vanadium	mg/kg	17	--	0.10	0.21
		Metal Total	**5E-04**	**9**	**10**
		Cumulative Risk/Hazard Total	**2E-02**	**9**	**10**
Subsurface Soil (0-66 inches bgs)					
Radionuclides[g]					
Uranium-238	pCi/g	1.1	*2.5E-05*	--	--
Uranium-234	pCi/g	1.0	*2.5E-05*	--	--
Thorium-230	pCi/g	2.0	*1.3E-05*	--	--
Radium-226 in SE	pCi/g	9.3	**1.8E-02**	--	--
		Radionuclide Total	**2E-02**	--	--
Metals[h]					
Aluminum	mg/kg	6,900	--	0.27	0.41
Arsenic	mg/kg	5.9	**2.4E-04**	0.52	1.0
Barium	mg/kg	82	--	0.04	0.036
Cadmium	mg/kg	0.16	1.1E-07	0.18	0.31
Chromium	mg/kg	8.2	**3.0E-04**	0.078	0.18
Cobalt	mg/kg	5.2	*5.2E-06*	0.85	**1.7**
Copper	mg/kg	11	--	0.081	0.14
Iron	mg/kg	15,000	--	0.70	**1.7**
Manganese	mg/kg	230	--	**5.2**	**3.0**
Molybdenum	mg/kg	0.55	--	0.021	0.036
Selenium	mg/kg	2.9	--	0.064	0.16
Thallium	mg/kg	0.15	--	0.58	**1.5**
Uranium	mg/kg	6.2	--	0.81	**1.9**
Vanadium	mg/kg	17	--	0.10	0.21
		Metal Total	**5E-04**	**9**	**10**
		Cumulative Risk/Hazard Total	**2E-02**	**9**	**10**

Table C-7: Human Health Risk and Hazard Summary and Identification of Candidate Contaminants of Concern

Kerr-McGee Ponds on United Nuclear Corporation Property					
COPC[a]	**Units**	**Exposure Point Concentration**	**Cancer Risk**[b,c,d]	**Noncancer Hazard**[b,d,e]	
				Adult	**Child**
Surface Soil (0-6 inches bgs)					
Radionuclides[g]					
Uranium-238	pCi/g	2.4	8.1E-08	--	--
Uranium-234	pCi/g	2.4	9.0E-08	--	--
Thorium-230	pCi/g	3.4	1.5E-07	--	--
Radium-226 in SE	pCi/g	13	**2.4E-04**	--	--
		Radionuclide Total	**2E-04**	--	--
Metals[h]					
Aluminum	mg/kg	6,600	--	0.0023	--
Arsenic	mg/kg	6.0	8.0E-07	0.0050	--
Barium	mg/kg	83	--	0.00014	--
Cadmium	mg/kg	0.11	9.8E-13	0.0004	--
Chromium	mg/kg	8.5	3.8E-10	0.0097	--
Cobalt	mg/kg	5.2	2.3E-10	0.0059	--
Copper	mg/kg	11	--	0.000094	--
Iron	mg/kg	15,000	--	0.0073	--
Manganese	mg/kg	220	--	0.0032	--
Molybdenum	mg/kg	0.57	--	0.000039	--
Selenium	mg/kg	4.0	--	0.00027	--
Thallium	mg/kg	0.14	--	0.0048	--
Uranium	mg/kg	7.7	--	0.013	--
Vanadium	mg/kg	19	--	0.0013	--
		Metal Total	8E-07	0.05	--
		Cumulative Risk/Hazard Total	**2E-04**	0.05	--
Subsurface Soil (0-72 inches bgs)					
Radionuclides[g]					
Uranium-238	pCi/g	52	*1.8E-06*	--	--
Uranium-234	pCi/g	49	*1.8E-06*	--	--
Thorium-230	pCi/g	3.4	1.5E-07	--	--
Radium-226 in SE	pCi/g	12	**2.2E-04**	--	--
		Radionuclide Total	**2E-04**	--	--
Metals[h]					
Aluminum	mg/kg	6,600	--	0.0023	--
Arsenic	mg/kg	5.8	7.7E-07	0.0048	--
Barium	mg/kg	75	--	0.00013	--
Cadmium	mg/kg	0.093	8.3E-13	0.00037	--
Chromium	mg/kg	8.1	3.6E-10	0.0093	--
Cobalt	mg/kg	5.2	2.3E-10	0.0059	--
Copper	mg/kg	10	--	0.000084	--
Iron	mg/kg	15,000	--	0.0073	--
Manganese	mg/kg	220	--	0.0032	--
Molybdenum	mg/kg	0.63	--	0.000043	--
Selenium	mg/kg	3.7	--	0.00025	--
Thallium	mg/kg	0.14	--	0.0048	--
Uranium	mg/kg	25	--	0.043	--
Vanadium	mg/kg	18	--	0.0012	--
		Metal Total	8E-07	0.08	--
		Cumulative Risk/Hazard Total	**2E-04**	0.08	--

Table C-7: Human Health Risk and Hazard Summary and Identification of Candidate Contaminants of Concern

Arroyos on the Navajo Nation					
COPC[a]	**Units**	**Exposure Point Concentration**	**Cancer Risk**[b,c,d]	**Noncancer Hazard**[b,d,e]	
				Adult	**Child**
Surface Soil (0-6 inches bgs)					
Radionuclides[g]					
Uranium-238	pCi/g	--	--	--	--
Uranium-234	pCi/g	--	--	--	--
Thorium-230	pCi/g	--	--	--	--
Radium-226 in SE	pCi/g	1.3	**3.6E-04**	--	--
		Radionuclide Total	**4E-04**		--
Metals[h]					
Aluminum	mg/kg	4,700	--	0.10	0.011
Arsenic	mg/kg	11	**1.5E-04**	0.39	0.096
Barium	mg/kg	74	--	0.026	0.0013
Cadmium	mg/kg	0.064	4.0E-08	0.031	0.0051
Chromium	mg/kg	6.7	*8.7E-05*	0.024	0.0066
Cobalt	mg/kg	4.0	*3.6E-06*	0.25	0.076
Copper	mg/kg	5.1	--	0.015	0.0030
Iron	mg/kg	12,000	--	0.15	0.080
Manganese	mg/kg	200	--	**3.4**	0.12
Molybdenum	mg/kg	0.81	--	0.012	0.0025
Selenium	mg/kg	1.5	--	0.0037	0.0010
Thallium	mg/kg	0.09	--	0.081	0.066
Uranium	mg/kg	2.9	--	0.14	0.035
Vanadium	mg/kg	25	--	0.061	0.013
		Metal Total	**2E-04**	**5**	0.5
		Cumulative Risk/Hazard Total	**6E-04**	**5**	0.5
Subsurface Soil (0-36 inches bgs)					
Radionuclides[g]					
Uranium-238	pCi/g	--	--	--	--
Uranium-234	pCi/g	--	--	--	--
Thorium-230	pCi/g	--	--	--	--
Radium-226 in SE	pCi/g	1.5	**3.6E-04**	--	--
		Radionuclide Total	**4E-04**	--	--
Metals[h]					
Aluminum	mg/kg	4,700	--	0.10	0.011
Arsenic	mg/kg	11	**1.5E-04**	0.39	0.095
Barium	mg/kg	75	--	0.027	0.001
Cadmium	mg/kg	0.073	4.6E-08	0.035	0.006
Chromium	mg/kg	6.7	*8.7E-05*	0.024	0.0066
Cobalt	mg/kg	4.5	4.1E-06	0.28	0.085
Copper	mg/kg	5.1	--	0.02	0.003
Iron	mg/kg	15,000	--	0.19	0.101
Manganese	mg/kg	400	--	6.82	0.236
Molybdenum	mg/kg	0.81	--	0.01	0.002
Selenium	mg/kg	1.5	--	0.00	0.001
Thallium	mg/kg	0.092	--	0.08	0.066
Uranium	mg/kg	2.9	--	0.14	0.035
Vanadium	mg/kg	25	--	0.06	0.013
		Metal Total	**2E-04**	**8**	0.7
		Cumulative Risk/Hazard Total	**6E-04**	**8**	0.7

Table C-7: Human Health Risk and Hazard Summary and Identification of Candidate Contaminants of Concern

Arroyos on United Nuclear Corporation Property					
COPC[a]	Units	Exposure Point Concentration	Cancer Risk[b,c,d]	Noncancer Hazard[b,d,e]	
				Adult	Child
Surface Soil (0-6 inches bgs)					
Radionuclides [g]					
Uranium-238	pCi/g	--	--	--	--
Uranium-234	pCi/g	--	--	--	--
Thorium-230	pCi/g	--	--	--	--
Radium-226 in SE	pCi/g	1.1	*2.0E-05*	--	--
Radionuclide Total			*2E-05*		--
Metals [h]					
Aluminum	mg/kg	4,400	--	0.0015	--
Arsenic	mg/kg	4.6	6.1E-07	0.0038	--
Barium	mg/kg	48	--	0.00008	--
Cadmium	mg/kg	0.054	4.8E-13	0.00022	--
Chromium	mg/kg	5.0	2.2E-10	0.0057	--
Cobalt	mg/kg	4.4	2.0E-10	0.0050	--
Copper	mg/kg	4.7	--	0.000040	--
Iron	mg/kg	13,000	--	0.0064	--
Manganese	mg/kg	240	--	0.0035	--
Molybdenum	mg/kg	0.28	--	0.000019	--
Selenium	mg/kg	1.1	--	0.000075	--
Thallium	mg/kg	0.057	--	0.0020	--
Uranium	mg/kg	0.091	--	0.00016	--
Vanadium	mg/kg	0.53	--	0.000036	--
Metal Total			6E-07	0.03	--
Cumulative Risk/Hazard Total			*2E-05*	0.03	--
Subsurface Soil (0-18 inches bgs)					
Radionuclides [g]					
Uranium-238	pCi/g	--	--	--	--
Uranium-234	pCi/g	--	--	--	--
Thorium-230	pCi/g	--	--	--	--
Radium-226 in SE	pCi/g	1.1	*2.0E-05*	--	--
Radionuclide Total			*2E-05*	--	--
Metals [h]					
Aluminum	mg/kg	4,700	--	0.0015	--
Arsenic	mg/kg	4.8	6.4E-07	0.0038	--
Barium	mg/kg	62	--	0.000084	--
Cadmium	mg/kg	0.055	4.9E-13	0.00022	--
Chromium	mg/kg	5.0	2.2E-10	0.0057	--
Cobalt	mg/kg	4.4	2.0E-10	0.0050	--
Copper	mg/kg	5.4	--	0.000040	--
Iron	mg/kg	15,000	--	0.0064	--
Manganese	mg/kg	280	--	0.0035	--
Molybdenum	mg/kg	0.28	--	0.000019	--
Selenium	mg/kg	1.1	--	0.000075	--
Thallium	mg/kg	0.059	--	0.0020	--
Uranium	mg/kg	0.091	--	0.00016	--
Vanadium	mg/kg	0.62	--	0.000036	--
Metal Total			6E-07	0.03	--
Cumulative Risk/Hazard Total			*2E-05*	0.03	--

Table C-7: Human Health Risk and Hazard Summary and Identification of Candidate Contaminants of Concern

Notes:

[a] **Bolded COPCs** are selected as candidate COCs because cancer risk is greater than one in ten thousand (1E-04) or noncancer hazard is greater than 1. *Italicized COPCs* are contaminants within the USEPA's cancer risk range (cancer risk greater or equal to 1E-04 and less than 1 in 1 million [1E-06]).

[b] **Bolded values** are values greater than the target cancer risk of one in ten thousand (1E-04) or noncancer target hazard of 1. *Italicized values* are within the USEPA's acceptable cancer risk range (cancer risk greater or equal to 1E-04 and less than 1E-06). Total risks and total hazards are reported to one significant digit; thus, values are commonly rounded. In practice, values can be slightly higher than the stated cutoff but still be considered equal to the cutoff because of rounding. Target organ analyses were performed for any scenario-media combination with a noncancer hazard greater than 1. If the target organ exceeds hazard index exceeds 1 but no individual COPC has a hazard exceeding 1, the COPC contributing the highest amount of hazard was identified as a candidate COC.

[c] Cancer risks are provided on Table C-5.1 through Table C-5.6.

[d] The methodology for calculating the risks and hazards and the inputs for cancer and noncancer equations are provided in the "Navajo Abandoned Uranium Mines Risk Assessment Methodology" (USEPA 2024b).

[e] Noncancer hazards are presented on Table C-5.1 through Table C-5.6.

[f] Thallium was retained as a candidate COC because the target organ analysis resulted in a hazard index of 3 for the dermal target organ and thallium has the highest contribution to the target organ HI as follows:

Metal	Target Organ(s)			
Aluminum	Nervous	--	--	
Arsenic	Cardiovascular	Dermal	--	
Barium	Urinary	--	--	
Cadmium	Urinary	--	--	
Cobalt	Endocrine	--	--	
Copper	Gastrointestinal	--	--	
Iron	Gastrointestinal	--	--	
Manganese	Nervous	--	--	
Molybdenum	Urinary	--	--	
Selenium	Dermal	Hematologic	Nervous	
Thallium	Dermal	--	--	
Uranium	Urinary	--	--	
Vanadium	Urinary	Dermal	--	

Adult Target Organ HI	
Nervous	**4**
Dermal	1
Urinary	**2**
Gastrointestinal	1

Child Target Organ HI	
Nervous	**3**
Dermal	**3**
Urinary	**5**
Gastrointestinal	1

[g] For radionuclides, uranium-238 is assumed to be in secular equilibrium with its decay chain; that is, all decay chain nuclides are present in equal activity concentrations. In this case, the risk from radium-226 and its decay products (that is, radium-226 in secular equilibrium) will account for most of the risk from the uranium-238 decay chain.

[h] In the absence of speciated chromium data, chromium is evaluated using the assumption that it is 100 percent hexavalent chromium (USEPA 2024b). No speciated chromium data are available.

--	Not applicable
bgs	Below ground surface
COC	Contaminant of concern
COPC	Contaminant of potential concern
EU	Exposure unit
HI	Hazard index
Kerr-McGee	Kerr-McGee Corporation
mg/kg	Milligram per kilogram
pCi/g	Picocurie per gram
SE	Secular equilbrium
USEPA	U.S. Environmental Protection Agency

Reference:

U.S. Environmental Protection Agency (USEPA). 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-8. Ecological Risk Assessment Screening for Soil

Constituent of Interest[a]	Detection Frequency[b]	Maximum Detected Concentration[b]	Plant NOEC	Soil Invertebrates NOEC	Avian Herbivore NOEC	Avian Ground Insectivore NOEC	Avian Carnivore NOEC	Mammalian Herbivore NOEC	Mammalian Ground Insectivore NOEC	Mammalian Carnivore NOEC	Minimum NOEC	HQ based on Minimum NOEC[c]	Include Contaminant as COPEC in SLERA Refinement?[d]
Radionuclides (pCi/g) [e]													
Uranium-238	41 / 160	52.1	50	13,000	2,700	2,700	2,700	1,400	1,400	1,400	50	**1.0**	**Yes**
Uranium-234	24 / 24	49.4	44	12,000	2,800	2,800	2,800	1,400	1,400	1,400	44	**1.1**	**Yes**
Thorium-230	41 / 41	92	110	37,000	8,700	8,700	8,700	3,700	3,700	3,700	110	0.84	No
Radium-226 in SE (Adjusted Radium-226)	797 / 797	468	5.0	240	15	15	15	6.0	6.0	6.0	5.0	**94**	**Yes**
Metals (mg/kg) [f,g]													
Aluminum	126 / 126	9,600	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	**NSL**	No
Antimony	125 / 126	0.26	11	78	NSL	NSL	NSL	10	0.27	4.9	0.27	0.96	No
Arsenic	175 / 175	11	18	6.8	67	43	1,100	170	46	170	6.8	**1.6**	**Yes**
Barium	169 / 169	420	110	330	720	820	7,500	3,200	200	9,100	110	**3.8**	**Yes**
Beryllium	126 / 126	1.0	2.5	40	NSL	NSL	NSL	21	34	90	2.5	0.40	No
Cadmium	154 / 169	0.3	32	140	28	0.77	630	73	0.36	84	0.36	0.69	No
Chromium [h]	169 / 169	24	0.35	0.34	78	26	780	380	34	180	0.3	**71**	**Yes**
Cobalt	126 / 126	10	13	NSL	270	120	1,300	2,100	230	470	13	0.77	No
Copper	126 / 126	21	70	80	76	28	1,600	1,100	49	560	28	0.75	No
Iron	126 / 126	23,000	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	**NSL**	No
Lead	169 / 169	130	120	1,700	46	11	510	1,200	56	460	11	**12**	**Yes**
Manganese	126 / 126	400	220	450	4,300	4,300	650,000	5,300	4,000	6,200	220	**1.8**	**Yes**
Molybdenum [i,j]	165 / 175	1.8	2	NSL	18	15	90	*635*	*4.8*	*64*	2	0.90	No
Nickel	126 / 126	20	38	280	210	20	2,800	340	10	130	10	**2.0**	**Yes**
Selenium	170 / 175	37	0.52	4.1	2.2	1.2	83	2.7	0.63	2.8	0.52	**71**	**Yes**
Silver	29 / 169	0.19	560	NSL	69	4.2	930	1,500	14	990	4.2	0.045	No
Thallium	126 / 126	0.22	0.050	NSL	6.9	4.5	48	1.2	0.42	5.0	0.050	**4.4**	**Yes**
Uranium	226 / 226	210	25	NSL	1,500	1,100	14,000	1,000	480	4,800	25	**8.4**	**Yes**
Vanadium	175 / 175	58	60	NSL	13	7.8	140	1,300	280	580	7.8	**7.4**	**Yes**
Zinc	126 / 126	95	160	120	950	46	30,000	6,800	79	10,000	46	**2.1**	**Yes**

Notes:

Grey highlighted cells indicate the maximum concentration exceeds the NOEC for the receptor group.

[a] **Bolded contaminants** are selected as COPECs for the SLERA refinement because the HQ is greater than or equal to 1.0.

[b] Includes soil samples collected site-wide from all depths. Includes all duplicate soil samples. See Table A2-1 for the summary statistics for each contaminant.

[c] HQ is calculated by dividing the maximum concentration by the minimum NOEC. **Bolded HQ values** indicate HQs greater than 1.0.

[d] A contaminant is included as a COPEC for the SLERA refinement if the calculated HQ is greater than 1.0.

[e] Radionuclide ESLs are based on dose assessments using the ERICA Tool (Brown and others 2008) for terrestrial animals and plants (see Appendix F in USEPA 2024b). ESLs for uranium-238 in SE are based on individual radium-226 ESLs that are adjusted to include doses from all progeny of uranium-238 in secular equilibrium. Site data for radium-226 are used to evaluate uranium-238 in SE.

[f] NOECs for metals are based on the Eco-SSL (USEPA 2023a) unless underlined, **bolded,** or *italicized*.

[g] Underlined values are based on LANL no effect level ESLs (Newport News Nuclear BWXT-Los Alamos, LLC. 2022) for contaminants for which Eco-SSLs are not available.

[h] In the absence of speciated chromium data, chromium is evaluated using the assumption that it is 100 percent hexavalent chromium (USEPA 2024b). No speciated chromium data are available. LANL chromium screening values are based on Cr(VI) (hexavalent chromium) for plants and invertebrates (Newport News Nuclear BWXT-Los Alamos, LLC. 2022) and Cr(III) (trivalent chromium) for birds and mammals (USEPA 2023a). Eco-SSLs for hexavalent chromium are not available for birds, and the hexavalent chromium Eco-SSLs formammals are higher than the trivalent chromium values (USEPA 2023a).

[i] **Bold value** for molybdenum is based on Oak Ridge National Laboratory no effect level for plants for which an Eco-SSL nor LANL ESL is available (Efroymson, Will, Suter II, and Wooten 1997).

[j] *Italicized values* for molybdenum are based on Oak Ridge National Laboratory preliminary remediation goals for ecological receptors (Efroymson, Suter II, Sample, and Jones 1997) for mammals for which Eco-SSLs and LANL NOECs are not available.

Table C-8. Ecological Risk Assessment Screening for Soil

Notes (Continued):

bgs	Below ground surface	mg/kg	Milligram per kilogram
COPEC	Contaminant of potential ecological concern	N3B	Newport News Nuclear BWXT-Los Alamos, LLC
Eco-SSL	Ecological soil screening level	NOEC	No observed effect concentration
ERICA	Environmental Risk from Ionizing Contaminants: Assessment and Management	NSL	No screening level
ESL	Ecological screening level	pCi/g	Picocurie per gram
HQ	Hazard quotient	SE	Secular equilibrium
LANL	Los Alamos National Laboratory	USEPA	U.S. Environmental Protection Agency

References:

Brown, J.E., B. Alfonso, R. Avila, N.A. Beresford, D. Copplestone, G. PrÖhl, and A. Ulanovsky. 2008. “The ERICA Tool.” *Journal of Environmental Radioactivity*. Volume 99, Issue 9. Pages 1371 through 1383.

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Efroymson, R.A., M.E. Will, G.W. Suter II, and A.C. Wooten. 1997. "Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants." ES/ER/TM-85/R3. Oak Ridge National Laboratories, Oak Ridge, TN.

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U.S. Environmental Protection Agency (USEPA). 2023a. "Interim Ecological Soil Screening Level Documents." Accessed July 20. https://www.epa.gov/chemical-research/interim-ecological-soil-screening-level-documents.

USEPA. 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-9. Exposure Point Concentrations for Ecological Risk Assessment

Site-Wide											
Contaminant	Units	Detection Frequency	Number of High Nondetect Results[a]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[b]	UCL95 / Distribution[c]		Exposure Point Concentration		
									Value[d]	Statistic[d]	Method[e]
Surface Soil (0-6 inches bgs)											
Uranium-238	pCi/g	10 / 10	--	2.43	KMP-SS66-0000-0003-01	1.285	1.553	NP	1.6	UCL95	(14)
Uranium-234	pCi/g	10 / 10	--	2.43	KMP-SS50-0000-0003-01	1.299	1.628	N	1.6	UCL95	(2)
Thorium-230	pCi/g	10 / 10	--	3.57	CR1E-SS07-0000-0003-01	1.948	2.494	N	2.5	UCL95	(2)
Radium-226	pCi/g	375 / 375	--	86.3	CESS-041 (2-6)	4.93	5.859	NP	5.9	UCL95	(14)
Arsenic	mg/kg	108 / 108	--	11	KMP-12-00	5.453	5.663	G	5.7	UCL95	(6)
Barium	mg/kg	108 / 108	--	420	CR1E-SS15-0000-0003-01	84.68	93.64	NP	94	UCL95	(14)
Chromium	mg/kg	108 / 108	--	24	KMP-SS75-0000-0003-02	7.083	7.576	NP	7.6	UCL95	(14)
Lead	mg/kg	108 / 108	--	130	KMP-SS75-0000-0003-02	11.85	13.93	NP	14	UCL95	(14)
Manganese	mg/kg	85 / 85	--	310	KMP-SS77-0000-0003-01	184	191.5	N	190	UCL95	(2)
Nickel	mg/kg	85 / 85	--	20	CR1E-SS07-0000-0003-01	7.839	8.287	LN	8.3	UCL95	(14)
Selenium	mg/kg	118 / 118	--	21	KMP-17-00	2.569	3.004	NP	3.0	UCL95	(14)
Thallium	mg/kg	84 / 85	0	0.22	CR1E-SS12-0000-0003-01	0.129	0.135	G	0.14	UCL95	(7)
Uranium	mg/kg	164 / 164	--	61	RWPR-SS-002 (1.5-2)	5.071	6.24	LN	6.2	UCL95	(14)
Vanadium	mg/kg	108 / 108	--	41	KMP-17-00	15.75	16.61	NP	17	UCL95	(14)
Zinc	mg/kg	85 / 85	--	95	KMP-SS75-0000-0003-01	45.41	47.86	NP	48	UCL95	(14)

Table C-9. Exposure Point Concentrations for Ecological Risk Assessment

Site-Wide											
Contaminant	Units	Detection Frequency	Number of High Nondetect Results[a]	Maximum Concentration (qualifier)	Location of Maximum Concentration	Arithmetic Mean[b]	UCL95 / Distribution[c]		Exposure Point Concentration		
									Value[d]	Statistic[d]	Method[e]
Subsurface Soil (0-72 inches bgs)											
Uranium-238	pCi/g	14 / 14	--	51.5	KMP-SB28-0060-0066-01	4.842	12	NP	12	UCL95	(14)
Uranium-234	pCi/g	14 / 14	--	49.4	KMP-SB28-0060-0066-01	4.699	11.53	NP	12	UCL95	(14)
Thorium-230	pCi/g	14 / 14	--	3.57	CR1E-SS07-0000-0003-01	1.707	2.123	N	2.1	UCL95	(2)
Radium-226	pCi/g	683 / 683	--	468	C1LP-401 SS4 4.5-6	12.82	15.6	NP	16	UCL95	(14)
Arsenic	mg/kg	160 / 160	--	11	KMP-12-00	5.408	5.565	LN	5.6	UCL95	(14)
Barium	mg/kg	154 / 154	--	420	CR1E-SS15-0000-0003-01	78.08	84.27	NP	84	UCL95	(14)
Chromium	mg/kg	154 / 154	--	24	KMP-SS75-0000-0003-02	7.128	7.491	NP	7.5	UCL95	(14)
Lead	mg/kg	154 / 154	--	130	KMP-SS75-0000-0003-02	11.01	12.55	NP	13	UCL95	(14)
Manganese	mg/kg	115 / 115	--	400	KMA-SS02-0012-0018-01	194.3	201.5	LN	200	UCL95	(14)
Nickel	mg/kg	115 / 115	--	20	CR1E-SS07-0000-0003-01	7.787	8.138	LN	8.1	UCL95	(14)
Selenium	mg/kg	171 / 176	0	37	KMP-16-18	2.553	3.066	NP	3.1	UCL95	(15)
Thallium	mg/kg	113 / 115	0	0.22	CR1E-SS12-0000-0003-01	0.13	0.135	N	0.14	UCL95	(3)
Uranium	mg/kg	213 / 213	--	210	CELI-502 SS3 3-4.5	12.13	15.61	NP	16	UCL95	(14)
Vanadium	mg/kg	160 / 160	--	58	KMP-16-18	15.7	16.43	NP	16	UCL95	(14)
Zinc	mg/kg	115 / 115	--	95	KMP-SS75-0000-0003-01	43.6	45.5	NP	46	UCL95	(14)

Notes:

[a] Number of nondetect results that exceeded the maximum detected concentration. These results were not included in the statistical calculations.

[b] The arithmetic mean for datasets with nondetected results is calculated using the Kaplan-Meier method.

[c] Tested using the Shapiro-Wilk W or Lilliefors test for normal and lognormal distributions and the Anderson-Darling and Kolmogorov-Smirnov tests for gamma distributions. A 5 percent level of significance was used in all tests. Distribution tests were conducted only for samples with at least four detected results. Distributions not confirmed as N, LN, or G were treated as NP in all statistical calculations.

[d] The EPC is the lesser of the UCL95 (or UCL99) and the maximum detected concentration. The maximum detected concentration is the default when there are fewer than 10 samples or fewer than four detected results. See Appendix D of USEPA (2024b).

[e] The statistical methods for selecting the exposure point concentration are as follows (not all are used):

(1) Maximum detected concentration
(2) 95% Student's t UCL
(3) 95% KM (t) UCL
(4) 95% Adjusted Gamma UCL
(5) 95% Gamma Adjusted KM-UCL
(6) 95% Approximate Gamma UCL
(7) 95% Gamma Approximate KM-UCL
(8) 95% H-UCL
(9) 95% H-UCL (KM log)
(10) 95% Bootstrap-t UCL
(11) 95% KM Bootstrap-t UCL
(12) 95% BCA UCL
(13) 95% KM BCA UCL
(14) 95% Percentile Bootstrap UCL
(15) 95% KM Percentile Bootstrap UCL
(16) 99% Bootstrap-t UCL
(17) 99% KM Percentile Bootstrap UCL

Table C-9. Exposure Point Concentrations for Ecological Risk Assessment

Notes (Continued):

BCA	Bias-corrected accelerated bootstrap method
bgs	Below ground surface
EPC	Exposure point concentration
G (data qualifier)	Sample density differs by more than 15% of the LCS density.
G (distribution)	Gamma distribution
H-UCL	UCL based upon Land's H-statistic
KM	Kaplan-Meier
LN	Lognormal distribution
M3	The requested MDC was not met, but the reported activity is greater than the reported MDC
N	Normal distribution
ND	Not detected
NP	Nonparametric distribution
pCi/g	Picocurie per gram
UCL	Upper confidence limit
UCL95	95 percent upper confidence limit
UCL99	99 percent upper confidence limit
USEPA	U.S. Environmental Protection Agency

Reference:

U.S. Environmental Protection Agency (USEPA). 2024b. "Navajo Abandoned Uranium Mines Risk Assessment Methodology." Draft Final. March.

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Church Rock Mine No. 1 - Surface Soil (0 - 6 inches bgs)																										
C1LI-005.1 (0-6)	6		--	--	--	2.61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-016.1 (0-6)	6		--	--	--	1.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-026.1 (0-6)	6		--	--	--	2.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-037.1 (0-6)	6		--	--	--	1.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-047.1 (0-2)	2		--	--	--	7.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-058.1 (0-6)	6		--	--	--	7.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-058.4 Dup	6		--	--	--	9.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-063.1 (0-6)	6		--	--	--	7.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-068.1 (0-6)	6		--	--	--	3.79	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-078.1 (0-6)	6		--	--	--	1.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-085.1 (0-6)	6		--	--	--	2.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-091.4 Dup	6		--	--	--	1.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-099.1 (0-6)	6		--	--	--	1.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-107.1 (0-6)	6		--	--	--	1.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-110.1 (0-6)	6		--	--	--	0.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-120.1 (0-6)	6		--	--	--	1.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-127.4 Dup	6		--	--	--	4.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-131.1 (0-6)	6		--	--	--	1.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-140.4 Dup	6		--	--	--	1.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-141.1 (0-6)	6		--	--	--	8.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-004.1 (0-6) Dup	6		--	--	--	1.35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-009.1 (0-6)	6		--	--	--	47.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-015.1 (0-6)	6		--	--	--	35.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-019.1 (0-6)	6		--	--	--	4.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-020.1 (0-6)	6		--	--	--	26.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-026.1 (0-6)	6		--	--	--	12.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-031.1 (0-6)	6		--	--	--	2.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-037.1 (0-6) Dup	6		--	--	--	2.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-042.1 (0-6)	6		--	--	--	2.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-048.1 (0-6)	6		--	--	--	3.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-052.1 (0-6)	6		--	--	--	1.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-053.1 (0-6)	6		--	--	--	2.97	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-059.1 (0-6)	6		--	--	--	2.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-064.1 (0-6)	6		--	--	--	1.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-070.1 (0-6)	6		--	--	--	1.77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-075.1 (0-6)	6		--	--	--	2.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-081.1 (0-6)	6		--	--	--	1.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-002.1 (0-6)	6		--	--	--	1.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-013.1 (0-6)	6		--	--	--	3.49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-020.1 (0-6)	6		--	--	--	2.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-022.1 (0-6)	6		--	--	--	1.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-034.1 (0-6)	6		--	--	--	2.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-041.1 (0-6)	6		--	--	--	1.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-048.1 (0-6)	6		--	--	--	2.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-050.1 (0-6)	6		--	--	--	1.87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-062.1 (0-6)	6		--	--	--	1.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-067.1 (0-6)	6		--	--	--	7.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-069.1 (0-6)	6		--	--	--	1.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-083.1 (0-6)	6		--	--	--	1.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-090.1 (0-6)	6		--	--	--	1.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-097.1 (0-6)	6		--	--	--	2.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-104.1 (0-6)	6		--	--	--	1.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-026.1 (0-2)	2		--	--	--	26.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-026.2 (2-6)	6		--	--	--	31.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-041.1 (0-2) Dup	2		--	--	--	2.52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-041.2 (2-6)	6		--	--	--	1.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-063A.1 (0-2)	2		--	--	--	41.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-063A.2 (2-6)	6		--	--	--	8.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-069.1 (0-2)	2		--	--	--	4.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-069.2 (2-6)	6		--	--	--	1.81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-082.1 (0-2)	2		--	--	--	1.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-082.2 (2-6)	6		--	--	--	1.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-125.1 (0-2)	2		--	--	--	1.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR1-SS05-0000-0003-01	3		--	--	--	--	3300	0.088	3.6	68	0.47	0.083	4	4.4	6.3	7900	8.7	120	0.15	4.7	1.1	0.058 U	0.098	1.5	11	35
CR1-SS06-0000-0003-01	3		--	--	--	--	5800	--	5.8	--	0.87	0.22	6.1	7.9	19	11000	17	150	0.42	9	1.9	0.1	0.2	--	14	70

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CR1-SS06-0000-0003-02	3		--	--	--	1.9	--	0.19	--	86	--	--	--	--	--	--	--	--	--	--	--	--	--	2.7	--	--
CR1-SS07-0000-0003-01	3		--	--	--	2.87	4500	0.098	3.5	87	0.54	0.1	4.1	8	9.2	11000	10	170	0.18	5	1.2	0.06 U	0.15	4.6	11	41
CR1-SS08-0000-0003-01	3		--	--	--	3.13	4400	0.16	5.3	89	0.63	0.12	4.9	5.6	9.9	11000	10	170	0.29	6.5	1.7	0.058 U	0.14	3.2	13	43
CR1-SS09-0000-0003-01	3		--	--	--	8.6	5900	0.19	5.3	65	0.8	0.21	6.8	7	16	13000	15	160	0.37	9.2	3.2	0.072	0.16	9	17	61
CR1-SS10-0000-0003-01	3		0.82	0.81	0.86	1.23	3100	0.14	5.9	43	0.5	0.13	3.4	6.1	10	11000	11	140	0.28	5.9	1.3	0.062 U	0.13	1.4	12	45
CR1-SS11-0000-0003-01	3		--	--	--	1.29	4100	0.12	4.6	78	0.61	0.12	4.3	6.1	10	10000	10	150	0.25	6.2	1.8	0.058 U	0.12	1	12	45
CR1-SS12-0000-0003-01	3		--	--	--	1.16	3600	0.038	2.9	36	0.56	0.038 U	4.1	6.2	3.9	9900	7.2	150	0.16	6.5	1.2	0.057 U	0.067	1.6	12	52
CR1-SS13-0000-0003-01	3		--	--	--	2.25	4400	0.18	4.8	85	0.68	0.14	4.7	6.1	12	11000	11	160	0.34	7.2	1.6	0.059	0.13	4.6	13	47
CR1-SS14-0000-0003-01	3		--	--	--	--	3700	0.12	4.2	77	0.52	0.13	4	4.8	8	9200	9.1	140	0.21	5.2	1.3	0.065 U	0.14	1.5	12	38
CR1-SS15-0000-0003-01	3		1.02	0.91	1.71	2.29	--	--	--	--	--	0.1	--	--	5.9	--	--	--	--	--	--	0.058 U	0.094	--	--	38
CR1-SS15-0000-0003-02	3		--	--	--	--	4300	0.097	4.2	120	0.46	--	4.8	3.9	--	9400	7.8	130	0.32	4.6	1.2	--	--	1.8	12	--
CR1-SS16-0000-0003-01	3		1.12	1.21	1.46	1.73	4300	0.14	5	94	0.62	0.13	4.5	6	16	10000	10	160	0.27	6.5	1.4	0.059 U	0.14	1.7	12	42
CR1-SS17-0000-0003-01	3		--	--	--	0.82	2300	0.1	3.7	80	0.32	0.065	2.7	3.7	5	7300	6.9	120	0.19	3.9	0.79	0.057 U	0.1	0.61	8.6	27
CR1-SS18-0000-0003-01	3		--	--	--	1.33	3900	0.14	4.7	90	0.57	0.13	4.6	5.7	10	9200	10	150	0.23	6.4	1.3	0.057 U	0.11	1.2	12	41
CR1-SS19-0000-0003-01	3		--	--	--	18.20	3500	0.11	4.1	210	0.45	0.081	4.2	4.3	6.9	9200	7.7	190	0.39	5.1	4.5	0.057 U	0.097	8.8	15	38
CR1-SS20-0000-0003-01	3		--	--	--	1.19	2900	0.076	3.8	54	0.38	0.086	3	4.3	6.1	7800	7.7	100	0.18	4.2	1.1	0.057 U	0.093	1.1	9.3	32
CR1-SS21-0000-0003-01	3		--	--	--	2.27	7000	0.22	5.9	100	0.97	0.25	7.5	8.3	21	13000	18	180	0.4	11	2.1	0.1	0.21	3.1	17	70
CR1-SS22-0000-0003-01	3		--	--	--	--	--	0.13	5.3	110	--	0.14	--	6.4	--	12000	12	--	--	--	1.6	--	0.15	1.6	15	56
CR1-SS22-0000-0003-02	3		--	--	--	--	5900	--	--	--	0.71	--	12	--	14	--	--	180	0.53	8.8	--	0.076	--	--	--	--
CR1-SS23-0000-0003-01	3		--	--	--	1.54	5600	0.14	5.8	98	0.8	0.19	6	7.3	17	12000	14	180	0.27	9.6	1.8	0.081	0.18	1.2	15	62
CR1-SS24-0000-0003-01	3		--	--	--	19.20	6200	0.11	5.3	330	0.78	0.18	6.4	6.9	15	12000	14	200	0.35	8.7	4.4	0.09	0.17	21	19	62
CR1-SS25-0000-0003-01	3		--	--	--	2.94	4600	0.13	6.1	98	0.62	0.17	5.2	6.3	12	12000	11	200	0.34	7.2	1.9	0.065	0.13	1.9	15	60
CR1-SS26-0000-0003-01	3		--	--	--	28.50	4400	0.16	6.1	100	0.71	0.15	4.6	5.7	12	13000	12	170	0.61	7.4	9.5	0.062 U	0.15	55	20	48
CR1-SS27-0000-0003-01	3		--	--	--	4.68	3300	0.15	4.3	66	0.5	0.12	3.7	5	9.4	9800	8.9	140	0.27	5.7	2.7	0.059 U	0.097	4.9	13	43
CR1-SS28-0000-0003-01	3		--	--	--	28.00	3600	0.11	3.5	66	0.43	0.12	5.6	4	7.6	8400	11	130	0.26	6.8	14	0.062 U	0.089	20	20	37
CR1-SS29-0000-0003-01	3		--	--	--	3.21	4400	0.12	4.7	95	0.62	0.15	5.3	5.7	12	9600	11	170	0.27	7.6	1.7	0.058 U	0.11	3.4	13	47
CR1-SS30-0000-0003-01	3		--	--	--	2.12	4000	0.089	4.3	66	0.49	0.11	4.5	5.2	7.8	9300	9.1	140	0.2	6.1	1.4	0.061 U	0.11	1.6	11	49
CR1-SS31-0000-0003-01	3		--	--	--	6.28	4600	0.078	3.6	41	0.44	0.11	6.2	3.4	5.7	10000	10	100	0.21	5.3	2.2	0.058 U	0.075	12	13	31
CR1-SS32-0000-0003-01	3		--	--	--	6.30	4200	0.13	4.1	83	0.57	0.13	13	6.3	12	9900	9.8	150	0.28	16	2.3	0.058 U	0.12	4.8	15	42
CR1-SS33-0000-0003-01	3		--	--	--	0.60	1400	0.055	3	63	0.2	0.051	2.3	2.5	3.2	5000	4.8	89	0.15	2.7	0.47	0.057 U	0.048	0.37	5.4	18
CR1-SS34-0000-0003-01	3		--	--	--	1.13	4800	0.14	5	86	0.62	0.12	5.2	5.8	11	11000	11	160	0.27	7.2	1.3	0.061	0.14	0.91	13	46
RWPR-SS-001 (0-6)	6		--	--	--	4.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.7	--	--
RWPR-SS-002 (0-6)	6		--	--	--	2.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.8	--	--
RWPR-SS-002 (1.5-2)	2		--	--	--	48.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	61	--	--
RWPR-SS-002 (2.5-3)	3		--	--	--	17.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	39	--	--
RWPR-SS-003 (0-2)	2		--	--	--	2.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.5	--	--
RWPR-SS-003 (2-5)	5		--	--	--	1.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.5	--	--
RWPR-SS-004 (0-6)	6		--	--	--	8.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.2	--	--
RWPR-SS-004 (1.5-2)	2		--	--	--	1.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.1	--	--
RWPR-SS-004 (2.5-3)	3		--	--	--	0.77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3	--	--
RWPR-SS-005 (0-2)	2		--	--	--	1.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.1	--	--
RWPR-SS-005 (2-6)	6		--	--	--	1.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.6	--	--
RWPR-SS-006 (0-6)	6		--	--	--	4.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.7	--	--
RWPR-SS-006 (1.5-1.9)	1.9		--	--	--	2.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.9	--	--
RWPR-SS-007 (0-6)	6		--	--	--	2.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--
RWPR-SS-008 (0-6)	6		--	--	--	5.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.3	--	--
RWPR-SS-009 (0-6) C	6		--	--	--	2.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.7	--	--
RWPR-SS-009 (1.5-2)	2		--	--	--	0.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.82	--	--
RWPR-SS-009 (2.5-3)	3		--	--	--	0.76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.6	--	--
RWPR-SS-010 (0-6)	6		--	--	--	17.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9.4	--	--
RWPR-SS-010 (1.5-2)	2		--	--	--	2.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.9	--	--
RWPR-SS-010 (2.5-3)	3		--	--	--	1.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.4	--	--
RWPR-SS-011 (0-6)	6		--	--	--	3.73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.8	--	--
RWPR-SS-011 (1.5-2)	2		--	--	--	0.96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.97	--	--
RWPR-SS-011 (2.5-3)	3		--	--	--	0.63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.68	--	--
RWPR-SS-012 (0-6)	6		--	--	--	12.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	--	--
RWPR-SS-012 (1.5-2)	2		--	--	--	2.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.6	--	--
RWPR-SS-012 (2.5-3)	3		--	--	--	1.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.2	--	--
RWPR-SS-014 (0-6)	6		--	--	--	3.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.3	--	--
RWPR-SS-014 (1.5-2)	2		--	--	--	7.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	--	--
RWPR-SS-019 (0-2)	2		--	--	--	6.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6.2	--	--
RWPR-SS-019 (0-6)	6		--	--	--	7.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6.5	--	--
RWPR-SS-019 (1.5-2)	2		--	--	--	1.64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3	--	--
RWPR-SS-019 (2.5-3)	3		--	--	--	0.87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.2	--	--
RWPR-SS-019 (2-6)	6		--	--	--	2.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	--	--
RWPR-SS-020 (0-6) C	6		--	--	--	18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.2	--	--

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RWPR-SS-020 (1.5-2)	2		--	--	--	7.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.8	--	--
RWPR-SS-020 (2.5-3)	3		--	--	--	3.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.3	--	--
RWPR-SS-021 (0-2)	2		--	--	--	6.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.7	--	--
RWPR-SS-021 (1.5-2)	2		--	--	--	1.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.2	--	--
RWPR-SS-021 (2.5-3)	3		--	--	--	1.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--
RWPR-SS-021 (2-6)	6		--	--	--	1.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.4	--	--
RWPR-SS-023 (0-6)	6		--	--	--	1.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3	--	--
RWPR-SS-023 (1.5-2)	2		--	--	--	1.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.1	--	--
RWPR-SS-023 (2.5-3)	3		--	--	--	1.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.2	--	--
RWPR-SS-025 (0-6)	6		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.61	--	--
RWPR-SS-025 (0-6) Dup	6		--	--	--	1.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RWPR-SS-028 (0-6)	6		--	--	--	1.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.78	--	--
RWPR-SS-028 (1.5-2)	2		--	--	--	1.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.2	--	--
RWPR-SS-028 (2.5-3)	3		--	--	--	2.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.5	--	--
RWPR-SS-029 (0-6)	6		--	--	--	0.79	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.9	--	--
RWPR-SS-211 (0-6)	6		--	--	--	3.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.8	--	--
RWPR-SS-211 (1.5-2)	2		--	--	--	1.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.96	--	--
RWPR-SS-211 (2.5-3)	3		--	--	--	0.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.63	--	--
RWPR-SS-221 (0-2)	2		--	--	--	7.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.6	--	--
RWPR-SS-221 (1.5-2)	2		--	--	--	1.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.5	--	--
RWPR-SS-221 (2.5-3)	3		--	--	--	1.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--
RWPR-SS-221 (2-6)	6		--	--	--	1.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.7	--	--
Frequency of Plant NOEC Exceedance:			0/3	0/3	0/3	**34/146**	0/30	0/30	0/30	**3/30**	0/30	0/30	**30/30**	0/30	0/30	0/30	0/30	0/30	0/30	0/30	**29/30**	0/30	**29/30**	**3/86**	0/30	0/30
Frequency of Soil Invertebrate NOEC Exceedance:			0/3	0/3	0/3	0/146	0/30	0/30	0/30	0/30	0/30	0/30	**30/30**	0/30	0/30	0/30	0/30	0/30	0/30	0/30	**4/30**	0/30	0/30	0/86	0/30	0/30
Frequency of Plant and Soil Invertebrate Exceedance:			0/3	0/3	0/3	**34/146**	0/30	0/30	0/30	**3/30**	0/30	0/30	**30/30**	0/30	0/30	0/30	0/30	0/30	0/30	0/30	**29/30**	0/30	**29/30**	**3/86**	0/30	0/30
Church Rock Mine No. 1 - Subsurface Soil (6 - 72 inches bgs) [d]																										
C1-1B008-5 (FD)	72		--	--	--	9.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1-B001-5	72		--	--	--	0.868	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1-B003-5	72		--	--	--	2.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1-B006-5	72		--	--	--	0.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1-B007-5	72		--	--	--	16.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-005.2 (18-24)	24		--	--	--	1.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-005.3 (30-36)	36		--	--	--	1.63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-016.2 (18-24)	24		--	--	--	5.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-016.3 (30-36)	36		--	--	--	2.88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-026.2 (18-24)	24		--	--	--	4.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-026.3 (30-36)	36		--	--	--	1.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-037.2 (18-24)	24		--	--	--	3.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-037.4 Dup	36		--	--	--	5.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-047.2 (8-14) Dup	14		--	--	--	8.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-058.2 (9-15)	15		--	--	--	3.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-068.2 (10-16)	16		--	--	--	1.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-078.2 (14-20)	20		--	--	--	2.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-085.2 (18-24)	24		--	--	--	1.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-085.3 (30-36)	36		--	--	--	1.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-091.2 (18-24)	24		--	--	--	1.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-091.3 (30-36)	36		--	--	--	1.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-099.2 (18-24)	24		--	--	--	1.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-099.3 (30-36)	36		--	--	--	1.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-107.2 (18-24)	24		--	--	--	1.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-107.3 (30-36)	36		--	--	--	1.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-110.2 (18-24)	24		--	--	--	1.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-110.3 (30-36)	36		--	--	--	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-120.2 (18-24)	24		--	--	--	1.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-120.3 (30-36)	36		--	--	--	1.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-127.2 (18-24)	24		--	--	--	2.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-127.3 (30-36)	36		--	--	--	2.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-131.2 (18-24)	24		--	--	--	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-131.3 (30-36)	36		--	--	--	0.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-140.2 (18-24)	24		--	--	--	1.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-140.3 (30-36)	36		--	--	--	1.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-141.2 (18-24)	24		--	--	--	1.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-141.3 (30-36)	36		--	--	--	1.64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-500 SS1 0-1.5	18		--	--	--	10.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-500 SS2 1.5-3	36		--	--	--	1.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-500 SS3 3-4.5	54		--	--	--	1.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
C1LI-500 SS4 4.5-6	72		--	--	--	2.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-501 SS1 0-1.5	18		--	--	--	5.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-501 SS10	72		--	--	--	--	--	--	3.6	--	--	--	--	--	--	--	--	--	1.1 U	--	0.53 U	--	--	--	11	--
C1LI-501 SS2 1.5-3	36		--	--	--	14.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-501 SS3 3-4.5	54		--	--	--	1.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LI-501 SS4 4.5-6	72		--	--	--	0.67	--	--	3.4	--	--	--	--	--	--	--	--	--	1 U	--	0.52 U	--	--	--	9.5	--
C1LP-004.2 (18-24)	24		--	--	--	62.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-004.3 (30-36)	36		--	--	--	45.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-009.2 (18-24)	24		--	--	--	13.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-009.3 (30-36)	36		--	--	--	6.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-015.2 (18-24)	24		--	--	--	7.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-015.3 (30-36)	36		--	--	--	4.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-019.2 (12-18)	18		--	--	--	1.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-020.2 (18-24)	24		--	--	--	29.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-020.3 (30-36)	36		--	--	--	29.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-020.4 (48-54) Dup	54		--	--	--	30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-026.2 (18-24)	24		--	--	--	22.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-026.3 (30-36)	36		--	--	--	26.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-031.2 (18-24)	24		--	--	--	3.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-031.3 (30-36)	36		--	--	--	2.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-037.2 (16-22)	22		--	--	--	2.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-042.2 (18-24)	24		--	--	--	2.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-042.3 (30-36)	36		--	--	--	1.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-048.2 (18-24)	24		--	--	--	1.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-048.3 (30-36)	36		--	--	--	1.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-052.2 (18-24)	24		--	--	--	1.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-052.3 (30-36)	36		--	--	--	1.81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-053.2 (18-24)	24		--	--	--	1.99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-053.3 (30-36)	36		--	--	--	2.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-059.2 (18-24)	24		--	--	--	2.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-059.3 (30-36)	36		--	--	--	2.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-064.2 (18-24)	24		--	--	--	1.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-064.3 (30-36)	36		--	--	--	1.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-070.2 (18-24)	24		--	--	--	1.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-070.3 (30-36)	36		--	--	--	6.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-075.2 (18-24)	24		--	--	--	1.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-075.4 Dup	36		--	--	--	1.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-081.2 (18-24)	24		--	--	--	1.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-081.3 (30-36)	36		--	--	--	1.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-400 SS1 0-1.5	18		--	--	--	2.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-400 SS2 1.5-3 Dup	36		--	--	--	31.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-400 SS3 3-4.5	54		--	--	--	2.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-400 SS4 4.5-6	72		--	--	--	2.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-401 SS1 0-1.5	18		--	--	--	8.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-401 SS2 1.5-3	36		--	--	--	18.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-401 SS3 3-4.5	54		--	--	--	30.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-401 SS4 4.5-6	72		--	--	--	468	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-402 DUP 402	72		--	--	--	14.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-402 SS1 0-1.5	18		--	--	--	2.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-402 SS2 1.5-3	36		--	--	--	1.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-402 SS3 3-4.5 Dup	54		--	--	--	3.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-402 SS4 4.5-6	72		--	--	--	16.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-403 SS1 0-1.5	18		--	--	--	21.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-403 SS2 1.5-3 Dup	36		--	--	--	27.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-403 SS3 3-4.5	54		--	--	--	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-403 SS4 4.5-6	72		--	--	--	59.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-404 SS1 0-1.5	18		--	--	--	2.66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-404 SS2 1.5-3 Dup	36		--	--	--	1.78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-404 SS3 3-4.5	54		--	--	--	2.92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-404 SS4 4.5-6 Dup	72		--	--	--	2.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-405 SS1 0-1.5	18		--	--	--	1.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-405 SS2 1.5-3	36		--	--	--	1.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-405 SS3 3-4.5	54		--	--	--	1.35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-405 SS4 4.5-6	72		--	--	--	1.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-406 SS1 0-1.5 Dup	18		--	--	--	1.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-406 SS2 1.5-3	36		--	--	--	1.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
C1LP-406 SS3 3-4.5	54		--	--	--	1.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-406 SS4 4.5-6	72		--	--	--	1.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-407 DUP 407	72		--	--	--	5.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-407 SS1 0-1.5	18		--	--	--	3.52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-407 SS2 1.5-3	36		--	--	--	3.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-407 SS3 3-4.5	54		--	--	--	5.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-407 SS4 4.5-6	72		--	--	--	5.52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-408 SS1 0-1.5	18		--	--	--	3.53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-408 SS2 1.5-3	36		--	--	--	4.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-408 SS3 3-4.5	54		--	--	--	5.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-408 SS4 4.5-6	72		--	--	--	6.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-700 SS1 0-1.5	18		--	--	--	1.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-700 SS2 1.5-3 Dup	36		--	--	--	5.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-700 SS3 3-4.5	54		--	--	--	39.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-700 SS4 4.5-6	72		--	--	--	34.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-701 SS1 0-1.5	18		--	--	--	2.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-701 SS2 1.5-3	36		--	--	--	3.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-701 SS3 3-4.5	54		--	--	--	3.94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-701 SS4 4.5-6	72		--	--	--	3.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-702 SS1 0-1.5	18		--	--	--	1.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-702 SS2 1.5-3	36		--	--	--	1.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-702 SS3 3-4.5	54		--	--	--	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-702 SS4 4.5-6	72		--	--	--	1.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-703 SS1 0-1.5	18		--	--	--	1.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-703 SS2 1.5-3	36		--	--	--	1.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-703 SS3 3-4.5	54		--	--	--	1.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LP-703 SS4 4.5-6	72		--	--	--	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-002.2 (6-12)	12		--	--	--	1.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-013.2 (18-24)	24		--	--	--	31.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-013.4	36		--	--	--	38.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-020.2 (18-24)	24		--	--	--	99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-020.3 (30-36)	36		--	--	--	189	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-022.2 (12-18) Dup	18		--	--	--	55.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-034.2 (18-24)	24		--	--	--	154	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-034.3 (30-36)	36		--	--	--	82	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-041.2 (12-18)	18		--	--	--	329	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-048.2 (12-18)	18		--	--	--	128	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-050.2 (18-24)	24		--	--	--	75.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-050.3 (30-36)	36		--	--	--	60.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-062.2 (18-24)	24		--	--	--	37.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-062.3 (30-36)	36		--	--	--	48.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-067.2 (18-24)	24		--	--	--	104	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-067.3 (30-36)	36		--	--	--	99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-069.2 (18-24)	24		--	--	--	38.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-069.3 (30-36)	36		--	--	--	67.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-083.2 (8-14)	14		--	--	--	1.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-090.3 (30-36)	36		--	--	--	56.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-090.4 Dup	24		--	--	--	76.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-097.2 (18-24)	24		--	--	--	1.82	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-097.3 (30-36)	36		--	--	--	2.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1LW-104.2 (14-20)	20		--	--	--	1.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-026.3 (12-18)	18		--	--	--	7.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-041.3 (6-12)	12		--	--	--	2.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-063A.3 (12-18)	18		--	--	--	1.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1SS-082.3 (18-24)	24		--	--	--	0.93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RWPR-SS-029 (6-9)	9		--	--	--	1.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.5	--	--
Frequency of Plant NOEC Exceedance:			0/0	0/0	0/0	**58/161**	0/0	0/0	0/2	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/2	0/0	0/2	0/0	0/0	0/1	0/2	0/0
Church Rock Mine No. 1 East - Surface Soil (0 - 6 inches bgs)																										
CELA-001 (0-2)	2		--	--	--	1.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-001 (2-6)	6		--	--	--	1.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-001A.1 (0-2")	2		--	--	--	1.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-004 (2-6) Dup	6		--	--	--	3.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-004.1 (0-2")	2		--	--	--	2.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-008 (2-6)	6		--	--	--	1.53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-008.1 (0-2")	2		--	--	--	1.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-012 (2-6)	6		--	--	--	1.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CELA-012.1 (0-2")	2		--	--	--	2.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-016 (2-6)	6		--	--	--	2.61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-016.1 (0-2")	2		--	--	--	4.93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-020 (2-6)	6		--	--	--	1.35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-020.1 (0-2")	2		--	--	--	1.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-024 (2-6)	6		--	--	--	1.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-024.1 (0-2")	2		--	--	--	1.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-027 (2-6)	6		--	--	--	2.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-027.1 (0-2")	2		--	--	--	2.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-031 (2-6)	6		--	--	--	2.63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-031.1 (0-2")	2		--	--	--	2.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-035 (2-6)	6		--	--	--	1.63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-035.1 (0-2")	2		--	--	--	1.96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-039 (2-6)	6		--	--	--	3.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-039.1 (0-2")	2		--	--	--	2.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-043 (2-6)	6		--	--	--	75.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-043.1 (0-2")	2		--	--	--	5.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-047 (2-6)	6		--	--	--	3.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-047.1 (0-2")	2		--	--	--	2.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-051 (2-6)	6		--	--	--	2.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-051.1 (0-2")	2		--	--	--	3.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-054 (2-6)	6		--	--	--	1.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-054.1 (0-2")	2		--	--	--	1.64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-058 (2-6)	6		--	--	--	3.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-058.1 (0-2")	2		--	--	--	37.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-062 (2-6)	6		--	--	--	2.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-062.1 (0-2") Dup	2		--	--	--	3.87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-062.2	2		--	--	--	3.79	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-066 (2-6)	6		--	--	--	1.64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-066.1 (0-2")	2		--	--	--	2.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-070 (2-6)	6		--	--	--	19.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-070.1 (0-2")	2		--	--	--	4.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-070.2	2		--	--	--	7.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-074 (2-6)	6		--	--	--	7.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-074.1 (0-2")	2		--	--	--	5.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-037 (2-6)	6		--	--	--	1.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-037.1 (0-2)	2		--	--	--	2.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-041 (2-6)	6		--	--	--	86.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-041.1 (0-2)	2		--	--	--	8.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-060 (2-6)	6		--	--	--	4.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-060.1 (0-2)	2		--	--	--	2.41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-069 (2-6)	6		--	--	--	2.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-069.1 (0-2)	2		--	--	--	1.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-070.1 (0-2)	2		--	--	--	1.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR1E-SS05-0000-0003-01	3		--	--	--	1.59	6000	0.05	6.10	44.00	0.54	0.09	8.00	4.60	9.40	16000.00	10.00	120.00	0.36	9.80	1.40	0.06	0.20	1.00	12.00	46.00
CR1E-SS06-0000-0003-01	3		--	--	--	6.22	4700	0.04	4.50	68.00	0.42	0.05	8.50	4.50	7.70	12000.00	7.80	160.00	0.24	10.00	1.90	0.057 U	0.11	5.40	13.00	33.00
CR1E-SS07-0000-0003-01	3		1.27	1.35	3.57	3.21	--	0.07	--	--	0.42	--	22.00	--	8.40	11000.00	7.00	--	0.21	20.00	1.30	--	0.10	--	14.00	32.00
CR1E-SS07-0000-0003-02	3		--	--	--	--	4800	--	4.10	85.00	--	0.05	--	5.70	--	--	--	180.00	--	--	--	0.065 U	--	2.40	--	--
CR1E-SS08-0000-0003-01	3		--	--	--	1.76	5300	0.10	4.00	80.00	0.49	0.08	6.10	4.10	6.30	11000.00	8.10	140.00	0.24	5.70	1.20	0.058 U	0.10	2.60	14.00	40.00
CR1E-SS09-0000-0003-01	3		--	--	--	1.69	8000	0.06	8.00	72.00	0.66	0.09	8.50	6.90	13.00	21000.00	13.00	180.00	0.20	11.00	1.60	0.06	0.17	0.91	17.00	60.00
CR1E-SS10-0000-0003-01	3		--	--	--	1.67	8400	0.06	10.00	70.00	0.76	0.07	10.00	9.30	17.00	23000.00	16.00	190.00	0.23	13.00	1.80	0.08	0.20	1.00	18.00	65.00
CR1E-SS11-0000-0003-01	3		--	--	--	3.80	7400	0.09	6.50	86.00	0.62	0.14	10.00	6.40	14.00	17000.00	13.00	280.00	0.37	11.00	2.10	0.08	0.16	2.40	18.00	71.00
CR1E-SS12-0000-0003-01	3		--	--	--	1.59	7600	0.23	8.70	180.00	1.00	0.23	8.40	10.00	19.00	20000.00	18.00	290.00	0.40	13.00	3.10	0.09	0.22	1.90	23.00	80.00
CR1E-SS13-0000-0003-01	3		0.96	1.04	1.16	1.16	5100	0.10	5.70	100.00	0.72	0.15	5.10	6.80	12.00	12000.00	12.00	160.00	0.19	7.50	1.80	0.064 U	0.14	1.10	14.00	49.00
CR1E-SS14-0000-0003-01	3		--	--	--	1.50	4600	0.11	4.70	110.00	0.63	0.13	4.80	5.90	11.00	11000.00	11.00	160.00	0.25	7.40	5.00	0.058 U	0.13	5.30	13.00	47.00
CR1E-SS15-0000-0003-01	3		--	--	--	3.11	4600	0.13	4.80	420.00	0.65	0.14	5.70	6.10	11.00	11000.00	11.00	170.00	0.40	7.90	1.80	0.058 U	0.12	3.30	13.00	47.00
CR1E-SS16-0000-0003-01	3		--	--	--	4.58	4000	0.06	3.80	93.00	0.43	0.07	4.50	4.10	6.50	9700.00	7.50	140.00	0.19	5.30	2.50	0.059 U	0.08	3.30	12.00	36.00
CR1E-SS17-0000-0003-01	3		--	--	--	13.90	4600	0.10	4.90	78.00	0.56	0.12	5.50	5.90	9.80	12000.00	9.90	180.00	0.27	7.10	4.70	0.058 U	0.11	6.30	15.00	44.00
CR1E-SS18-0000-0003-01	3		--	--	--	1.81	4800	0.09	4.80	160.00	0.56	0.11	5.80	5.30	9.80	11000.00	9.70	180.00	0.21	7.20	1.60	0.059 U	0.11	1.40	13.00	45.00
CR1E-SS19-0000-0003-01	3		--	--	--	--	--	--	--	27.00	--	0.06	--	--	--	--	--	130.00	--	--	1.20	--	--	--	11.00	--
CR1E-SS19-0000-0003-02	3		--	--	--	1.39	4800	0.04	5.50	--	0.45	--	7.10	4.00	7.30	13000.00	8.30	--	0.38	8.00	--	0.059 U	0.16	0.87	--	36.00
Frequency of Plant NOEC Exceedance:			0/2	0/2	0/2	**10/67**	0/15	0/15	0/15	**3/15**	0/15	0/15	**15/15**	0/15	0/15	0/15	0/15	**2/15**	0/15	0/15	**15/15**	0/15	**15/15**	0/15	0/15	0/15
Frequency of Soil Invertebrate NOEC Exceedance:			0/2	0/2	0/2	0/67	0/15	0/15	3/15	**1/15**	0/15	0/15	**15/15**	0/15	0/15	0/15	0/15	**0/15**	0/15	0/15	**2/15**	0/15	0/15	0/15	0/15	0/15
Frequency of Plant and Soil Invertebrate Exceedance:			0/2	0/2	0/2	**10/67**	0/15	0/15	3/15	**3/15**	0/15	0/15	**15/15**	0/15	0/15	0/15	0/15	**2/15**	0/15	0/15	**15/15**	0/15	**15/15**	0/15	0/15	0/15

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Church Rock Mine No. 1 East - Subsurface Soil (6 - 72 inches bgs)[d]																										
C1E-1B002-5 (FD)	72		--	--	--	1.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1E-B001-5	72		--	--	--	0.674	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1E-B003-5	72		--	--	--	19.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1E-B004-5	72		--	--	--	1.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1E-B005-5	72		--	--	--	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C1E-B006-5	72		--	--	--	0.932	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-001 (18-24)	24		--	--	--	1.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-001 (30-36)	36		--	--	--	1.49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-004 (10-16)	16		--	--	--	1.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-008 DUP	18		--	--	--	3.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-012 (18-24)	24		--	--	--	1.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-012 (30-36)	36		--	--	--	1.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-016 (18-24)	24		--	--	--	96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-016 (30-36)	36		--	--	--	74.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-020 (6-12)	12		--	--	--	1.52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-024 (14-20)	20		--	--	--	1.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-027 (18-24)	24		--	--	--	112	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-027 (30-36)	36		--	--	--	81.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-031 (18-24)	24		--	--	--	71.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-031 (30-36)	36		--	--	--	151	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-035 (18-24)	24		--	--	--	352	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-035 (30-36)	36		--	--	--	103	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-039 (18-24)	24		--	--	--	194	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-039 (27-33)	33		--	--	--	429	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-043 (18-24)	24		--	--	--	363	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-043 (30-36)	36		--	--	--	35.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-047 (18-24)	24		--	--	--	59.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-047 (30-36)	36		--	--	--	123	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-051 (6-12)	12		--	--	--	89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-054 (18-24)	24		--	--	--	83.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-054 (30-36)	36		--	--	--	65.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-058 DUP	24		--	--	--	261	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-062 (13-19)	19		--	--	--	3.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-066 (12-18)	18		--	--	--	45.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-070 (9-15)	15		--	--	--	2.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELA-074 (9-14)	14		--	--	--	3.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELI-502 DUP 502	54		--	--	--	90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELI-502 SS1 0-1.5	18		--	--	--	25.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELI-502 SS2 1.5-3 Dup	24		--	--	--	232	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELI-502 SS3 3-4.5	54		--	--	--	97	--	--	2	--	--	--	--	--	--	--	--	--	1.1 U	--	0.53 U	--	--	210	11	--
CELI-502 SS4 4.5-6	72		--	--	--	8.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELI-502 SS9	54		--	--	--	--	--	--	2.8	--	--	--	--	--	--	--	--	--	1.8	--	23	--	--	--	28	--
CELI-503 SS1 0-1.5	18		--	--	--	14.5	--	--	6.2	--	--	--	--	--	--	--	--	--	1.1 U	--	2.7 U	--	--	73	18	--
CELI-503 SS2 1.5-3	36		--	--	--	1.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELI-503 SS3 3-4.5	54		--	--	--	1.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELI-503 SS4 4.5-6	72		--	--	--	1.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELI-503 SS5	18		--	--	--	--	--	--	7.2	--	--	--	--	--	--	--	--	--	1.3 U	--	3.2 U	--	--	--	21	--
CELP-409 SS1 0-1.5	18		--	--	--	2.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELP-409 SS2 1.5-3	36		--	--	--	2.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELP-409 SS3 3-4.5	54		--	--	--	1.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CELP-409 SS4 4.5-6	72		--	--	--	2.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-037 (18-24)	24		--	--	--	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-037 (24-30)	30		--	--	--	1.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-041 (6-12)	12		--	--	--	16.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-060 (18-24)	24		--	--	--	1.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-060 (30-36)	36		--	--	--	2.39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-069 (18-24)	24		--	--	--	3.79	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CESS-069 (30-36)	36		--	--	--	2.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Frequency of Plant NOEC Exceedance:			0/0	0/0	0/0	**28/56**	0/0	0/0	0/4	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/4	0/0	**1/4**	0/0	0/0	**2/2**	0/4	0/0

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Kerr-McGee Ponds on the Navajo Nation - Surface Soil (0 - 6 inches bgs)																										
KMP-13-00	2		--	--	--	2.15	--	--	5.30	66.00	--	0.08	7.10	--	--	--	8.60	--	0.50	--	1.80	0.5 U	--	0.87	15.00	--
KMP-14-00	2		--	--	--	--	--	--	--	--	--	0.14	--	--	--	--	11.00	--	0.55	--	--	0.49 U	--	--	17.00	--
KMP-14D-00	2		--	--	--	8.21	--	--	5.60	78.00	--	--	8.20	--	--	--	--	--	--	--	2.90	--	--	1.30	--	--
KMP-SB44-0000-0006-01	6		--	--	--	9.30	6500	0.13	5.60	82.00	0.57	0.16	7.00	5.10	11.00	14000.00	13.00	230.00	0.42	7.90	2.40	0.062 U	0.15	6.20	15.00	44.00
KMP-SS49-0000-0003-01	3		--	--	--	4.00	--	0.09	--	--	--	0.09	--	--	--	--	--	--	0.36	--	--	--	--	1.40	--	--
KMP-SS49-0000-0003-02	3		--	--	--	--	6900	--	5.90	75.00	0.56		7.80	5.20	9.30	15000.00	11.00	220.00	--	8.40	1.90	0.059 U	0.15	--	16.00	45.00
KMP-SS74-0000-0003-01	3		1.13	0.97	2.04	2.80	5600	0.05	4.90	56.00	0.50	0.08	6.00	4.10	7.40	12000.00	9.30	190.00	0.35	6.80	1.40	0.059 U	0.12	0.94	12.00	36.00
Frequency of Plant NOEC Exceedance:			0/1	0/1	0/1	**2/5**	0/3	0/3	0/5	0/5	0/3	0/6	**5/5**	0/3	0/3	0/3	0/5	**1/3**	0/5	0/3	**5/5**	0/5	**3/3**	0/5	0/5	0/3
Frequency of Soil Invertebrate NOEC Exceedance:			0/1	0/1	0/1	0/5	0/3	0/3	0/5	0/5	0/3	0/6	**5/5**	0/3	0/3	0/3	0/5	0/3	0/5	0/3	0/5	0/5	0/3	0/5	0/5	0/3
Frequency of Plant and Soil Invertebrate Exceedance:			0/1	0/1	0/1	**2/5**	0/3	0/3	0/5	0/5	0/3	0/6	**5/5**	0/3	0/3	0/3	0/5	**1/3**	0/5	0/3	**5/5**	0/5	**3/3**	0/5	0/5	0/3
Kerr-McGee Ponds on the Navajo Nation - Subsurface Soil (6 - 72 inches bgs) [d]																										
KMP-SB43-0018-0024-01	24		--	--	--	2.13	6800	0.093	5.9	56	0.57	0.073	7.4	5.1	9	15000	10	210	0.37	7.8	1.3	0.06 U	0.14	3.8	14	41
KMP-SB45-0060-0066-01	66		--	--	--	1.46	6700	0.088	5.7	74	0.55	0.06	7	5.1	8.1	14000	9.5	220	0.36	7.7	1.2	0.06 U	0.14	0.64	14	39
Frequency of Plant NOEC Exceedance:			0/0	0/0	0/0	0/2	0/2	0/2	0/2	0/2	0/2	0/2	**2/2**	0/2	0/2	0/2	0/2	0/2	0/2	0/2	**2/2**	0/2	**2/2**	0/2	0/2	0/2
Kerr-McGee Ponds on United Nuclear Corporation Property - Surface Soil (0 - 6 inches bgs)																										
KMP-01-00	2		--	--	--	3.06	--	--	6.90	87.00	--	0.12	8.70	--	--	--	12.00	--	0.69	--	2.70	0.53 U	--	2.60	21.00	--
KMP-02-00	2		--	--	--	1.41	--	--	5.20	140.00	--	0.12 U	7.10	--	--	--	8.30	--	0.52	--	1.60	0.5 U	--	9.70	16.00	--
KMP-03-00	2		--	--	--	8.32	--	--	4.50	55.00	--	0.08	6.60	--	--	--	8.60	--	1.3 U	--	3.10	0.53 U	--	3.50	16.00	--
KMP-04-00	2		--	--	--	2.67	--	--	7.00	90.00	--	0.12	9.50	--	--	--	13.00	--	0.57	--	1.80	0.21 U	--	1.30	21.00	--
KMP-05-00	2		--	--	--	2.92	--	--	4.70	50.00	--	0.07	7.30	--	--	--	8.50	--	1.3 U	--	1.80	0.52 U	--	1.40	17.00	--
KMP-06-00	2		--	--	--	2.22	--	--	4.50	51.00	--	0.12 U	6.90	--	--	--	7.70	--	0.52	--	2.00	0.49 U	--	2.80	16.00	--
KMP-07-00	2		--	--	--	6.45	--	--	9.20	100.00	--	0.14	12.00	--	--	--	17.00	--	0.65	--	3.30	0.58 U	--	2.90	26.00	--
KMP-08-00	2		--	--	--	5.36	--	--	4.80	55.00	--	0.07	6.80	--	--	--	10.00	--	1.2 U	--	2.60	0.49 U	--	2.10	17.00	--
KMP-09-00	2		--	--	--	7.42	--	--	5.30	65.00	--	0.09	8.30	--	--	--	9.90	--	0.93	--	5.00	0.56 U	--	13.00	22.00	--
KMP-10-00	2		--	--	--	7.77	--	--	5.20	92.00	--	0.10	6.90	--	--	--	8.90	--	0.51	--	3.60	0.51 U	--	4.20	18.00	--
KMP-15-00	2		--	--	--	22.84	--	--	5.00	73.00	--	0.13	7.80	--	--	--	11.00	--	0.65	--	6.60	0.51 U	--	13.00	23.00	--
KMP-16-00	2		--	--	--	6.67	--	--	--	89.00	--	--	9.90	--	--	--	14.00	--	--	--	3.80	--	--	3.60	--	--
KMP-16D-00	2		--	--	--	--	--	--	7.50	--	--	0.14	--	--	--	--	--	--	0.75	--	--	0.52 U	--	--	22.00	--
KMP-17-00	2		--	--	--	48.54	--	--	7.60	120.00	--	0.14	8.50	--	--	--	13.00	--	0.65	--	21.00	0.45 U	--	40.00	41.00	--
KMP-18-00	2		--	--	--	--	--	--	6.60	90.00	--	0.15	10.00	--	--	--	14.00	--	0.74	--	5.60	0.49 U	--	--	25.00	--
KMP-18D-00	2		--	--	--	16.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13.00	--	--
KMP-19-00	2		--	--	--	26.04	--	--	5.30	74.00	--	0.08	7.20	--	--	--	10.00	--	0.70	--	8.80	0.46 U	--	18.00	26.00	--
KMP-20-00	2		--	--	--	13.70	--	--	5.70	74.00	--	0.10	8.00	--	--	--	11.00	--	0.61	--	6.20	0.5 U	--	12.00	22.00	--
KMP-21-00	2		--	--	--	4.43	--	--	4.90	52.00	--	0.06	7.00	--	--	--	8.70	--	0.54	--	2.50	0.45 U	--	4.80	17.00	--
KMP-22-00	2		--	--	--	4.35	--	--	4.90	51.00	--	0.12 U	7.00	--	--	--	8.10	--	1.2 U	--	2.00	0.48 U	--	3.50	16.00	--
KMP-23-00	2		--	--	--	3.73	--	--	6.00	63.00	--	0.11	7.60	--	--	--	9.60	--	0.80	--	1.90	0.51 U	--	2.80	18.00	--
KMP-SB27-0000-0006-01	6		1.17	1.11	0.94	1.27	7000	0.08	5.90	81.00	0.60	0.07	8.10	5.00	9.30	15000.00	10.00	200.00	0.41	8.70	1.30	0.059 U	0.17	1.50	14.00	40.00
KMP-SS45-0000-0003-01	3		--	--	--	1.14	4000	0.10	4.30	110.00	0.46	0.12	9.60	4.70	9.00	9300.00	8.10	--	0.24	11.00	0.97	0.057 U	0.10	0.99	11.00	33.00
KMP-SS45-0000-0003-02	3		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KMP-SS46-0000-0003-01	3		--	--	--	2.46	4900	0.04	4.10	75.00	0.41	0.08	5.90	4.00	7.20	11000.00	7.40	180.00	0.26	7.00	1.20	0.057 U	0.10	1.70	12.00	32.00
KMP-SS47-0000-0003-01	3		--	--	--	1.54	5100	0.05	4.40	63.00	0.44	0.08	5.80	4.20	6.40	12000.00	7.90	190.00	0.25	6.30	1.10	0.058 U	0.10	0.83	13.00	34.00
KMP-SS48-0000-0003-01	3		--	--	--	24.60	6000	0.09	5.30	52.00	0.49	0.09	6.70	4.40	7.70	13000.00	9.50	200.00	0.45	7.00	6.30	0.057 U	0.13	13.00	16.00	39.00
KMP-SS50-0000-0003-01	3		1.92	2.43	3.41	4.41	6300	0.05	5.40	58.00	0.54	0.09	6.90	4.60	8.00	14000.00	10.00	200.00	0.34	7.40	2.40	0.058 U	0.13	4.00	14.00	40.00
KMP-SS51-0000-0003-01	3		--	--	--	1.66	6500	0.07	5.60	62.00	0.54	0.11	7.30	5.10	8.90	14000.00	11.00	210.00	0.29	7.80	1.40	0.057 U	0.13	1.20	14.00	43.00
KMP-SS52-0000-0003-01	3		--	--	--	2.47	6100	0.06	5.10	51.00	0.50	0.05	6.70	4.60	7.00	14000.00	8.50	180.00	0.37	7.20	1.30	0.057 U	0.12	3.30	13.00	37.00
KMP-SS53-0000-0003-01	3		--	--	--	0.89	5000	0.06	4.30	46.00	0.42	0.05	5.50	4.00	5.30	12000.00	7.20	180.00	0.28	5.90	0.99	0.057 U	0.09	0.61	13.00	31.00
KMP-SS54-0000-0003-01	3		--	--	--	7.60	7100	0.11	6.70	85.00	0.63	0.12	8.70	6.00	13.00	17000.00	12.00	230.00	0.44	10.00	1.90	0.06	0.15	2.20	16.00	51.00
KMP-SS55-0000-0003-01	3		--	--	--	8.30	8300	0.15	7.50	97.00	0.73	0.13	9.30	6.70	15.00	19000.00	15.00	270.00	0.55	11.00	2.80	0.09	0.18	5.90	19.00	59.00
KMP-SS56-0000-0003-01	3		--	--	--	6.57	5900	0.07	5.00	52.00	0.49	0.07	6.50	4.10	7.40	13000.00	9.10	200.00	0.46	6.70	2.20	0.058 U	0.12	5.10	14.00	38.00
KMP-SS57-0000-0003-01	3		--	--	--	12.00	7100	0.10	6.10	65.00	0.59	0.11	8.10	5.40	10.00	16000.00	12.00	210.00	0.58	8.40	3.30	0.058 U	0.14	5.90	17.00	48.00
KMP-SS58-0000-0003-01	3		--	--	--	7.80	6700	0.11	5.40	64.00	0.54	0.13	7.40	4.80	9.30	14000.00	11.00	220.00	0.38	7.40	2.50	0.057 U	0.12	2.60	15.00	43.00
KMP-SS59-0000-0003-01	3		--	--	--	12.00	7000	0.09	6.00	70.00	0.58	0.09	7.70	5.30	9.50	16000.00	11.00	220.00	0.46	8.30	3.50	0.057 U	0.14	19.00	17.00	47.00
KMP-SS60-0000-0003-01	3		--	--	--	8.80	6000	0.11	6.00	66.00	0.49	0.08	6.70	4.90	9.20	14000.00	10.00	190.00	0.61	7.70	3.00	0.058 U	0.12	5.60	15.00	43.00
KMP-SS61-0000-0003-01	3		--	--	--	11.50	6300	0.10	5.40	70.00	0.52	0.11	7.10	4.60	8.80	14000.00	11.00	200.00	0.35	7.40	3.90	0.057 U	0.12	8.50	16.00	41.00
KMP-SS62-0000-0003-01	3		--	--	--	2.67	6300	0.10	5.10	59.00	0.51	0.09	7.00	4.40	7.90	14000.00	9.30	200.00	0.31	6.90	1.50	0.058 U	0.11	3.20	14.00	39.00
KMP-SS63-0000-0003-01	3		--	--	--	3.17	5900	0.07	4.80	50.00	0.50	0.08	6.60	4.30	7.10	13000.00	8.60	190.00	0.60	6.90	1.70	0.057 U	0.11	4.70	13.00	39.00
KMP-SS64-0000-0003-01	3		--	--	--	4.23	6100	0.09	5.00	52.00	0.50	0.07	6.90	4.50	7.70	14000.00	9.10	180.00	0.56	7.10	1.70	0.057 U	0.12	5.70	14.00	39.00
KMP-SS65-0000-0003-01	3		--	--	--	6.93	6100	0.08	5.20	57.00	0.49	0.08	6.90	4.60	8.20	14000.00	9.90	210.00	0.33	7.20	2.10	0.058 U	0.12	4.30	15.00	40.00
KMP-SS66-0000-0003-01	3		2.43	2.23	2.14	2.95	5800	0.06	4.80	49.00	0.47	0.06	6.20	4.20	6.50	13000.00	8.30	180.00	0.32	6.30	1.40	0.058 U	0.10	4.60	13.00	36.00
KMP-SS67-0000-0003-01	3		--	--	--	6.08	6900	0.08	6.20	99.00	0.56	0.10	7.90	5.50	11.00	16000.00	12.00	230.00	0.36	8.70	2.00	0.058 U	0.14	3.40	16.00	48.00
KMP-SS68-0000-0003-01	3		--	--	--	4.10	7500	0.07	6.90	91.00	0.60	0.08	8.30	6.00	11.00	17000.00	12.00	220.00	0.30	9.40	2.00	0.058 U	0.14	3.10	16.00	47.00
KMP-SS69-0000-0003-01	3		--	--	--	4.10	7500	0.07	6.50	74.00	0.62	0.13	8.40	5.70	11.00	17000.00	12.00	230.00	0.42	9.10	1.70	0.06	0.15	0.94	16.00	51.00
KMP-SS70-0000-0003-01	3		--	--	--	--	6400	0.05	6.10	59.00	0.51	0.07	7.10	5.30	9.20	15000.00	10.00	170.00	0.27	8.20	1.20	0.058 U	0.12	0.72	14.00	43.00
KMP-SS70-0000-0003-02	3		--	--	--	1.53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
KMP-SS71-0000-0003-01	3		--	--	--	12.90	6100	0.06	5.60	64.00	0.48	0.11	7.00	4.70	8.80	14000.00	11.00	200.00	0.41	7.50	2.90	0.057 U	0.12	1.40	15.00	43.00
KMP-SS72-0000-0003-01	3		--	--	--	2.09	6400	0.07	5.90	60.00	0.52	0.08	7.20	5.20	9.60	15000.00	10.00	200.00	0.30	8.10	1.30	0.058 U	0.12	0.70	14.00	47.00
KMP-SS73-0000-0003-01	3		--	--	--	4.90	6800	0.08	6.70	92.00	0.59	0.13	8.10	5.90	13.00	16000.00	13.00	230.00	0.42	9.60	1.90	0.07	0.14	1.20	16.00	53.00
KMP-SS75-0000-0003-01	3		--	--	--	68.10	5700	0.19	6.70	170.00	0.48	0.14	10.00	4.90	16.00	17000.00	37.00	240.00	1.40	9.10	9.10	0.058 U	0.14	19.00	36.00	95.00
KMP-SS75-0000-0003-02	3		--	--	--	57.90	5800	0.26	7.00	160.00	0.49	0.16	24.00	5.30	18.00	19000.00	130.00	230.00	1.60	9.40	7.80	0.058 U	0.15	25.00	33.00	90.00
KMP-SS76-0000-0003-01	3		--	--	--	6.17	7600	0.09	6.80	62.00	0.63	0.12	8.80	5.50	12.00	17000.00	14.00	230.00	0.45	9.50	2.20	0.07	0.18	1.30	16.00	53.00
KMP-SS77-0000-0003-01	3		--	--	--	5.82	7000	0.11	6.50	170.00	0.60	0.19	8.40	5.70	14.00	16000.00	16.00	310.00	0.46	9.30	2.00	0.07	0.16	1.40	16.00	55.00
KMP-SS78-0000-0003-01	3		1.01	0.93	2.19	2.97	5400	0.06	5.40	38.00	0.47	0.07	6.40	5.10	7.30	14000.00	9.20	210.00	0.40	7.50	1.20	0.058 U	0.15	0.72	12.00	39.00
KMP-SS79-0000-0003-01	3		--	--	--	7.30	6200	0.08	5.00	67.00	0.49	0.12	6.70	4.60	8.70	13000.00	11.00	230.00	0.33	7.10	2.20	0.058 U	0.11	4.50	14.00	39.00
Frequency of Plant NOEC Exceedance:			0/4	0/4	0/4	**28/54**	0/35	0/35	0/54	**5/54**	0/35	0/54	**54/54**	0/35	0/35	0/35	**1/54**	**10/34**	0/54	0/35	**54/54**	0/54	**35/35**	**1/54**	0/54	0/35
Frequency of Soil Invertebrate NOEC Exceedance:			0/4	0/4	0/4	0/54	0/35	0/35	**8/54**	0/54	0/35	0/54	**54/54**	0/35	0/35	0/35	0/54	0/34	0/54	0/35	**9/54**	0/54	0/35	0/54	0/54	0/35
Frequency of Plant and Soil Invertebrate Exceedance:			0/4	0/4	0/4	**28/54**	0/35	0/35	**8/54**	**5/54**	0/35	0/54	**54/54**	0/35	0/35	0/35	**1/54**	**10/34**	0/54	0/35	**54/54**	0/54	**35/35**	**1/54**	0/54	0/35
Kerr-McGee Ponds on United Nuclear Corporation Property - Subsurface Soil (6 - 72 inches bgs)[d]																										
KMP-16-18	24		--	--	--	143.1	--	--	5.1	190	--	0.11	8.1	--	--	--	11	--	1.4	--	37	0.52 U	--	110	58	--
KMP-16-36	42		--	--	--	1.7	--	--	5	51	--	0.12 U	7.5	--	--	--	8.3	--	0.63	--	1.4	0.48 U	--	37	16	--
KMP-17-18	24		--	--	--	8.3	--	--	4.9	55	--	0.12 U	7	--	--	--	7.6	--	0.64	--	3	0.46 U	--	130	17	--
KMP-17-36	42		--	--	--	3.4	--	--	4.7	43	--	0.12 U	6.9	--	--	--	7.3	--	0.58	--	2.3	0.47 U	--	58	16	--
KMP-18-18	24		--	--	--	1.9	--	--	4.5	43	--	0.11 U	7	--	--	--	7.2	--	0.75	--	1.4	0.45 U	--	24	16	--
KMP-18-36	42		--	--	--	1.3	--	--	4.7	43	--	0.13 U	7.7	--	--	--	8	--	0.65	--	1.7	0.5 U	--	38	16	--
KMP-19-18	24		--	--	--	3.1	--	--	5	62	--	0.13 U	7.7	--	--	--	9.1	--	0.79	--	3.3	0.53 U	--	60	18	--
KMP-19-36	42		--	--	--	1.7	--	--	5.3	55	--	0.13 U	7.4	--	--	--	7	--	0.67	--	2	0.5 U	--	32	17	--
KMP-20-18	24		--	--	--	2.3	--	--	4.2	74	--	0.13 U	8.6	--	--	--	6.7	--	0.69	--	1.6	0.5 U	--	22	17	--
KMP-20-36	42		--	--	--	1.3	--	--	7.5	69	--	0.076	7.4	--	--	--	12	--	1.1	--	1.5	0.5 U	--	32	17	--
KMP-21-18	24		--	--	--	3.2	--	--	4	41	--	0.076	5.9	--	--	--	6.4	--	0.76	--	1.6	0.46 U	--	35	13	--
KMP-21-36	42		--	--	--	1.6	--	--	5.3	57	--	0.067	8	--	--	--	8.9	--	0.75	--	2.1	0.5 U	--	22	17	--
KMP-22-18	24		--	--	--	1.1	--	--	5.3	47	--	0.062	7.8	--	--	--	8.5	--	0.51	--	1.7	0.19	--	4.3	16	--
KMP-22-36	42		--	--	--	0.9	--	--	4	40	--	0.12 U	5.8	--	--	--	6.4	--	1.2 U	--	1.4	0.5 U	--	0.77	13	--
KMP-23-18	24		--	--	--	1.3	--	--	4.9	51	--	0.077	7.8	--	--	--	7.9	--	1	--	1.3	0.51 U	--	44	16	--
KMP-23-36	42		--	--	--	1.3	--	--	4.9	54	--	0.13 U	8.2	--	--	--	8.2	--	1.3	--	1.5	0.52 U	--	52	16	--
KMP-SB24-0018-0024-01	24		--	--	--	0.98	6900	0.1	7	60	0.6	0.094	7.6	5.9	11	16000	12	220	0.4	9	1.4	0.066 U	0.15	2.2	15	46
KMP-SB24-0048-0054-01	54		1.22	1.33	1.22	1.56	9600	0.11	8.5	110	0.85	0.1	11	7.9	14	22000	15	300	0.53	12	1.8	0.11	0.21	1.1	20	60
KMP-SB25-0006-0012-01	12		--	--	--	1.81	5500	0.058	4.7	47	0.47	0.045	6.1	4.4	6.6	12000	7.7	180	0.67	6.5	1.5	0.06 U	0.11	23	13	32
KMP-SB25-0018-0024-01	24		--	--	--	0.92	6000	0.064	5.1	44	0.51	0.054	6.6	4.7	7.4	13000	8.2	190	0.47	6.9	1.1	0.062 U	0.12	60	13	35
KMP-SB26-0006-0012-01	12		1.33	1.06	1.13	1.16	8300	0.14	6.8	110	0.67	0.14	8.7	6	12	16000	13	270	0.48	9.7	1.5	0.067	0.17	5.9	17	48
KMP-SB26-0012-0018-01	18		--	--	--	--	--	0.11	6.5	--	0.63	0.12	8.4	5.7	11	16000	12	--	0.43	9.4	1.3	--	0.18	1.8	--	--
KMP-SB26-0012-0018-02	18		--	--	--	1.83	7700	--	--	90	--	--	--	--	--	--	--	250	--	--	--	0.066	--	--	16	46
KMP-SB27-0012-0018-01	18		--	--	--	1.17	8200	0.091	6.7	92	0.68	0.08	9	5.8	11	16000	11	230	0.41	9.7	1.5	0.069	0.18	0.8	16	46
KMP-SB28-0036-0042-01	42		--	--	--	0.93	5600	0.063	4.9	45	0.47	0.053	6.1	4.4	6.7	12000	7.9	170	1.7	6.5	1.1	0.061 U	0.11	180	12	32
KMP-SB28-0042-0048-01	48		--	--	--	0.93	6400	0.065	5.4	57	0.53	0.064	6.8	4.7	7.4	14000	8.6	200	1.4	7.3	1.1	0.061 U	0.13	190	13	36
KMP-SB28-0060-0066-01	66		51.5	49.4	1.1	--	5900	0.063	6.3	50	0.52	0.051	6.5	5.2	7.1	14000	8.8	190	--	7.2	1.2	0.06 U	0.13	160	13	35
KMP-SB28-0060-0066-02	66		--	--	--	0.95	--	--	--	--	--	--	--	--	--	--	--	--	0.38	--	--	--	--	--	--	--
KMP-SB29-0048-0054-01	54		--	--	--	0.82	--	0.063	--	60	--	--	5.6	4.1	--	--	--	--	0.39	--	1.1	0.059 U	0.1	0.59	13	31
KMP-SB29-0048-0054-02	54		--	--	--	--	5300	--	5	--	0.43	0.048	--	--	5.6	14000	7.4	310	--	6.1	--	--	--	--	--	--
KMP-SB30-0030-0036-01	36		--	--	--	0.78	5600	0.058	4.9	43	0.48	0.047	6.1	5.2	6.4	12000	7.9	170	1.2	6.6	2.9	0.058 U	0.12	0.86	12	32
KMP-SB31-0060-0066-01	66		--	--	--	1.43	6900	0.057	6.3	59	0.61	0.061	7.8	5.7	9.8	16000	11	200	0.36	8.8	1.4	0.061	0.17	0.8	14	44
KMP-SB32-0060-0066-01	66		--	--	--	2.09	5500	0.049	5	46	0.46	0.051	8.2	4.3	7.2	12000	8.1	180	0.91	6.6	1.6	0.059 U	0.12	14	13	33
KMP-SB33-0054-0060-01	60		--	--	--	0.7	5600	0.043	5.1	44	0.47	0.05	6	4.5	6.8	13000	7.8	190	0.3	6.7	1.1	0.059 U	0.12	0.66	12	33
KMP-SB33-0060-0066-01	66		--	--	--	1.02	5000	0.042	4.6	35	0.43	0.044	7.7	4.3	6.6	12000	7.2	190	0.81	6.3	0.99	0.058 U	0.1	1.9	12	38
KMP-SB33-0066-0072-01	72		--	--	--	4.55	5500	0.046	4.9	47	0.44	0.052	6.6	4.3	7.2	12000	8.4	180	0.41	6.4	1.7	0.057 U	0.11	4	13	36
KMP-SB34-0048-0054-01	54		--	--	--	3.57	5400	0.05	4.8	41	0.45	0.05	6	4.3	6.9	12000	8.1	170	0.44	6.3	1.5	0.059 U	0.12	20	12	34
KMP-SB35-0006-0012-01	12		--	--	--	27.1	5400	0.1	5.3	65	0.44	0.11	5.8	4.2	7.6	12000	9.7	230	0.62	6.1	6.4	0.057 U	0.1	30	17	36
KMP-SB36-0030-0036-01	36		--	--	--	30.7	6100	0.074	5.5	51	0.5	0.065	6.7	4.7	8	13000	8.9	220	0.58	7.1	2.4	0.056 U	0.12	24	14	38
KMP-SB37-0066-0072-01	72		--	--	--	8.7	7000	0.099	6.2	58	0.57	0.07	7.5	5.4	9.5	15000	10	200	0.39	8.2	2	0.058 U	0.15	7.1	15	42
KMP-SB38-0006-0012-01	12		--	--	--	1.4	7200	0.11	6	69	0.55	0.094	7.5	5.9	9.8	16000	11	250	0.5	8.9	1.3	0.063 U	0.13	1.4	16	44
KMP-SB38-0036-0042-01	42		0.89	1.0	0.97	1.14	7900	0.11	6.8	83	0.6	0.079	8.6	6.3	11	17000	11	230	0.33	9.4	1.3	0.059 U	0.15	0.63	16	48
KMP-SB40-0054-0060-01	60		--	--	--	1.19	6400	0.07	5.1	55	0.51	0.06	6.6	4.5	7.2	13000	8	190	0.32	6.8	1.3	0.059 U	0.12	28	13	34
KMP-SB41-0054-0060-01	60		--	--	--	1.48	7600	0.087	6	90	0.61	0.063	8	5.5	9.6	15000	10	240	0.41	8.6	1.3	0.061 U	0.16	0.76	15	43
KMP-SB42-0054-0060-01	60		--	--	--	1.05	7900	0.099	6.4	86	0.69	0.081	8.5	6.2	11	17000	11	240	0.39	9.3	1.4	0.061 U	0.17	1	17	47
Frequency of Plant NOEC Exceedance:			**1/4**	**1/4**	0/4	**5/42**	0/26	0/26	0/42	**1/42**	0/26	0/42	**42/42**	0/26	0/26	0/26	0/42	**10/26**	0/42	0/26	**42/42**	0/42	**26/26**	**17/42**	0/42	0/26

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Arroyos on Navajo Nation - Surface Soil (0 - 6 inches bgs)																										
CRPA-004.2 (2-6)	6		--	--	--	1.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-005.1 (0-2)	2		--	--	--	1.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-005.2 (2-6)	6		--	--	--	1.76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-006.1 (0-2)	2		--	--	--	1.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-007.1 (0-2)	2		--	--	--	1.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-007.2 (2-6)	6		--	--	--	1.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-008.1 (0-2)	2		--	--	--	1.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-009.1 (0-2)	2		--	--	--	1.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-009.2 (2-6)	6		--	--	--	1.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-010.1 (0-2)	2		--	--	--	1.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-010.2 (2-6)	6		--	--	--	1.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-011.2 (2-6)	6		--	--	--	0.92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-011.4	2		--	--	--	1.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-012.1 (0-2)	2		--	--	--	1.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-012.2 (2-6)	6		--	--	--	1.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-013.1 (0-2)	2		--	--	--	1.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-013.2 (2-6)	6		--	--	--	1.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-014.1 (0-2)	2		--	--	--	1.79	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-014.2 (2-6)	6		--	--	--	1.81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-U1.1 (0-2)	2		--	--	--	1.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-U1.2 (2-6)	6		--	--	--	1.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-001.1 (0-2)	2		--	--	--	0.99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-001.2 (2-6)	6		--	--	--	1.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-002.1 (0-2)	2		--	--	--	0.78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-002.2 (2-6)	6		--	--	--	0.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-003.1 (0-2)	2		--	--	--	1.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-003.2 (2-6)	6		--	--	--	1.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-004.2 (2-6)	6		--	--	--	1.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-004.4	2		--	--	--	1.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-005.1 (0-2)	2		--	--	--	0.73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-005.2 (2-6)	6		--	--	--	0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-006.1 (0-2)	2		--	--	--	0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-006.2 (2-6)	6		--	--	--	0.41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-007.1 (0-2)	2		--	--	--	1.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-007.2 (2-6)	6		--	--	--	1.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-008.1 (0-2)	2		--	--	--	1.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-008.4	6		--	--	--	1.96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-009.1 (0-2)	2		--	--	--	0.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-009.2 (2-4)	4		--	--	--	1.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-010.1 (0-2)	2		--	--	--	1.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-010.2 (2-6)	6		--	--	--	1.82	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-011.1 (0-2)	2		--	--	--	1.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-011.2 (2-6)	6		--	--	--	1.52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-012.1 (0-2)	2		--	--	--	0.73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-012.2 (2-6)	6		--	--	--	1.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-013.1 (0-2)	2		--	--	--	1.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-014.1 (0-2)	2		--	--	--	1.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-015.1 (0-2)	2		--	--	--	1.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-015.2 (2-6)	6		--	--	--	1.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-016.1 (0-2)	2		--	--	--	0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-017.1 (0-2)	2		--	--	--	1.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-017.2 (2-6)	6		--	--	--	0.93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-018.1 (0-2)	2		--	--	--	1.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-018.2 (2-6)	6		--	--	--	2.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-019.1 (0-2)	2		--	--	--	0.94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-020.2 (2-6)	6		--	--	--	3.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-020.4	2		--	--	--	1.35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-021.1 (0-2)	2		--	--	--	0.93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-021.2 (2-6)	6		--	--	--	2.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-022.1 (0-2)	2		--	--	--	0.76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-023.1 (0-2)	2		--	--	--	0.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-023.2 (2-6)	6		--	--	--	1.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-024.1 (0-2)	2		--	--	--	0.92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-024.2 (2-6)	6		--	--	--	1.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-025.1 (0-2)	2		--	--	--	0.49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CRUA-026.1 (0-2)	2		--	--	--	0.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-026.2 (2-6)	6		--	--	--	1.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-027.1 (0-2)	2		--	--	--	1.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-027.2 (2-6)	6		--	--	--	1.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-028.1 (0-2)	2		--	--	--	0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-028.2 (2-6)	6		--	--	--	1.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-029.1 (0-2)	2		--	--	--	1.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-029.2 (2-6)	6		--	--	--	1.53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-030.1 (0-2)	2		--	--	--	0.93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-030.2 (2-6)	6		--	--	--	1.63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-031.2 (2-6)	6		--	--	--	1.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-031.4	2		--	--	--	1.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-032.1 (0-2)	2		--	--	--	1.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-032.2 (2-6)	6		--	--	--	1.52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-033.1 (0-2)	2		--	--	--	1.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-033.2 (2-6)	6		--	--	--	1.61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-034.1 (0-2)	2		--	--	--	0.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-034.2 (2-6)	6		--	--	--	1.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-035.1 (0-2)	2		--	--	--	1.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-035.2 (2-6)	6		--	--	--	1.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-036.1 (0-2)	2		--	--	--	0.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-036.2 (2-6)	6		--	--	--	0.66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KMA-SS02-0000-0003-01	3		--	--	--	0.86	4700	0.04	4.40	59.00	0.38	0.05	5.1	4.00	5.10	12000.00	7.30	200.00	0.24	5.50	1.00	0.058 U	0.09	0.59	12.00	31.00
KMP-11-00	2		--	--	--	0.84	--	--	7.6	74.00	--	0.06	5.5	--	--	--	9.10	--	0.62	--	1.10	0.47 U	--	0.64	16.00	--
KMP-12-00	2		--	--	--	0.94	--	--	11	59.00	--	0.06	6.7	--	--	--	9.00	--	0.81	--	1.50	0.47 U	--	0.69	25.00	--
Frequency of Plant NOEC Exceedance:			0/0	0/0	0/0	0/90	0/1	0/1	0/3	0/3	0/1	0/3	**3/3**	0/1	0/1	0/1	0/3	0/1	0/3	0/1	**3/3**	0/3	**1/1**	0/3	0/3	0/1
Frequency of Soil Invertebrate NOEC Exceedance:			0/0	0/0	0/0	0/90	0/1	0/1	**2/3**	0/3	0/1	0/3	**3/3**	0/1	0/1	0/1	0/3	0/1	0/3	0/1	0/3	0/3	0/1	0/3	0/3	0/1
Frequency of Plant and Soil Invertebrate Exceedance:			0/0	0/0	0/0	0/90	0/1	0/1	**2/3**	0/3	0/1	0/3	**3/3**	0/1	0/1	0/1	0/3	0/1	0/3	0/1	**3/3**	0/3	**1/1**	0/3	0/3	0/1
Arroyos on Navajo Nation - Subsurface Soil (6 - 72 inches bgs)[d]																										
CRPA-003.3 (30-36)	36		--	--	--	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-004.3 (7-13)	13		--	--	--	1.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-005.3 (30-36)	36		--	--	--	2.66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-007.3 (6-12)	12		--	--	--	1.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-010.3 (9-15)	15		--	--	--	1.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-011.3 (15-21)	21		--	--	--	1.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-012.3 (30-36)	36		--	--	--	1.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-013.3 (30-36)	36		--	--	--	1.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-U1.3 (14-20)	20		--	--	--	2.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-001.3 (14-20)	20		--	--	--	1.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-002.3 (13-19)	19		--	--	--	0.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-003.3 (6-11)	11		--	--	--	1.93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-004.3 (14-20)	20		--	--	--	1.63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-005.3 (30-36)	36		--	--	--	1.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-006.3 (30-36)	36		--	--	--	1.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-007.3 (6-12)	12		--	--	--	1.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-008.3 (18-24)	24		--	--	--	1.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-009.3 (16-22)	22		--	--	--	1.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-010.3 (30-36)	36		--	--	--	1.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-011.3 (30-36)	36		--	--	--	1.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-012.3 (30-36)	36		--	--	--	1.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-015.3 (30-36)	36		--	--	--	2.66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-017.3 (30-36)	36		--	--	--	2.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-018.3 (30-36)	36		--	--	--	2.93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-020.3 (30-36)	36		--	--	--	3.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-021.3 (30-36)	36		--	--	--	1.94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-023.3 (30-36)	36		--	--	--	2.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-024.3 (30-36)	36		--	--	--	1.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-026.3 (30-36)	36		--	--	--	2.82	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-027.3 (30-36)	36		--	--	--	1.41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-028.3 (30-36)	36		--	--	--	1.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-029.3 (30-36)	36		--	--	--	1.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-030.3 (6-12)	12		--	--	--	1.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-031.3 (30-36)	36		--	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-032.3 (30-36)	36		--	--	--	2.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-033.3 (30-36)	36		--	--	--	3.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-034.3 (30-36)	36		--	--	--	1.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table C-10. Comparison of Individual Sample Results to Plant and Invertebrate NOECs

Sample ID	Sample Depth Bottom	COPEC[a]:	Uranium-238	Uranium-234	Thorium-230	Radium-226 in SE (Adjusted Radium-226)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium[b]	Cobalt	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
		Plant NOEC[c]:	50	44	110	5.0	NSL	11	18	110	2.5	32	0.35	13	70	NSL	120	220	2	38	0.52	NSL	0.050	25	60	160
		Soil Invertebrate NOEC[c]:	13,000	12,000	37,000	240	NSL	78	6.8	330	40	140	0.34	NSL	80	NSL	1,700	450	NSL	280	4.1	NSL	NSL	NSL	NSL	120
		Units:	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CRUA-035.3 (30-36)	36		--	--	--	1.64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-036.3 (30-36)	36		--	--	--	2.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KMA-SS02-0012-0018-01	18		--	--	--	0.75	4200	0.064	5.6	75	0.39	0.073	4.5	4.5	5.1	15000	8	400	0.45	5.5	0.9	0.06 U	0.082	0.56	13	32
Frequency of Plant NOEC Exceedance:			0/0	0/0	0/0	0/40	0/1	0/1	0/1	0/1	0/1	0/1	**1/1**	0/1	0/1	0/1	0/1	**1/1**	0/1	0/1	**1/1**	0/1	**1/1**	0/1	0/1	0/1
Arroyos on United Nuclear Corporation Property- Surface Soil (0 - 6 inches bgs)																										
CRPA-001.1 (0-2)	2		--	--	--	0.79	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-001.2 (2-6)	6		--	--	--	1.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-002.1 (0-2)	2		--	--	--	1.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-002.2 (2-6)	6		--	--	--	1.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-003.1 (0-2)	2		--	--	--	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-003.2 (2-6)	6		--	--	--	1.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-037.1 (0-2)	2		--	--	--	0.79	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-037.2 (2-6)	6		--	--	--	1.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-038.1 (0-2)	2		--	--	--	0.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-038.2 (2-6)	6		--	--	--	0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-039.1 (0-2)	2		--	--	--	0.58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-039.2 (2-6)	6		--	--	--	0.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KMA-SS01-0000-0003-01	3		--	--	--	0.85	4400	0.055	4.6	48	0.37	0.054	4.9	4.4	4.7	13000	7.5	240	0.28	5.5	1.3	0.057 U	0.09	0.53	12	30
Frequency of Plant NOEC Exceedance:			0/0	0/0	0/0	0/13	0/1	0/1	0/1	0/1	0/1	0/1	**1/1**	0/1	0/1	0/1	0/1	**1/1**	0/1	0/1	**1/1**	0/1	**1/1**	0/1	0/1	0/1
Frequency of Soil Invertebrate NOEC Exceedance:			0/0	0/0	0/0	0/13	0/1	0/1	0/1	0/1	0/1	0/1	**1/1**	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Frequency of Plant and Soil Invertebrate Exceedance:			0/0	0/0	0/0	0/13	0/1	0/1	0/1	0/1	0/1	0/1	**1/1**	0/1	0/1	0/1	0/1	**1/1**	0/1	0/1	**1/1**	0/1	**1/1**	0/1	0/1	0/1
Arroyos on United Nuclear Corporation Property - Subsurface Soil (6 - 72 inches bgs) [d]																										
CRPA-001.3 (30-36)	36		--	--	--	1.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-002.3 (30-36)	36		--	--	--	1.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRPA-003.3 (30-36)	36		--	--	--	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-037.3 (30-36)	36		--	--	--	1.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-038.3 (30-36)	36		--	--	--	0.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CRUA-039.3 (30-36)	36		--	--	--	0.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KMA-SS01-0012-0018-01	18		--	--	--	0.82	4700	0.067	4.8	62	0.4	0.055	5	3.9	5.4	15000	7.5	280	0.28	5.8	0.91	0.059 U	0.086	0.62	13	33
Frequency of Plant NOEC Exceedance:			0/0	0/0	0/0	0/7	0/1	0/1	0/1	0/1	0/1	0/1	**1/1**	0/1	0/1	0/1	0/1	**1/1**	0/1	0/1	**1/1**	0/1	**1/1**	0/1	0/1	0/1
Analyte Identified as Surface Soil Candidate COEC? [e]			No	No	No	**Yes (P)**	No	No	**Yes (I)**	**Yes (P/I)**	No	No	**Yes (P/I)**	No	No	No	**Yes (P)**	**Yes (P)**	No	No	**Yes (P/I)**	No	**Yes (P)**	**Yes (P)**	No	No
Analyte Identified as Subsurface Soil Candidate COEC? [e]			**Yes (P)**	**Yes (P)**	No	**Yes (P)**	No	No	No	**Yes (P)**	No	No	**Yes (P)**	No	No	No	No	**Yes (P)**	No	No	**Yes (P)**	No	**Yes (P)**	**Yes (P)**	No	No

Notes:

Exceeds plant NOEC.

Exceeds soil invertebrate NOEC.

Exceeds both soil invertebrate and plant NOECs.

[a] A constituent is included as a COPEC if the calculated SLERA HQ is equal to or greater than 1.0 (see Table C-8).

[b] In the absence of speciated chromium data, chromium is evaluated using the assumption that it is 100 percent hexavalent chromium (USEPA 2024b). No speciated chromium data are available. LANL chromium screening values are based on Cr(VI) (hexavalent chromium) for plants and invertebrates (Newport News Nuclear BWXT-Los Alamos, LLC. 2022).

[c] Screening levels for plants and invertebrates are NOECs (see Table C-8).

[d] Plants are exposed to surface and subsurface soil from 0 to 72 inches bgs. Soil invertebrates are exposed to surface soil (0 to 6 inches bgs) only; subsurface soil samples results are not compared to soil invertebrates NOECs.

[e] COPECs are identified as candidate COECs if at least one sample result exceeds the plant or soil invertebrate NOEC for surface soil, or the plant NOEC for subsurface soil. "P" refers to "plant" and "I" refers to "invertebrate."

--	Not analyzed
bgs	Below ground surface
COEC	Contaminant of ecological concern
COPEC	Contaminant of potential ecological concern
HQ	Hazard quotient
mg/kg	Milligram per kilogram
NOEC	No observed effect concentration
NSL	No screening level
pCi/g	Picocurie per gram
Ra-226	Radium-226
SLERA	Screening-level ecological risk assessment
U	Not detected
USEPA	U.S. Environmental Protection Agency

References:

Newport News Nuclear BWXT-Los Alamos, LLC. 2022. “ECORISK Database." Release 4.3. 701067. Document EM2020-0575. September.

U.S. Environmental Protection Agency (USEPA). 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-11. Screening-Level Ecological Risk Assessment Refinement for Soil - Birds

Site-Wide							
COPEC[a]	**EPC**[b]	**Avian Herbivore NOEC**[c]	**Avian Ground Insectivore NOEC**[c]	**Avian Carnivore NOEC**[c]	**Minimum Avian NOEC**	**Refined HQ based on Minimum Avian NOEC**[d]	**Include Contaminant as Candidate COEC for Birds?**[e]
Surface Soil (0-6 inches bgs)							
Radionuclides (pCi/g) [f]							
Uranium-238	1.6	2,700	2,700	2,700	2,700	0.00059	No
Uranium-234	1.6	2,800	2,800	2,800	2,800	0.00057	No
Thorium-230	2.5	8,700	8,700	8,700	8,700	0.00029	No
Radium-226 in SE (Adjusted Radium-226)	5.9	15	15	15	15	0.39	No
Metals (mg/kg)							
Arsenic	5.7	67	43	1,100	43	0.13	No
Barium	94	720	820	7,500	720	0.13	No
Chromium [g]	7.6	78	26	780	26	0.29	No
Lead	14	46	11	510	11	**1.3**	**Yes**
Manganese	190	4,300	4,300	650,000	4300	0.04	No
Nickel	8.3	210	20	2,800	20	0.42	No
Selenium	3.0	2.2	1.2	83	1.2	**2.5**	**Yes**
Thallium	0.14	6.9	4.5	48	4.5	0.03	No
Uranium	6.2	1,500	1,100	14,000	1100	0.01	No
Vanadium	17	13	7.8	140	7.8	**2.2**	**Yes**
Zinc	48	950	46	30,000	46	**1.0**	**Yes**

Notes:

Grey highlighted cells indicate the EPC exceeds the NOEC for the receptor group.

[a] **Bolded COPECs** have a HQ greater than 1.0.

[b] EPCs are provided in Table C-9.

[c] See Table C-8 for sources of NOECs.

[d] HQ is calculated by dividing the EPC by the minimum NOEC. **Bolded HQ values** indicate HQs greater than or equal to 1.0.

[e] A contaminant is identified as a candidate COEC if the HQ (HQ based on minimum NOEC) is greater than or equal to 1.0.

[f] ESLs for uranium-238 in SE are based on individual radium-226 ESLs that are adjusted to include doses from all progeny of uranium-238 in secular equilibrium. Site data for radium-226 are used to evaluate uranium-238 in SE.

[g] In the absence of speciated chromium data, chromium is evaluated using the assumption that it is 100 percent hexavalent chromium (USEPA 2024b). No speciated chromium data are available. Eco-SSLs for hexavalent chromium are not available for birds; therefore,Cr(III) (trivalent chromium) Eco-SSLs were used (USEPA 2023a).

bgs	Below ground surface	mg/kg	Milligram per kilogram
COEC	Contaminant of ecological concern	NOEC	No observed effect concentration
COPEC	Contaminant of potential ecological concern	NSL	No screening level
Eco-SSL	Ecological soil screening level	pCi/g	Picocurie per gram
EPC	Exposure point concentration	SE	Secular equilibrium
ESL	Ecological screening level	USEPA	U.S. Environmental Protection Agency
HQ	Hazard quotient		

Table C-11. Screening-Level Ecological Risk Assessment Refinement for Soil - Birds

References:

U.S. Environmental Protection Agency (USEPA). 2023a. "Interim Ecological Soil Screening Level Documents." Accessed July 20. https://www.epa.gov/chemical-research/interim-ecological-soil-screening-level-documents.

USEPA. 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

Table C-12. Screening-Level Ecological Risk Assessment Refinement for Soil - Mammals

Site-Wide							
COPEC[a]	**EPC[b]**	**Mammalian Herbivore NOEC[c]**	**Mammalian Ground Insectivore NOEC[c]**	**Mammalian Carnivore NOEC[c]**	**Minimum NOEC**	**Refined HQ based on Minimum Mammalian NOEC[d]**	**Include Contaminant as Candidate COEC for Mammals?[e]**
Surface Soil (0-6 inches bgs)							
Radionuclides (pCi/g) [f]							
Uranium-238	1.6	1,400	1,400	1,400	1,400	0.0011	No
Uranium-234	1.6	1,400	1,400	1,400	1,400	0.0011	No
Thorium-230	2.5	3,700	3,700	3,700	3,700	0.0007	No
Radium-226 in SE (Adjusted Radium-226)	5.9	6.0	6.0	6.0	6.0	0.98	No
Metals (mg/kg)							
Arsenic	5.7	170	46	170	46	0.12	No
Barium	94	3,200	200	9,100	200	0.47	No
Chromium [g]	7.6	380	34	180	34	0.22	No
Lead	14	1,200	56	460	56	0.25	No
Manganese	190	5,300	4,000	6,200	4,000	0.048	No
Nickel	8.3	340	10	130	10	0.83	No
Selenium	3.0	2.7	0.63	2.8	0.63	**4.8**	**Yes**
Thallium	0.14	1.2	0.42	5.0	0.42	0.33	No
Uranium	6.2	1,000	480	4,800	480	0.013	No
Vanadium	17	1,300	280	580	280.0	0.061	No
Zinc	48	6,800	79	10,000	79	0.61	No
Subsurface Soil (0-72 inches bgs)							
Radionuclides (pCi/g)							
Uranium-238	12	1,400	1,400	1,400	1,400	0.0086	No
Uranium-234	12	1,400	1,400	1,400	1,400	0.0086	No
Thorium-230	2.1	3,700	3,700	3,700	3,700	0.00057	No
Radium-226 in SE (Adjusted Radium-226)	16	6.0	6.0	6.0	6.0	**2.7**	**Yes**
Metals (mg/kg)							
Arsenic	5.6	170	46	170	46	0.12	No
Barium	84	3,200	200	9,100	200	0.42	No
Chromium [g]	7.5	380	34	180	34	0.22	No
Lead	13	1,200	56	460	56	0.23	No
Manganese	200	5,300	4,000	6,200	4,000	0.050	No
Molybdenum	0.52	635	4.8	64	4.8	0.11	No
Nickel	8.1	340	10	130	10	0.81	No
Selenium	3.1	2.7	0.63	2.8	0.63	**4.9**	**Yes**
Silver	0.094	1,500	14	990	14	0.0067	No
Thallium	0.14	1.2	0.42	5.0	0.42	0.33	No
Uranium	16	1,000	480	4,800	480	0.033	No
Vanadium	16	1,300	280	580	280.0	0.057	No
Zinc	46	6,800	79	10,000	79	0.58	No

Table C-12. Screening-Level Ecological Risk Assessment Refinement for Soil - Mammals

Notes:

Grey highlighted cells indicate the EPC exceeds the NOEC for the receptor group.

[a] **Bolded COPECs** have a HQ greater than 1.0.

[b] EPCs are provided in Table C-9.

[c] See Table C-8 for sources of NOECs.

[d] HQ is calculated by dividing the EPC by the minimum NOEC. **Bolded HQ** values indicate HQs equal to or greater than 1.0.

[e] A contaminant is identified as a candidate COEC if the HQ (HQ based on minimum NOEC) is equal to or greater than 1.0.

[f] ESLs for uranium-238 in SE are based on individual radium-226 ESLs that are adjusted to include doses from all progeny of uranium-238 in secular equilibrium. Site data for radium-226 are used to evaluate uranium-238 in SE.

[g] In the absence of speciated chromium data, chromium is evaluated using the assumption that it is 100 percent hexavalent chromium (USEPA 2024b). No speciated chromium data are available. Cr(III) (trivalent chromium) Eco-SSLs were used for mammals because the hexavalent chromium Eco-SSLs for mammals are higher than the trivalent chromium values (USEPA 2023a).

bgs	Below ground surface
COPEC	Contaminant of potential ecological concern
Eco-SSL	Ecological soil screening level
HQ	Hazard quotient
LANL	Los Alamos National Laboratory
mg/kg	Milligram per kilogram
NA	Not applicable - receptor is not exposed to the subsurface depth interval
N3B	Newport News Nuclear BWXT-Los Alamos, LLC
NOEC	No observed effect concentration
NSL	No screening level
pCi/g	Picocurie per gram
SE	Secular equlibrium
USEPA	U.S. Environmental Protection Agency

References:

U.S. Environmental Protection Agency (USEPA). 2023a. "Interim Ecological Soil Screening Level Documents." Accessed July 20. https://www.epa.gov/chemical-research/interim-ecological-soil-screening-level-documents.

USEPA. 2024b. “Navajo Abandoned Uranium Mines Risk Assessment Methodology.” Draft Final. March.

ATTACHMENT C-1

DATA USED IN THE RISK ASSESSMENT

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	C1LI-047.1 (0-2)	12/14/2010	35.6665979	-108.501549	0	2	713R11	Ra-226	7.9 G	0.6	pCi/g
CR1	C1LI-047.1 (0-2) Dup	12/14/2010	35.6665979	-108.501549	0	2	713R11	Ra-226	7.9	0.6	pCi/g
CR1	C1SS-026.1 (0-2)	12/15/2010	35.6641373	-108.503343	0	2	713R11	Ra-226	26.9	0.6	pCi/g
CR1	C1SS-041.1 (0-2)	12/15/2010	35.6637671	-108.502242	0	2	713R11	Ra-226	1.42	0.8	pCi/g
CR1	C1SS-041.1 (0-2) Dup	12/15/2010	35.6637671	-108.502242	0	2	713R11	Ra-226	2.52	0.54	pCi/g
CR1	C1SS-063A.1 (0-2)	12/15/2010	35.6638077	-108.500865	0	2	713R11	Ra-226	41.2 G	0.8	pCi/g
CR1	C1SS-069.1 (0-2)	12/15/2010	35.6664561	-108.500366	0	2	713R11	Ra-226	4.68	0.41	pCi/g
CR1	C1SS-069.3 Dup	12/15/2010	35.6664561	-108.500366	0	2	713R11	Ra-226	3.7	0.54	pCi/g
CR1	C1SS-082.1 (0-2)	12/15/2010	35.6629857	-108.499478	0	2	713R11	Ra-226	1.43 G	0.39	pCi/g
CR1	C1SS-125.1 (0-2)	12/15/2010	35.665878	-108.497089	0	2	713R11	Ra-226	1.29 G	0.56	pCi/g
CR1	RWPR-SS-003 (0-2)	10/8/2010	35.6660108	-108.504365	0	2	713R11	Ra-226	2.65 G	0.65	pCi/g
CR1	RWPR-SS-005 (0-2)	10/8/2010	35.6658177	-108.504495	0	2	713R11	Ra-226	1.55	0.54	pCi/g
CR1	RWPR-SS-019 (0-2)	10/8/2010	35.6646791	-108.504222	0	2	713R11	Ra-226	6.28 G	0.77	pCi/g
CR1	RWPR-SS-021 (0-2)	10/6/2010	35.6644876	-108.504083	0	2	713R11	Ra-226	6.22	0.46	pCi/g
CR1	RWPR-SS-221 (0-2)	10/6/2010	35.6644876	-108.504083	0	2	713R11	Ra-226	7.4 G	0.7	pCi/g
CR1	RWPR-SS-003 (0-2)	10/8/2010	35.6660108	-108.504365	0	2	SW6020	URANIUM	3.5	11	mg/kg
CR1	RWPR-SS-005 (0-2)	10/8/2010	35.6658177	-108.504495	0	2	SW6020	URANIUM	2.1	10	mg/kg
CR1	RWPR-SS-019 (0-2)	10/8/2010	35.6646791	-108.504222	0	2	SW6020	URANIUM	6.2	11	mg/kg
CR1	RWPR-SS-021 (0-2)	10/6/2010	35.6644876	-108.504083	0	2	SW6020	URANIUM	4.7	11	mg/kg
CR1	RWPR-SS-221 (0-2)	10/6/2010	35.6644876	-108.504083	0	2	SW6020	URANIUM	4.6	12	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	ALUMINUM	3300	15	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	ALUMINUM	5800	16	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	ALUMINUM	5000	15	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	ALUMINUM	4500	16	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	ALUMINUM	4400	15	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	ALUMINUM	5900	15	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	ALUMINUM	3100	16	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	ALUMINUM	4100	15	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	ALUMINUM	3600	15	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	ALUMINUM	4400	15	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	ALUMINUM	3700	17	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	ALUMINUM	4100	15	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	ALUMINUM	4300	15	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	ALUMINUM	4300	15	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	ALUMINUM	2300	15	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	ALUMINUM	3900	15	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	ALUMINUM	3500	15	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	ALUMINUM	2900	15	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	ALUMINUM	7000	16	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	ALUMINUM	5600	15	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	ALUMINUM	5900	15	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	ALUMINUM	5600	17	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	ALUMINUM	6200	16	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	ALUMINUM	4600	16	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	ALUMINUM	4400	16	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	ALUMINUM	3300	15	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	ALUMINUM	3600	16	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	ALUMINUM	4400	15	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	ALUMINUM	4000	16	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	ALUMINUM	4600	15	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	ALUMINUM	4200	15	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	ALUMINUM	1400	15	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	ALUMINUM	4800	15	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	ANTIMONY	0.088 J	0.1	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	ANTIMONY	0.18	0.11	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	ANTIMONY	0.19	0.1	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	ANTIMONY	0.098 J	0.11	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	ANTIMONY	0.16	0.1	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	ANTIMONY	0.19	0.1	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	ANTIMONY	0.14 J	0.11	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	ANTIMONY	0.12	0.1	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	ANTIMONY	0.038 J	0.1	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	ANTIMONY	0.18	0.1	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	ANTIMONY	0.12	0.11	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	ANTIMONY	0.082 J	0.1	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	ANTIMONY	0.097 J	0.1	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	ANTIMONY	0.14	0.1	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	ANTIMONY	0.1	0.1	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	ANTIMONY	0.14	0.1	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	ANTIMONY	0.11	0.1	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	ANTIMONY	0.076 J	0.1	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	ANTIMONY	0.22	0.1	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	ANTIMONY	0.13	0.1	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	ANTIMONY	0.11	0.1	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	ANTIMONY	0.14	0.12	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	ANTIMONY	0.11	0.11	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	ANTIMONY	0.13	0.11	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	ANTIMONY	0.16 J	0.11	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	ANTIMONY	0.15	0.1	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	ANTIMONY	0.11 J	0.11	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	ANTIMONY	0.12	0.1	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	ANTIMONY	0.089 J	0.11	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	ANTIMONY	0.078 J	0.1	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	ANTIMONY	0.13	0.1	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	ANTIMONY	0.055 J	0.1	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	ANTIMONY	0.14	0.1	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	ARSENIC	3.6	0.2	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	ARSENIC	5.8	0.21	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	ARSENIC	5.2	0.2	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	ARSENIC	3.5	0.21	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	ARSENIC	5.3	0.21	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	ARSENIC	5.3	0.2	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	ARSENIC	5.9	0.22	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	ARSENIC	4.6	0.2	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	ARSENIC	2.9	0.2	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	ARSENIC	4.8	0.2	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	ARSENIC	4.2	0.23	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	ARSENIC	4	0.2	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	ARSENIC	4.2	0.2	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	ARSENIC	5	0.21	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	ARSENIC	3.7	0.2	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	ARSENIC	4.7	0.2	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	ARSENIC	4.1	0.2	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	ARSENIC	3.8	0.2	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	ARSENIC	5.9	0.21	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	ARSENIC	5.3	0.2	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	ARSENIC	5.1	0.2	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	ARSENIC	5.8	0.23	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	ARSENIC	5.3	0.21	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	ARSENIC	6.1	0.22	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	ARSENIC	6.1	0.22	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	ARSENIC	4.3	0.21	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	ARSENIC	3.5	0.22	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	ARSENIC	4.7	0.2	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	ARSENIC	4.3	0.21	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	ARSENIC	3.6	0.2	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	ARSENIC	4.1	0.2	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	ARSENIC	3	0.2	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	ARSENIC	5	0.2	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	BARIUM	68	0.51	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	BARIUM	79	0.53	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	BARIUM	86	0.51	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	BARIUM	87	0.53	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	BARIUM	89	0.51	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	BARIUM	65	0.51	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	BARIUM	43 J	0.55	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	BARIUM	78	0.51	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	BARIUM	36	0.5	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	BARIUM	85	0.5	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	BARIUM	77	0.57	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	BARIUM	97	0.5	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	BARIUM	120	0.5	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	BARIUM	94	0.51	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	BARIUM	80	0.5	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	BARIUM	90	0.5	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	BARIUM	210	0.5	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	BARIUM	54	0.5	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	BARIUM	100	0.52	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	BARIUM	110	0.5	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	BARIUM	110	0.51	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	BARIUM	98	0.58	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	BARIUM	330	0.53	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	BARIUM	98	0.55	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	BARIUM	100	0.54	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	BARIUM	66	0.52	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	BARIUM	66	0.55	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	BARIUM	95	0.51	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	BARIUM	66	0.53	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	BARIUM	41	0.51	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	BARIUM	83	0.51	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	BARIUM	63	0.5	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	BARIUM	86	0.51	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	BERYLLIUM	0.47	0.051	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	BERYLLIUM	0.87	0.053	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	BERYLLIUM	0.75	0.051	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	BERYLLIUM	0.54	0.053	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	BERYLLIUM	0.63	0.051	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	BERYLLIUM	0.8	0.051	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	BERYLLIUM	0.5	0.055	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	BERYLLIUM	0.61	0.051	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	BERYLLIUM	0.56	0.05	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	BERYLLIUM	0.68	0.05	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	BERYLLIUM	0.52	0.057	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	BERYLLIUM	0.43	0.05	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	BERYLLIUM	0.46	0.05	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	BERYLLIUM	0.62	0.051	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	BERYLLIUM	0.32	0.05	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	BERYLLIUM	0.57	0.05	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	BERYLLIUM	0.45	0.05	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	BERYLLIUM	0.38	0.05	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	BERYLLIUM	0.97	0.052	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	BERYLLIUM	0.69	0.05	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	BERYLLIUM	0.71	0.051	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	BERYLLIUM	0.8	0.058	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	BERYLLIUM	0.78	0.053	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	BERYLLIUM	0.62	0.055	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	BERYLLIUM	0.71	0.054	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	BERYLLIUM	0.5	0.052	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	BERYLLIUM	0.43	0.055	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	BERYLLIUM	0.62	0.051	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	BERYLLIUM	0.49	0.053	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	BERYLLIUM	0.44	0.051	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	BERYLLIUM	0.57	0.051	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	BERYLLIUM	0.2	0.05	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	BERYLLIUM	0.62	0.051	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	CADMIUM	0.083 J	0.2	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	CADMIUM	0.22	0.21	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	CADMIUM	0.21	0.2	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	CADMIUM	0.1 J	0.21	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	CADMIUM	0.12 J	0.21	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	CADMIUM	0.21	0.2	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	CADMIUM	0.13 J	0.22	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	CADMIUM	0.12 J	0.2	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	CADMIUM	0.038 U	0.2	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	CADMIUM	0.14 J	0.2	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	CADMIUM	0.13 J	0.23	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	CADMIUM	0.1 J	0.2	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	CADMIUM	0.09 J	0.2	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	CADMIUM	0.13 J	0.21	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	CADMIUM	0.065 J	0.2	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	CADMIUM	0.13 J	0.2	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	CADMIUM	0.081 J	0.2	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	CADMIUM	0.086 J	0.2	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	CADMIUM	0.25	0.21	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	CADMIUM	0.14 J	0.2	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	CADMIUM	0.13 J	0.2	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	CADMIUM	0.19 J	0.23	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	CADMIUM	0.18 J	0.21	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	CADMIUM	0.17 J	0.22	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	CADMIUM	0.15 J	0.22	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	CADMIUM	0.12 J	0.21	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	CADMIUM	0.12 J	0.22	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	CADMIUM	0.15 J	0.2	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	CADMIUM	0.11 J	0.21	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	CADMIUM	0.11 J	0.2	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	CADMIUM	0.13 J	0.2	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	CADMIUM	0.051 J	0.2	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	CADMIUM	0.12 J	0.2	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	CHROMIUM	4	1	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	CHROMIUM	6.1	1.1	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	CHROMIUM	5.4	1	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	CHROMIUM	4.1	1.1	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	CHROMIUM	4.9	1	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	CHROMIUM	6.8	1	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	CHROMIUM	3.4	1.1	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	CHROMIUM	4.3	1	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	CHROMIUM	4.1	1	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	CHROMIUM	4.7	1	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	CHROMIUM	4	1.1	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	CHROMIUM	4.3	1	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	CHROMIUM	4.8	1	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	CHROMIUM	4.5	1	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	CHROMIUM	2.7	1	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	CHROMIUM	4.6	1	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	CHROMIUM	4.2	1	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	CHROMIUM	3	1	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	CHROMIUM	7.5	1	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	CHROMIUM	11	1	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	CHROMIUM	12	1	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	CHROMIUM	6	1.2	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	CHROMIUM	6.4	1.1	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	CHROMIUM	5.2	1.1	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	CHROMIUM	4.6	1.1	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	CHROMIUM	3.7	1	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	CHROMIUM	5.6	1.1	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	CHROMIUM	5.3	1	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	CHROMIUM	4.5	1.1	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	CHROMIUM	6.2	1	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	CHROMIUM	13	1	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	CHROMIUM	2.3	1	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	CHROMIUM	5.2	1	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	COBALT	4.4	0.51	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	COBALT	7.9	0.53	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	COBALT	7	0.51	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	COBALT	8	0.53	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	COBALT	5.6	0.51	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	COBALT	7	0.51	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	COBALT	6.1	0.55	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	COBALT	6.1	0.51	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	COBALT	6.2	0.5	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	COBALT	6.1	0.5	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	COBALT	4.8	0.57	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	COBALT	3.6	0.5	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	COBALT	3.9	0.5	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	COBALT	6	0.51	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	COBALT	3.7	0.5	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	COBALT	5.7	0.5	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	COBALT	4.3	0.5	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	COBALT	4.3	0.5	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	COBALT	8.3	0.52	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	COBALT	6.4	0.5	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	COBALT	6.4	0.51	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	COBALT	7.3	0.58	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	COBALT	6.9	0.53	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	COBALT	6.3	0.55	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	COBALT	5.7	0.54	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	COBALT	5	0.52	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	COBALT	4	0.55	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	COBALT	5.7	0.51	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	COBALT	5.2	0.53	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	COBALT	3.4	0.51	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	COBALT	6.3	0.51	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	COBALT	2.5	0.5	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	COBALT	5.8	0.51	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	COPPER	6.3	2	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	COPPER	19	2.1	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	COPPER	16	2	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	COPPER	9.2	2.1	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	COPPER	9.9	2.1	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	COPPER	16	2	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	COPPER	10	2.2	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	COPPER	10	2	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	COPPER	3.9	2	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	COPPER	12	2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	COPPER	8	2.3	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	COPPER	5.9	2	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	COPPER	5.9	2	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	COPPER	16	2.1	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	COPPER	5	2	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	COPPER	10	2	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	COPPER	6.9	2	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	COPPER	6.1	2	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	COPPER	21	2.1	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	COPPER	13	2	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	COPPER	14	2	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	COPPER	17	2.3	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	COPPER	15	2.1	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	COPPER	12	2.2	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	COPPER	12	2.2	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	COPPER	9.4	2.1	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	COPPER	7.6	2.2	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	COPPER	12	2	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	COPPER	7.8	2.1	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	COPPER	5.7	2	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	COPPER	12	2	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	COPPER	3.2	2	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	COPPER	11	2	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	IRON	7900	20	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	IRON	11000	21	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	IRON	10000	20	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	IRON	11000	21	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	IRON	11000	21	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	IRON	13000	20	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	IRON	11000	22	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	IRON	10000	20	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	IRON	9900	20	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	IRON	11000	20	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	IRON	9200	23	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	IRON	8600	20	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	IRON	9400	20	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	IRON	10000	21	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	IRON	7300	20	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	IRON	9200	20	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	IRON	9200	20	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	IRON	7800	20	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	IRON	13000	21	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	IRON	12000	20	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	IRON	12000	20	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	IRON	12000	23	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	IRON	12000	21	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	IRON	12000	22	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	IRON	13000	22	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	IRON	9800	21	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	IRON	8400	22	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	IRON	9600	20	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	IRON	9300	21	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	IRON	10000	20	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	IRON	9900	20	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	IRON	5000	20	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	IRON	11000	20	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	LEAD	8.7	0.2	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	LEAD	17	0.21	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	LEAD	14	0.2	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	LEAD	10	0.21	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	LEAD	10	0.21	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	LEAD	15	0.2	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	LEAD	11	0.22	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	LEAD	10	0.2	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	LEAD	7.2	0.2	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	LEAD	11	0.2	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	LEAD	9.1	0.23	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	LEAD	7.6	0.2	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	LEAD	7.8	0.2	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	LEAD	10	0.21	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	LEAD	6.9	0.2	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	LEAD	10	0.2	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	LEAD	7.7	0.2	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	LEAD	7.7	0.2	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	LEAD	18	0.21	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	LEAD	12	0.2	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	LEAD	12	0.2	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	LEAD	14	0.23	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	LEAD	14	0.21	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	LEAD	11	0.22	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	LEAD	12	0.22	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	LEAD	8.9	0.21	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	LEAD	11	0.22	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	LEAD	11	0.2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	LEAD	9.1	0.21	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	LEAD	10	0.2	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	LEAD	9.8	0.2	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	LEAD	4.8	0.2	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	LEAD	11	0.2	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	MANGANESE	120	0.76	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	MANGANESE	150	0.79	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	MANGANESE	150	0.77	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	MANGANESE	170	0.79	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	MANGANESE	170	0.77	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	MANGANESE	160	0.76	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	MANGANESE	140	0.82	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	MANGANESE	150	0.76	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	MANGANESE	150	0.75	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	MANGANESE	160	0.76	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	MANGANESE	140	0.85	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	MANGANESE	120	0.76	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	MANGANESE	130	0.75	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	MANGANESE	160	0.77	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	MANGANESE	120	0.75	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	MANGANESE	150	0.75	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	MANGANESE	190	0.75	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	MANGANESE	100	0.76	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	MANGANESE	180	0.78	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	MANGANESE	170	0.75	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	MANGANESE	180	0.77	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	MANGANESE	180	0.86	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	MANGANESE	200	0.79	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	MANGANESE	200	0.82	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	MANGANESE	170	0.81	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	MANGANESE	140	0.77	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	MANGANESE	130	0.82	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	MANGANESE	170	0.77	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	MANGANESE	140	0.8	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	MANGANESE	100	0.76	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	MANGANESE	150	0.77	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	MANGANESE	89	0.75	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	MANGANESE	160	0.76	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	MOLYBDENUM	0.15 J	0.2	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	MOLYBDENUM	0.42	0.21	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	MOLYBDENUM	0.38	0.2	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	MOLYBDENUM	0.18 J	0.21	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	MOLYBDENUM	0.29	0.21	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	MOLYBDENUM	0.37	0.2	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	MOLYBDENUM	0.28	0.22	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	MOLYBDENUM	0.25	0.2	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	MOLYBDENUM	0.16 J	0.2	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	MOLYBDENUM	0.34	0.2	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	MOLYBDENUM	0.21 J	0.23	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	MOLYBDENUM	0.28	0.2	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	MOLYBDENUM	0.32	0.2	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	MOLYBDENUM	0.27	0.21	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	MOLYBDENUM	0.19 J	0.2	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	MOLYBDENUM	0.23	0.2	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	MOLYBDENUM	0.39	0.2	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	MOLYBDENUM	0.18 J	0.2	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	MOLYBDENUM	0.4	0.21	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	MOLYBDENUM	0.49	0.2	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	MOLYBDENUM	0.53	0.2	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	MOLYBDENUM	0.27	0.23	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	MOLYBDENUM	0.35	0.21	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	MOLYBDENUM	0.34	0.22	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	MOLYBDENUM	0.61 J	0.22	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	MOLYBDENUM	0.27	0.21	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	MOLYBDENUM	0.26	0.22	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	MOLYBDENUM	0.27	0.2	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	MOLYBDENUM	0.2 J	0.21	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	MOLYBDENUM	0.21	0.2	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	MOLYBDENUM	0.28	0.2	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	MOLYBDENUM	0.15 J	0.2	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	MOLYBDENUM	0.27	0.2	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	NICKEL	4.7	2	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	NICKEL	9	2.1	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	NICKEL	8.1	2	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	NICKEL	5	2.1	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	NICKEL	6.5	2.1	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	NICKEL	9.2	2	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	NICKEL	5.9	2.2	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	NICKEL	6.2	2	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	NICKEL	6.5	2	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	NICKEL	7.2	2	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	NICKEL	5.2	2.3	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	NICKEL	4.2	2	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	NICKEL	4.6	2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	NICKEL	6.5	2.1	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	NICKEL	3.9	2	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	NICKEL	6.4	2	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	NICKEL	5.1	2	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	NICKEL	4.2	2	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	NICKEL	11	2.1	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	NICKEL	8.3	2	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	NICKEL	8.8	2	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	NICKEL	9.6	2.3	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	NICKEL	8.7	2.1	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	NICKEL	7.2	2.2	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	NICKEL	7.4	2.2	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	NICKEL	5.7	2.1	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	NICKEL	6.8	2.2	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	NICKEL	7.6	2	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	NICKEL	6.1	2.1	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	NICKEL	5.3	2	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	NICKEL	16	2	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	NICKEL	2.7	2	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	NICKEL	7.2	2	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	713R15	Ra-226	1.4	0.54	pCi/g
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	713R15	Ra-226	1.86 J	0.6	pCi/g
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	713R15	Ra-226	1.9 J	0.63	pCi/g
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	713R15	Ra-226	2.87	0.52	pCi/g
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	713R15	Ra-226	3.13 J	0.48	pCi/g
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	713R15	Ra-226	8.6 J	0.8	pCi/g
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	713R15	Ra-226	1.23	0.44	pCi/g
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	713R15	Ra-226	1.29	0.47	pCi/g
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	713R15	Ra-226	1.16	0.37	pCi/g
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	713R15	Ra-226	2.25	0.55	pCi/g
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	713R15	Ra-226	1.42	0.37	pCi/g
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	713R15	Ra-226	2.29	0.54	pCi/g
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	713R15	Ra-226	2.27	0.44	pCi/g
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	713R15	Ra-226	1.73 J	0.32	pCi/g
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	713R15	Ra-226	0.82 J	0.44	pCi/g
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	713R15	Ra-226	1.33	0.52	pCi/g
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	713R15	Ra-226	18.2	0.5	pCi/g
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	713R15	Ra-226	1.19	0.52	pCi/g
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	713R15	Ra-226	2.27 J	0.44	pCi/g
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	713R15	Ra-226	1.77 J	0.53	pCi/g
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	713R15	Ra-226	1.85 J	0.45	pCi/g
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	713R15	Ra-226	1.54 J	0.34	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	713R15	Ra-226	19.2 J	0.7	pCi/g
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	713R15	Ra-226	2.94 J	0.48	pCi/g
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	713R15	Ra-226	28.5	0.8	pCi/g
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	713R15	Ra-226	4.68	0.53	pCi/g
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	713R15	Ra-226	28	0.8	pCi/g
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	713R15	Ra-226	3.21	0.36	pCi/g
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	713R15	Ra-226	2.12	0.52	pCi/g
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	713R15	Ra-226	6.28	0.49	pCi/g
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	713R15	Ra-226	6.3	0.5	pCi/g
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	713R15	Ra-226	0.6	0.38	pCi/g
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	713R15	Ra-226	1.13	0.41	pCi/g
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	SELENIUM	1.1	1	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	SELENIUM	1.9	1.1	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	SELENIUM	1.6	1	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	SELENIUM	1.2	1.1	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	SELENIUM	1.7	1	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	SELENIUM	3.2	1	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	SELENIUM	1.3	1.1	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	SELENIUM	1.8	1	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	SELENIUM	1.2	1	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	SELENIUM	1.6	1	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	SELENIUM	1.3	1.1	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	SELENIUM	1.1	1	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	SELENIUM	1.2	1	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	SELENIUM	1.4	1	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	SELENIUM	0.79 J	1	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	SELENIUM	1.3	1	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	SELENIUM	4.5	1	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	SELENIUM	1.1	1	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	SELENIUM	2.1	1	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	SELENIUM	1.6	1	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	SELENIUM	1.6	1	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	SELENIUM	1.8	1.2	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	SELENIUM	4.4	1.1	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	SELENIUM	1.9	1.1	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	SELENIUM	9.5	1.1	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	SELENIUM	2.7	1	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	SELENIUM	14	1.1	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	SELENIUM	1.7	1	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	SELENIUM	1.4	1.1	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	SELENIUM	2.2	1	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	SELENIUM	2.3	1	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	SELENIUM	0.47 J	1	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	SELENIUM	1.3	1	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	SILVER	0.058 UJ	0.12	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	SILVER	0.1 J	0.12	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	SILVER	0.08 J	0.12	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	SILVER	0.06 UJ	0.12	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	SILVER	0.058 UJ	0.12	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	SILVER	0.072 J	0.12	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	SILVER	0.062 UJ	0.12	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	SILVER	0.058 UJ	0.12	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	SILVER	0.057 UJ	0.11	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	SILVER	0.059 J	0.12	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	SILVER	0.065 UJ	0.13	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	SILVER	0.058 UJ	0.12	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	SILVER	0.057 UJ	0.11	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	SILVER	0.059 UJ	0.12	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	SILVER	0.057 UJ	0.11	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	SILVER	0.057 UJ	0.11	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	SILVER	0.057 UJ	0.11	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	SILVER	0.057 UJ	0.11	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	SILVER	0.1 J	0.12	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	SILVER	0.071 J	0.11	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	SILVER	0.076 J	0.12	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	SILVER	0.081 J	0.13	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	SILVER	0.09 J	0.12	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	SILVER	0.065 J	0.13	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	SILVER	0.062 U	0.12	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	SILVER	0.059 U	0.12	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	SILVER	0.062 U	0.12	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	SILVER	0.061 U	0.12	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	SILVER	0.061 J	0.12	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	THALLIUM	0.098	0.01	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	THALLIUM	0.2	0.011	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	THALLIUM	0.17	0.01	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	THALLIUM	0.15	0.011	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	THALLIUM	0.14	0.01	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	THALLIUM	0.16	0.01	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	THALLIUM	0.13	0.011	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	THALLIUM	0.067	0.01	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	THALLIUM	0.13	0.01	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	THALLIUM	0.14	0.011	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	THALLIUM	0.094	0.01	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	THALLIUM	0.094	0.01	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	THALLIUM	0.14	0.01	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	THALLIUM	0.1	0.01	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	THALLIUM	0.11	0.01	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	THALLIUM	0.097	0.01	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	THALLIUM	0.093	0.01	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	THALLIUM	0.21	0.01	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	THALLIUM	0.15	0.01	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	THALLIUM	0.15	0.01	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	THALLIUM	0.18	0.012	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	THALLIUM	0.17	0.011	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	THALLIUM	0.13	0.011	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	THALLIUM	0.15	0.011	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	THALLIUM	0.097	0.01	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	THALLIUM	0.089	0.011	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	THALLIUM	0.11	0.01	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	THALLIUM	0.11	0.011	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	THALLIUM	0.075	0.01	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	THALLIUM	0.048	0.01	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	THALLIUM	0.14	0.01	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	URANIUM	1.5	0.02	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	URANIUM	2.6	0.021	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	URANIUM	2.7	0.02	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	URANIUM	4.6	0.021	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	URANIUM	3.2	0.021	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	URANIUM	9	0.02	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	URANIUM	1.4	0.022	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	URANIUM	1	0.02	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	URANIUM	1.6	0.02	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	URANIUM	4.6	0.02	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	URANIUM	1.5	0.023	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	URANIUM	1.5	0.02	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	URANIUM	1.8	0.02	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	URANIUM	1.7	0.021	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	URANIUM	0.61	0.02	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	URANIUM	1.2	0.02	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	URANIUM	8.8	0.02	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	URANIUM	1.1	0.02	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	URANIUM	3.1	0.021	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	URANIUM	1.6	0.02	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	URANIUM	1.6	0.02	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	URANIUM	1.2	0.023	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	URANIUM	21	0.021	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	URANIUM	1.9	0.022	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	URANIUM	55	0.022	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	URANIUM	4.9	0.021	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	URANIUM	20	0.022	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	URANIUM	3.4	0.02	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	URANIUM	1.6	0.021	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	URANIUM	12	0.02	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	URANIUM	4.8	0.02	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	URANIUM	0.37	0.02	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	URANIUM	0.91	0.02	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	VANADIUM	11	0.51	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	VANADIUM	14	0.53	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	VANADIUM	13	0.51	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	VANADIUM	11	0.53	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	VANADIUM	13	0.51	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	VANADIUM	17	0.51	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	VANADIUM	12	0.55	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	VANADIUM	12	0.51	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	VANADIUM	12	0.5	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	VANADIUM	13	0.5	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	VANADIUM	12	0.57	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	VANADIUM	11	0.5	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	VANADIUM	12	0.5	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	VANADIUM	12	0.51	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	VANADIUM	8.6	0.5	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	VANADIUM	12	0.5	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	VANADIUM	15	0.5	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	VANADIUM	9.3	0.5	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	VANADIUM	17	0.52	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	VANADIUM	15	0.5	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	VANADIUM	15	0.51	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	VANADIUM	15	0.58	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	VANADIUM	19	0.53	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	VANADIUM	15	0.55	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	VANADIUM	20	0.54	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	VANADIUM	13	0.52	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	VANADIUM	20	0.55	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	VANADIUM	13	0.51	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	VANADIUM	11	0.53	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	VANADIUM	13	0.51	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	VANADIUM	15	0.51	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	VANADIUM	5.4	0.5	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	VANADIUM	13	0.51	mg/kg
CR1	CR1-SS05-0000-0003-01	5/19/2022	35.666713	-108.504141	0	3	SW6020	ZINC	35	10	mg/kg
CR1	CR1-SS06-0000-0003-01	5/19/2022	35.667094	-108.502536	0	3	SW6020	ZINC	70	11	mg/kg
CR1	CR1-SS06-0000-0003-02	5/19/2022	35.667094	-108.502536	0	3	SW6020	ZINC	62	10	mg/kg
CR1	CR1-SS07-0000-0003-01	5/19/2022	35.667085	-108.501729	0	3	SW6020	ZINC	41	11	mg/kg
CR1	CR1-SS08-0000-0003-01	5/19/2022	35.666503	-108.503201	0	3	SW6020	ZINC	43	10	mg/kg
CR1	CR1-SS09-0000-0003-01	5/19/2022	35.666327	-108.502514	0	3	SW6020	ZINC	61	10	mg/kg
CR1	CR1-SS10-0000-0003-01	5/19/2022	35.666522	-108.501608	0	3	SW6020	ZINC	45	11	mg/kg
CR1	CR1-SS11-0000-0003-01	5/19/2022	35.666126	-108.501314	0	3	SW6020	ZINC	45	10	mg/kg
CR1	CR1-SS12-0000-0003-01	5/19/2022	35.666314	-108.500988	0	3	SW6020	ZINC	52	10	mg/kg
CR1	CR1-SS13-0000-0003-01	5/19/2022	35.666176	-108.499679	0	3	SW6020	ZINC	47	10	mg/kg
CR1	CR1-SS14-0000-0003-01	5/19/2022	35.666944	-108.499149	0	3	SW6020	ZINC	38	11	mg/kg
CR1	CR1-SS15-0000-0003-01	5/18/2022	35.66634	-108.498	0	3	SW6020	ZINC	38	10	mg/kg
CR1	CR1-SS15-0000-0003-02	5/18/2022	35.66634	-108.498	0	3	SW6020	ZINC	34	10	mg/kg
CR1	CR1-SS16-0000-0003-01	5/18/2022	35.66598	-108.498	0	3	SW6020	ZINC	42	10	mg/kg
CR1	CR1-SS17-0000-0003-01	5/18/2022	35.665398	-108.498872	0	3	SW6020	ZINC	27	10	mg/kg
CR1	CR1-SS18-0000-0003-01	5/18/2022	35.665202	-108.499554	0	3	SW6020	ZINC	41	10	mg/kg
CR1	CR1-SS19-0000-0003-01	5/18/2022	35.665408	-108.500208	0	3	SW6020	ZINC	38	10	mg/kg
CR1	CR1-SS20-0000-0003-01	5/19/2022	35.664437	-108.499566	0	3	SW6020	ZINC	32	10	mg/kg
CR1	CR1-SS21-0000-0003-01	5/19/2022	35.663695	-108.499566	0	3	SW6020	ZINC	70	10	mg/kg
CR1	CR1-SS22-0000-0003-01	5/19/2022	35.663664	-108.500468	0	3	SW6020	ZINC	56	10	mg/kg
CR1	CR1-SS22-0000-0003-02	5/19/2022	35.663664	-108.500468	0	3	SW6020	ZINC	56	10	mg/kg
CR1	CR1-SS23-0000-0003-01	5/19/2022	35.663755	-108.501126	0	3	SW6020	ZINC	62	12	mg/kg
CR1	CR1-SS24-0000-0003-01	5/19/2022	35.664237	-108.500743	0	3	SW6020	ZINC	62	11	mg/kg
CR1	CR1-SS25-0000-0003-01	5/19/2022	35.664474	-108.500594	0	3	SW6020	ZINC	60	11	mg/kg
CR1	CR1-SS26-0000-0003-01	5/19/2022	35.664639	-108.501293	0	3	SW6020	ZINC	48	11	mg/kg
CR1	CR1-SS27-0000-0003-01	5/19/2022	35.664035	-108.501678	0	3	SW6020	ZINC	43	10	mg/kg
CR1	CR1-SS28-0000-0003-01	5/19/2022	35.664057	-108.503308	0	3	SW6020	ZINC	37	11	mg/kg
CR1	CR1-SS29-0000-0003-01	5/19/2022	35.66443	-108.504	0	3	SW6020	ZINC	47	10	mg/kg
CR1	CR1-SS30-0000-0003-01	5/19/2022	35.665182	-108.504127	0	3	SW6020	ZINC	49	11	mg/kg
CR1	CR1-SS31-0000-0003-01	5/19/2022	35.665752	-108.504261	0	3	SW6020	ZINC	31	10	mg/kg
CR1	CR1-SS32-0000-0003-01	5/19/2022	35.665946	-108.50414	0	3	SW6020	ZINC	42	10	mg/kg
CR1	CR1-SS33-0000-0003-01	5/19/2022	35.663477	-108.501566	0	3	SW6020	ZINC	18	10	mg/kg
CR1	CR1-SS34-0000-0003-01	5/19/2022	35.66306	-108.5	0	3	SW6020	ZINC	46	10	mg/kg
CR1	RWPR-SS-001 (0-6)	10/6/2010	35.6661433	-108.504248	0	6	713R11	Ra-226	4.54 G	0.44	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	RWPR-SS-002 (0-6)	10/6/2010	35.6661419	-108.503999	0	6	713R11	Ra-226	2.9 G	0.54	pCi/g
CR1	C1LI-005.1 (0-6)	12/14/2010	35.6663944	-108.503553	0	6	713R11	Ra-226	2.61 G	0.57	pCi/g
CR1	C1LI-016.1 (0-6)	12/14/2010	35.6667753	-108.502749	0	6	713R11	Ra-226	1.14 G	0.49	pCi/g
CR1	C1LI-026.1 (0-6)	12/14/2010	35.6669753	-108.50235	0	6	713R11	Ra-226	2.22 G	0.47	pCi/g
CR1	C1LI-037.1 (0-6)	12/14/2010	35.6667797	-108.501957	0	6	713R11	Ra-226	1.37 G	0.48	pCi/g
CR1	C1LI-058.1 (0-6)	12/14/2010	35.6660344	-108.500605	0	6	713R11	Ra-226	7.37	0.52	pCi/g
CR1	C1LI-058.4 Dup	12/14/2010	35.6660344	-108.500605	0	6	713R11	Ra-226	9.6	0.7	pCi/g
CR1	C1LI-063.1 (0-6)	12/13/2010	35.6656513	-108.500325	0	6	713R11	Ra-226	7.31	0.54	pCi/g
CR1	C1LI-068.1 (0-6)	12/13/2010	35.666229	-108.500202	0	6	713R11	Ra-226	3.79 G	0.49	pCi/g
CR1	C1LI-078.1 (0-6)	12/14/2010	35.6660362	-108.49979	0	6	713R11	Ra-226	1.5 G	0.41	pCi/g
CR1	C1LI-085.1 (0-6)	12/13/2010	35.6652767	-108.499514	0	6	713R11	Ra-226	2.72 G	0.59	pCi/g
CR1	C1LI-085.1 (0-6) Dup	12/13/2010	35.6652767	-108.499514	0	6	713R11	Ra-226	2.7 G	0.57	pCi/g
CR1	C1LI-091.1 (0-6)	12/13/2010	35.665467	-108.499381	0	6	713R11	Ra-226	1.35 G	0.48	pCi/g
CR1	C1LI-091.4 Dup	12/13/2010	35.665467	-108.499381	0	6	713R11	Ra-226	1.38 G	0.5	pCi/g
CR1	C1LI-099.1 (0-6)	12/13/2010	35.6664237	-108.499261	0	6	713R11	Ra-226	1.85	0.51	pCi/g
CR1	C1LI-107.1 (0-6)	12/14/2010	35.6670014	-108.499118	0	6	713R11	Ra-226	1.05 G	0.47	pCi/g
CR1	C1LI-110.1 (0-6)	12/14/2010	35.6660517	-108.498975	0	6	713R11	Ra-226	0.98 LT	0.47	pCi/g
CR1	C1LI-120.1 (0-6)	12/13/2010	35.6652921	-108.49871	0	6	713R11	Ra-226	1.05 G	0.49	pCi/g
CR1	C1LI-120.1 (0-6) Dup	12/13/2010	35.6652921	-108.49871	0	6	713R11	Ra-226	0.87 LT,G	0.54	pCi/g
CR1	C1LI-127.1 (0-6)	12/14/2010	35.6658533	-108.498576	0	6	713R11	Ra-226	4.13	0.46	pCi/g
CR1	C1LI-127.4 Dup	12/14/2010	35.6658533	-108.498576	0	6	713R11	Ra-226	4.85	0.58	pCi/g
CR1	C1LI-131.1 (0-6)	12/13/2010	35.6652826	-108.49844	0	6	713R11	Ra-226	1.21 G	0.5	pCi/g
CR1	C1LI-140.1 (0-6)	12/13/2010	35.66566	-108.498258	0	6	713R11	Ra-226	1.66 G	0.5	pCi/g
CR1	C1LI-140.4 Dup	12/13/2010	35.66566	-108.498258	0	6	713R11	Ra-226	1.86 G	0.68	pCi/g
CR1	C1LI-141.1 (0-6)	12/14/2010	35.6660451	-108.498177	0	6	713R11	Ra-226	8.9 G	0.6	pCi/g
CR1	C1LP-004.1 (0-6)	12/13/2010	35.664119	-108.502188	0	6	713R11	Ra-226	1.24 G	0.46	pCi/g
CR1	C1LP-004.1 (0-6) Dup	12/13/2010	35.664119	-108.502188	0	6	713R11	Ra-226	1.35 G	0.54	pCi/g
CR1	C1LP-009.1 (0-6)	12/13/2010	35.6639221	-108.501523	0	6	713R11	Ra-226	47.1 G	1	pCi/g
CR1	C1LP-009.4 Dup	12/13/2010	35.6639221	-108.501523	0	6	713R11	Ra-226	42.7 M3,G	1.1	pCi/g
CR1	C1LP-015.1 (0-6)	12/13/2010	35.6639346	-108.501254	0	6	713R11	Ra-226	35.8 M3,G	1.2	pCi/g
CR1	C1LP-019.1 (0-6)	12/15/2010	35.6645068	-108.501124	0	6	713R11	Ra-226	4.9 G	0.6	pCi/g
CR1	C1LP-020.1 (0-6)	12/13/2010	35.6639251	-108.500984	0	6	713R11	Ra-226	26.6	1	pCi/g
CR1	C1LP-026.1 (0-6)	12/13/2010	35.6643085	-108.500718	0	6	713R11	Ra-226	12.5 G	0.7	pCi/g
CR1	C1LP-031.1 (0-6)	12/13/2010	35.6648889	-108.500588	0	6	713R11	Ra-226	2.23 G	0.62	pCi/g
CR1	C1LP-037.1 (0-6)	12/13/2010	35.6645002	-108.500323	0	6	713R11	Ra-226	2.23 G	0.71	pCi/g
CR1	C1LP-037.1 (0-6) Dup	12/13/2010	35.6645002	-108.500323	0	6	713R11	Ra-226	2.25 G	0.45	pCi/g
CR1	C1LP-042.1 (0-6)	12/13/2010	35.6646878	-108.500183	0	6	713R11	Ra-226	2.02 G	0.49	pCi/g
CR1	C1LP-048.1 (0-6)	12/13/2010	35.6639283	-108.49991	0	6	713R11	Ra-226	3.23 G	0.79	pCi/g
CR1	C1LP-052.1 (0-6)	12/13/2010	35.6637533	-108.499771	0	6	713R11	Ra-226	1.3 G	0.55	pCi/g
CR1	C1LP-053.1 (0-6)	12/13/2010	35.6641186	-108.499777	0	6	713R11	Ra-226	2.97 G	0.58	pCi/g
CR1	C1LP-053.1 (0-6) Dup	12/13/2010	35.6641186	-108.499777	0	6	713R11	Ra-226	2.19 G	0.6	pCi/g
CR1	C1LP-059.1 (0-6)	12/13/2010	35.6646908	-108.499647	0	6	713R11	Ra-226	2.3 G	0.77	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	C1LP-064.1 (0-6)	12/13/2010	35.6648619	-108.499507	0	6	713R11	Ra-226	1.33 G	0.62	pCi/g
CR1	C1LP-070.1 (0-6)	12/13/2010	35.6641079	-108.499235	0	6	713R11	Ra-226	1.77 G	0.57	pCi/g
CR1	C1LP-075.1 (0-6)	12/13/2010	35.6646828	-108.499105	0	6	713R11	Ra-226	2.08 G	0.64	pCi/g
CR1	C1LP-081.1 (0-6)	12/13/2010	35.6643108	-108.498819	0	6	713R11	Ra-226	1.43	0.49	pCi/g
CR1	C1LP-081.1 (0-6) Dup	12/13/2010	35.6643108	-108.498819	0	6	713R11	Ra-226	1.43	0.41	pCi/g
CR1	C1LW-002.1 (0-6)	12/16/2010	35.6661835	-108.503942	0	6	713R11	Ra-226	1.68 G	0.47	pCi/g
CR1	C1LW-002.1 (0-6) Dup	12/16/2010	35.6661835	-108.503942	0	6	713R11	Ra-226	1.39 G	0.58	pCi/g
CR1	C1LW-013.1 (0-6)	12/14/2010	35.6652515	-108.503557	0	6	713R11	Ra-226	3.49	0.57	pCi/g
CR1	C1LW-020.1 (0-6)	12/14/2010	35.6658232	-108.503512	0	6	713R11	Ra-226	2.36 G	0.61	pCi/g
CR1	C1LW-022.1 (0-6)	12/15/2010	35.6644948	-108.503278	0	6	713R11	Ra-226	1.24	0.46	pCi/g
CR1	C1LW-034.1 (0-6)	12/14/2010	35.6648644	-108.503012	0	6	713R11	Ra-226	2.09 G	0.62	pCi/g
CR1	C1LW-041.1 (0-6)	12/15/2010	35.6654339	-108.502875	0	6	713R11	Ra-226	1.37	0.36	pCi/g
CR1	C1LW-048.1 (0-6)	12/14/2010	35.6660088	-108.502742	0	6	713R11	Ra-226	2.01 G	0.48	pCi/g
CR1	C1LW-050.1 (0-6)	12/14/2010	35.66468	-108.502583	0	6	713R11	Ra-226	1.87 G	0.64	pCi/g
CR1	C1LW-062.1 (0-6)	12/14/2010	35.6650605	-108.502334	0	6	713R11	Ra-226	1.4	0.58	pCi/g
CR1	C1LW-067.1 (0-6)	12/14/2010	35.6648745	-108.502187	0	6	713R11	Ra-226	7.02	0.41	pCi/g
CR1	C1LW-069.1 (0-6)	12/14/2010	35.6656327	-108.502204	0	6	713R11	Ra-226	1.27 G	0.49	pCi/g
CR1	C1LW-083.1 (0-6)	12/14/2010	35.6654455	-108.501778	0	6	713R11	Ra-226	1.89 G	0.49	pCi/g
CR1	C1LW-090.1 (0-6)	12/14/2010	35.6656427	-108.501392	0	6	713R11	Ra-226	1.84 G	0.47	pCi/g
CR1	C1LW-097.1 (0-6)	12/14/2010	35.6654554	-108.500987	0	6	713R11	Ra-226	2.2 G	0.39	pCi/g
CR1	C1LW-104.1 (0-6)	12/14/2010	35.6656499	-108.500588	0	6	713R11	Ra-226	1.48 G	0.47	pCi/g
CR1	RWPR-SS-004 (0-6)	10/6/2010	35.6660068	-108.504092	0	6	713R11	Ra-226	8.9 G	0.6	pCi/g
CR1	RWPR-SS-006 (0-6)	10/8/2010	35.6658165	-108.504225	0	6	713R11	Ra-226	4.89 G	0.61	pCi/g
CR1	RWPR-SS-007 (0-6)	10/8/2010	35.6656262	-108.504355	0	6	713R11	Ra-226	2.01 G	0.66	pCi/g
CR1	RWPR-SS-008 (0-6)	10/8/2010	35.6656249	-108.504096	0	6	713R11	Ra-226	5.17 G	0.77	pCi/g
CR1	RWPR-SS-010 (0-6)	10/6/2010	35.6654388	-108.503963	0	6	713R11	Ra-226	17.3 G	0.9	pCi/g
CR1	RWPR-SS-011 (0-6)	10/7/2010	35.6652416	-108.504358	0	6	713R11	Ra-226	3.73 G	0.61	pCi/g
CR1	RWPR-SS-011 (0-6) Dup	10/7/2010	35.6652416	-108.504358	0	6	713R11	Ra-226	3.54 G	0.5	pCi/g
CR1	RWPR-SS-012 (0-6)	10/7/2010	35.6652376	-108.504092	0	6	713R11	Ra-226	12.2 G	0.7	pCi/g
CR1	RWPR-SS-014 (0-6)	10/7/2010	35.6650555	-108.504222	0	6	713R11	Ra-226	3.56	0.55	pCi/g
CR1	RWPR-SS-019 (0-6)	10/7/2010	35.6646791	-108.504222	0	6	713R11	Ra-226	7.2 G	0.7	pCi/g
CR1	RWPR-SS-023 (0-6)	10/6/2010	35.6642878	-108.503953	0	6	713R11	Ra-226	1.67 G	0.48	pCi/g
CR1	RWPR-SS-025 (0-6)	10/8/2010	35.6640782	-108.504086	0	6	713R11	Ra-226	0.99 LT,G	0.37	pCi/g
CR1	RWPR-SS-025 (0-6) Dup	10/8/2010	35.6640782	-108.504086	0	6	713R11	Ra-226	1.07 G	0.47	pCi/g
CR1	RWPR-SS-211 (0-6)	10/7/2010	35.6652416	-108.504358	0	6	713R11	Ra-226	3.9 G	0.56	pCi/g
CR1	RWPR-SS-001 (0-6)	10/6/2010	35.6661433	-108.504248	0	6	SW6020	URANIUM	8.7	11	mg/kg
CR1	RWPR-SS-002 (0-6)	10/6/2010	35.6661419	-108.503999	0	6	SW6020	URANIUM	4.8	11	mg/kg
CR1	RWPR-SS-004 (0-6)	10/6/2010	35.6660068	-108.504092	0	6	SW6020	URANIUM	8.2	12	mg/kg
CR1	RWPR-SS-006 (0-6)	10/8/2010	35.6658165	-108.504225	0	6	SW6020	URANIUM	3.7	11	mg/kg
CR1	RWPR-SS-007 (0-6)	10/8/2010	35.6656262	-108.504355	0	6	SW6020	URANIUM	3	11	mg/kg
CR1	RWPR-SS-008 (0-6)	10/8/2010	35.6656249	-108.504096	0	6	SW6020	URANIUM	7.3	11	mg/kg
CR1	RWPR-SS-010 (0-6)	10/6/2010	35.6654388	-108.503963	0	6	SW6020	URANIUM	9.4	11	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	RWPR-SS-011 (0-6)	10/7/2010	35.6652416	-108.504358	0	6	SW6020	URANIUM	2.8	11	mg/kg
CR1	RWPR-SS-012 (0-6)	10/7/2010	35.6652376	-108.504092	0	6	SW6020	URANIUM	10	11	mg/kg
CR1	RWPR-SS-014 (0-6)	10/7/2010	35.6650555	-108.504222	0	6	SW6020	URANIUM	3.3	11	mg/kg
CR1	RWPR-SS-019 (0-6)	10/7/2010	35.6646791	-108.504222	0	6	SW6020	URANIUM	6.5	11	mg/kg
CR1	RWPR-SS-023 (0-6)	10/6/2010	35.6642878	-108.503953	0	6	SW6020	URANIUM	1.3	11	mg/kg
CR1	RWPR-SS-025 (0-6)	10/8/2010	35.6640782	-108.504086	0	6	SW6020	URANIUM	0.61	10	mg/kg
CR1	RWPR-SS-211 (0-6)	10/7/2010	35.6652416	-108.504358	0	6	SW6020	URANIUM	2.8	11	mg/kg
CR1	C1LI-500 SS1 0-1.5	5/3/2011	35.6668364	-108.502316	0	18	713R11	Ra-226	10.2 G	0.6	pCi/g
CR1	C1LI-501 SS1 0-1.5	5/3/2011	35.6665962	-108.502944	0	18	713R11	Ra-226	5.51 G	0.52	pCi/g
CR1	C1LP-400 SS1 0-1.5	4/25/2011	35.6645408	-108.501319	0	18	713R11	Ra-226	2.15 G	0.57	pCi/g
CR1	C1LP-401 SS1 0-1.5	4/25/2011	35.6640736	-108.501375	0	18	713R11	Ra-226	8.2	0.6	pCi/g
CR1	C1LP-402 SS1 0-1.5	4/29/2011	35.6646723	-108.5003	0	18	713R11	Ra-226	2.2 G	0.5	pCi/g
CR1	C1LP-403 SS1 0-1.5	4/29/2011	35.6640345	-108.500584	0	18	713R11	Ra-226	21.4 G	0.6	pCi/g
CR1	C1LP-404 SS1 0-1.5	5/1/2011	35.664222	-108.499825	0	18	713R11	Ra-226	2.66 G	0.48	pCi/g
CR1	C1LP-405 SS1 0-1.5	5/1/2011	35.6640588	-108.499182	0	18	713R11	Ra-226	1.65 G	0.66	pCi/g
CR1	C1LP-406 SS1 0-1.5	5/1/2011	35.6654968	-108.499143	0	18	713R11	Ra-226	1.16 G	0.4	pCi/g
CR1	C1LP-406 SS1 0-1.5 Dup	5/1/2011	35.6654968	-108.499143	0	18	713R11	Ra-226	1.18 G	0.43	pCi/g
CR1	C1LP-407 SS1 0-1.5	5/2/2011	35.6658597	-108.498441	0	18	713R11	Ra-226	3.52 G	0.62	pCi/g
CR1	C1LP-407 SS1 0-1.5 Dup	5/2/2011	35.6658597	-108.498441	0	18	713R11	Ra-226	3.23 G	0.48	pCi/g
CR1	C1LP-408 SS1 0-1.5	5/2/2011	35.6661682	-108.498101	0	18	713R11	Ra-226	3.53 G	0.49	pCi/g
CR1	C1LP-700 SS1 0-1.5	4/30/2011	35.663741	-108.500407	0	18	713R11	Ra-226	1.46 G	0.48	pCi/g
CR1	C1LP-701 SS1 0-1.5	4/30/2011	35.6635129	-108.500075	0	18	713R11	Ra-226	2.86 G	0.66	pCi/g
CR1	C1LP-702 SS1 0-1.5	4/30/2011	35.6633178	-108.499525	0	18	713R11	Ra-226	1.33	0.46	pCi/g
CR1	C1LP-703 SS1 0-1.5	4/30/2011	35.6650352	-108.499164	0	18	713R11	Ra-226	1.28 G	0.47	pCi/g
CR1	C1LP-703 SS1 0-1.5 Dup	4/30/2011	35.6650352	-108.499164	0	18	713R11	Ra-226	1.16 G	0.54	pCi/g
CR1	RWPR-SS-006 (1.5-1.9)	10/8/2010	35.6658165	-108.504225	1.5	1.9	713R11	Ra-226	2.15	0.52	pCi/g
CR1	RWPR-SS-006 (1.5-1.9)	10/8/2010	35.6658165	-108.504225	1.5	1.9	SW6020	URANIUM	1.9	11	mg/kg
CR1	RWPR-SS-002 (1.5-2)	10/6/2010	35.6661419	-108.503999	1.5	2	713R11	Ra-226	48.5 M3	1.2	pCi/g
CR1	RWPR-SS-004 (1.5-2)	10/6/2010	35.6660068	-108.504092	1.5	2	713R11	Ra-226	1.32	0.33	pCi/g
CR1	RWPR-SS-009 (1.5-2)	10/7/2010	35.6654374	-108.504225	1.5	2	713R11	Ra-226	0.56 LT	0.37	pCi/g
CR1	RWPR-SS-010 (1.5-2)	10/6/2010	35.6654388	-108.503963	1.5	2	713R11	Ra-226	2.62	0.35	pCi/g
CR1	RWPR-SS-011 (1.5-2)	10/7/2010	35.6652416	-108.504358	1.5	2	713R11	Ra-226	0.96 LT	0.48	pCi/g
CR1	RWPR-SS-012 (1.5-2)	10/7/2010	35.6652376	-108.504092	1.5	2	713R11	Ra-226	2.08	0.48	pCi/g
CR1	RWPR-SS-014 (1.5-2)	10/7/2010	35.6650555	-108.504222	1.5	2	713R11	Ra-226	7.18	0.56	pCi/g
CR1	RWPR-SS-014 (1.5-2) Dup	10/7/2010	35.6650555	-108.504222	1.5	2	713R11	Ra-226	6.69	0.6	pCi/g
CR1	RWPR-SS-019 (1.5-2)	10/7/2010	35.6646791	-108.504222	1.5	2	713R11	Ra-226	1.64	0.48	pCi/g
CR1	RWPR-SS-020 (1.5-2)	10/7/2010	35.6646778	-108.50396	1.5	2	713R11	Ra-226	7.7	0.7	pCi/g
CR1	RWPR-SS-021 (1.5-2)	10/6/2010	35.6644876	-108.504083	1.5	2	713R11	Ra-226	1.67 G	0.51	pCi/g
CR1	RWPR-SS-023 (1.5-2)	10/6/2010	35.6642878	-108.503953	1.5	2	713R11	Ra-226	1.44 G	0.5	pCi/g
CR1	RWPR-SS-211 (1.5-2)	10/7/2010	35.6652416	-108.504358	1.5	2	713R11	Ra-226	1.03	0.43	pCi/g
CR1	RWPR-SS-221 (1.5-2)	10/6/2010	35.6644876	-108.504083	1.5	2	713R11	Ra-226	1.65 G	0.49	pCi/g
CR1	RWPR-SS-002 (1.5-2)	10/6/2010	35.6661419	-108.503999	1.5	2	SW6020	URANIUM	61	10	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	RWPR-SS-004 (1.5-2)	10/6/2010	35.6660068	-108.504092	1.5	2	SW6020	URANIUM	2.1	10	mg/kg
CR1	RWPR-SS-009 (1.5-2)	10/7/2010	35.6654374	-108.504225	1.5	2	SW6020	URANIUM	0.82	10	mg/kg
CR1	RWPR-SS-010 (1.5-2)	10/6/2010	35.6654388	-108.503963	1.5	2	SW6020	URANIUM	5.9	10	mg/kg
CR1	RWPR-SS-011 (1.5-2)	10/7/2010	35.6652416	-108.504358	1.5	2	SW6020	URANIUM	0.97	10	mg/kg
CR1	RWPR-SS-012 (1.5-2)	10/7/2010	35.6652376	-108.504092	1.5	2	SW6020	URANIUM	2.6	10	mg/kg
CR1	RWPR-SS-014 (1.5-2)	10/7/2010	35.6650555	-108.504222	1.5	2	SW6020	URANIUM	9	10	mg/kg
CR1	RWPR-SS-019 (1.5-2)	10/7/2010	35.6646791	-108.504222	1.5	2	SW6020	URANIUM	1.3	10	mg/kg
CR1	RWPR-SS-020 (1.5-2)	10/7/2010	35.6646778	-108.50396	1.5	2	SW6020	URANIUM	5.8	11	mg/kg
CR1	RWPR-SS-021 (1.5-2)	10/6/2010	35.6644876	-108.504083	1.5	2	SW6020	URANIUM	2.2	11	mg/kg
CR1	RWPR-SS-023 (1.5-2)	10/6/2010	35.6642878	-108.503953	1.5	2	SW6020	URANIUM	1.1	11	mg/kg
CR1	RWPR-SS-211 (1.5-2)	10/7/2010	35.6652416	-108.504358	1.5	2	SW6020	URANIUM	0.96	10	mg/kg
CR1	RWPR-SS-221 (1.5-2)	10/6/2010	35.6644876	-108.504083	1.5	2	SW6020	URANIUM	3.5	11	mg/kg
CR1	RWPR-SS-003 (2-5)	10/8/2010	35.6660108	-108.504365	2	5	713R11	Ra-226	1.34 G	0.69	pCi/g
CR1	RWPR-SS-003 (2-5)	10/8/2010	35.6660108	-108.504365	2	5	SW6020	URANIUM	2.5	11	mg/kg
CR1	RWPR-SS-005 (2-6)	10/8/2010	35.6658177	-108.504495	2	6	713R11	Ra-226	1.72 G	0.72	pCi/g
CR1	RWPR-SS-019 (2-6)	10/8/2010	35.6646791	-108.504222	2	6	713R11	Ra-226	2.23 G	0.48	pCi/g
CR1	C1SS-026.2 (2-6)	12/15/2010	35.6641373	-108.503343	2	6	713R11	Ra-226	31.8	0.9	pCi/g
CR1	C1SS-026.2 (2-6) Dup	12/15/2010	35.6641373	-108.503343	2	6	713R11	Ra-226	28.4	0.9	pCi/g
CR1	C1SS-041.2 (2-6)	12/15/2010	35.6637671	-108.502242	2	6	713R11	Ra-226	1.55 G	0.43	pCi/g
CR1	C1SS-063A.2 (2-6)	12/15/2010	35.6638077	-108.500865	2	6	713R11	Ra-226	8.4 G	0.8	pCi/g
CR1	C1SS-069.2 (2-6)	12/15/2010	35.6664561	-108.500366	2	6	713R11	Ra-226	1.81	0.47	pCi/g
CR1	C1SS-082.2 (2-6)	12/15/2010	35.6629857	-108.499478	2	6	713R11	Ra-226	1.17 G	0.52	pCi/g
CR1	RWPR-SS-021 (2-6)	10/6/2010	35.6644876	-108.504083	2	6	713R11	Ra-226	1.19 G	0.55	pCi/g
CR1	RWPR-SS-221 (2-6)	10/6/2010	35.6644876	-108.504083	2	6	713R11	Ra-226	1.38 G	0.57	pCi/g
CR1	RWPR-SS-005 (2-6)	10/8/2010	35.6658177	-108.504495	2	6	SW6020	URANIUM	1.6	11	mg/kg
CR1	RWPR-SS-019 (2-6)	10/8/2010	35.6646791	-108.504222	2	6	SW6020	URANIUM	5	11	mg/kg
CR1	RWPR-SS-021 (2-6)	10/6/2010	35.6644876	-108.504083	2	6	SW6020	URANIUM	2.4	11	mg/kg
CR1	RWPR-SS-221 (2-6)	10/6/2010	35.6644876	-108.504083	2	6	SW6020	URANIUM	2.7	11	mg/kg
CR1	RWPR-SS-002 (2.5-3)	10/6/2010	35.6661419	-108.503999	2.5	3	713R11	Ra-226	17.3 G	1	pCi/g
CR1	RWPR-SS-004 (2.5-3)	10/6/2010	35.6660068	-108.504092	2.5	3	713R11	Ra-226	0.77 LT	0.49	pCi/g
CR1	RWPR-SS-009 (2.5-3)	10/7/2010	35.6654374	-108.504225	2.5	3	713R11	Ra-226	0.76 LT	0.45	pCi/g
CR1	RWPR-SS-010 (2.5-3)	10/6/2010	35.6654388	-108.503963	2.5	3	713R11	Ra-226	1.62	0.51	pCi/g
CR1	RWPR-SS-011 (2.5-3)	10/7/2010	35.6652416	-108.504358	2.5	3	713R11	Ra-226	0.63 LT	0.32	pCi/g
CR1	RWPR-SS-012 (2.5-3)	10/7/2010	35.6652376	-108.504092	2.5	3	713R11	Ra-226	1.12	0.49	pCi/g
CR1	RWPR-SS-019 (2.5-3)	10/7/2010	35.6646791	-108.504222	2.5	3	713R11	Ra-226	0.87 LT	0.42	pCi/g
CR1	RWPR-SS-020 (2.5-3)	10/7/2010	35.6646778	-108.50396	2.5	3	713R11	Ra-226	3.42	0.52	pCi/g
CR1	RWPR-SS-021 (2.5-3)	10/6/2010	35.6644876	-108.504083	2.5	3	713R11	Ra-226	1.33 G	0.4	pCi/g
CR1	RWPR-SS-023 (2.5-3)	10/6/2010	35.6642878	-108.503953	2.5	3	713R11	Ra-226	1.56	0.48	pCi/g
CR1	RWPR-SS-211 (2.5-3)	10/7/2010	35.6652416	-108.504358	2.5	3	713R11	Ra-226	0.75 LT	0.42	pCi/g
CR1	RWPR-SS-221 (2.5-3)	10/6/2010	35.6644876	-108.504083	2.5	3	713R11	Ra-226	1.57	0.57	pCi/g
CR1	RWPR-SS-002 (2.5-3)	10/6/2010	35.6661419	-108.503999	2.5	3	SW6020	URANIUM	39	11	mg/kg
CR1	RWPR-SS-004 (2.5-3)	10/6/2010	35.6660068	-108.504092	2.5	3	SW6020	URANIUM	1.3	10	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	RWPR-SS-009 (2.5-3)	10/7/2010	35.6654374	-108.504225	2.5	3	SW6020	URANIUM	0.6	11	mg/kg
CR1	RWPR-SS-010 (2.5-3)	10/6/2010	35.6654388	-108.503963	2.5	3	SW6020	URANIUM	2.4	10	mg/kg
CR1	RWPR-SS-011 (2.5-3)	10/7/2010	35.6652416	-108.504358	2.5	3	SW6020	URANIUM	0.68	10	mg/kg
CR1	RWPR-SS-012 (2.5-3)	10/7/2010	35.6652376	-108.504092	2.5	3	SW6020	URANIUM	2.2	10	mg/kg
CR1	RWPR-SS-019 (2.5-3)	10/7/2010	35.6646791	-108.504222	2.5	3	SW6020	URANIUM	1.2	10	mg/kg
CR1	RWPR-SS-020 (2.5-3)	10/7/2010	35.6646778	-108.50396	2.5	3	SW6020	URANIUM	5.3	10	mg/kg
CR1	RWPR-SS-021 (2.5-3)	10/6/2010	35.6644876	-108.504083	2.5	3	SW6020	URANIUM	3	11	mg/kg
CR1	RWPR-SS-023 (2.5-3)	10/6/2010	35.6642878	-108.503953	2.5	3	SW6020	URANIUM	1.2	11	mg/kg
CR1	RWPR-SS-211 (2.5-3)	10/7/2010	35.6652416	-108.504358	2.5	3	SW6020	URANIUM	0.63	10	mg/kg
CR1	RWPR-SS-221 (2.5-3)	10/6/2010	35.6644876	-108.504083	2.5	3	SW6020	URANIUM	3	11	mg/kg
CR1	C1LW-002.2 (6-12)	12/16/2010	35.6661835	-108.503942	6	12	713R11	Ra-226	1.36	0.41	pCi/g
CR1	C1SS-041.3 (6-12)	12/15/2010	35.6637671	-108.502242	6	12	713R11	Ra-226	2.05	0.41	pCi/g
CR1	C1LI-047.2 (8-14)	12/14/2010	35.6665979	-108.501549	8	14	713R11	Ra-226	7.7	0.5	pCi/g
CR1	C1LI-047.2 (8-14) Dup	12/14/2010	35.6665979	-108.501549	8	14	713R11	Ra-226	8.4	0.6	pCi/g
CR1	C1LW-083.2 (8-14)	12/14/2010	35.6654455	-108.501778	8	14	713R11	Ra-226	1.4	0.37	pCi/g
CR1	C1LI-058.2 (9-15)	12/14/2010	35.6660344	-108.500605	9	15	713R11	Ra-226	3.51	0.39	pCi/g
CR1	C1LI-068.2 (10-16)	12/13/2010	35.666229	-108.500202	10	16	713R11	Ra-226	1.71	0.47	pCi/g
CR1	C1LP-019.2 (12-18)	12/15/2010	35.6645068	-108.501124	12	18	713R11	Ra-226	1.15	0.37	pCi/g
CR1	C1LW-022.2 (12-18)	12/15/2010	35.6644948	-108.503278	12	18	713R11	Ra-226	49.5 M3	1.1	pCi/g
CR1	C1LW-022.2 (12-18) Dup	12/15/2010	35.6644948	-108.503278	12	18	713R11	Ra-226	55.3 M3	1.2	pCi/g
CR1	C1LW-041.2 (12-18)	12/15/2010	35.6654339	-108.502875	12	18	713R11	Ra-226	329 M3	3	pCi/g
CR1	C1LW-041.2 (12-18) Dup	12/15/2010	35.6654339	-108.502875	12	18	713R11	Ra-226	324 M3	3	pCi/g
CR1	C1LW-048.2 (12-18)	12/14/2010	35.6660088	-108.502742	12	18	713R11	Ra-226	128 M3,G	2	pCi/g
CR1	C1SS-026.3 (12-18)	12/15/2010	35.6641373	-108.503343	12	18	713R11	Ra-226	7.3	0.66	pCi/g
CR1	C1SS-063A.3 (12-18)	12/15/2010	35.6638077	-108.500865	12	18	713R11	Ra-226	1.6	0.38	pCi/g
CR1	C1LI-078.2 (14-20)	12/14/2010	35.6660362	-108.49979	14	20	713R11	Ra-226	2.72 G	0.64	pCi/g
CR1	C1LW-104.2 (14-20)	12/14/2010	35.6656499	-108.500588	14	20	713R11	Ra-226	1.31	0.4	pCi/g
CR1	C1LP-037.2 (16-22)	12/13/2010	35.6645002	-108.500323	16	22	713R11	Ra-226	2.11	0.37	pCi/g
CR1	C1LP-037.2 (16-22) Dup	12/13/2010	35.6645002	-108.500323	16	22	713R11	Ra-226	1.96	0.45	pCi/g
CR1	C1LI-005.2 (18-24)	12/14/2010	35.6663944	-108.503553	18	24	713R11	Ra-226	1.9	0.44	pCi/g
CR1	C1LI-016.2 (18-24)	12/14/2010	35.6667753	-108.502749	18	24	713R11	Ra-226	5.23	0.57	pCi/g
CR1	C1LI-026.2 (18-24)	12/14/2010	35.6669753	-108.50235	18	24	713R11	Ra-226	4.71	0.4	pCi/g
CR1	C1LI-037.2 (18-24)	12/14/2010	35.6667797	-108.501957	18	24	713R11	Ra-226	3.89	0.49	pCi/g
CR1	C1LI-085.2 (18-24)	12/13/2010	35.6652767	-108.499514	18	24	713R11	Ra-226	1.59 G	0.5	pCi/g
CR1	C1LI-091.2 (18-24)	12/13/2010	35.665467	-108.499381	18	24	713R11	Ra-226	1.48 G	0.51	pCi/g
CR1	C1LI-099.2 (18-24)	12/13/2010	35.6664237	-108.499261	18	24	713R11	Ra-226	1.31	0.53	pCi/g
CR1	C1LI-099.4 Dup	12/13/2010	35.6664237	-108.499261	18	24	713R11	Ra-226	1.48	0.36	pCi/g
CR1	C1LI-107.2 (18-24)	12/14/2010	35.6670014	-108.499118	18	24	713R11	Ra-226	1.31 G	0.56	pCi/g
CR1	C1LI-107.4 Dup	12/14/2010	35.6670014	-108.499118	18	24	713R11	Ra-226	1.19 G	0.59	pCi/g
CR1	C1LI-107.4 Dup2	12/14/2010	35.6670014	-108.499118	18	24	713R11	Ra-226	0.81 LT,G	0.57	pCi/g
CR1	C1LI-110.2 (18-24)	12/14/2010	35.6660517	-108.498975	18	24	713R11	Ra-226	1.17	0.48	pCi/g
CR1	C1LI-110.2 (18-24) Dup	12/14/2010	35.6660517	-108.498975	18	24	713R11	Ra-226	0.97 LT	0.39	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	C1LI-120.2 (18-24)	12/13/2010	35.6652921	-108.49871	18	24	713R11	Ra-226	1.38 G	0.55	pCi/g
CR1	C1LI-127.2 (18-24)	12/14/2010	35.6658533	-108.498576	18	24	713R11	Ra-226	2.12	0.43	pCi/g
CR1	C1LI-131.2 (18-24)	12/13/2010	35.6652826	-108.49844	18	24	713R11	Ra-226	0.9 LT	0.39	pCi/g
CR1	C1LI-140.2 (18-24)	12/13/2010	35.66566	-108.498258	18	24	713R11	Ra-226	1.37	0.48	pCi/g
CR1	C1LI-141.2 (18-24)	12/14/2010	35.6660451	-108.498177	18	24	713R11	Ra-226	1.86 G	0.58	pCi/g
CR1	C1LP-004.2 (18-24)	12/13/2010	35.664119	-108.502188	18	24	713R11	Ra-226	62.6 M3,G	1.3	pCi/g
CR1	C1LP-009.2 (18-24)	12/13/2010	35.6639221	-108.501523	18	24	713R11	Ra-226	13.5	0.7	pCi/g
CR1	C1LP-015.2 (18-24)	12/13/2010	35.6639346	-108.501254	18	24	713R11	Ra-226	7.45	0.51	pCi/g
CR1	C1LP-020.2 (18-24)	12/13/2010	35.6639251	-108.500984	18	24	713R11	Ra-226	29.9	0.7	pCi/g
CR1	C1LP-026.2 (18-24)	12/13/2010	35.6643085	-108.500718	18	24	713R11	Ra-226	22.5	0.8	pCi/g
CR1	C1LP-031.2 (18-24)	12/13/2010	35.6648889	-108.500588	18	24	713R11	Ra-226	3.05	0.5	pCi/g
CR1	C1LP-042.2 (18-24)	12/13/2010	35.6646878	-108.500183	18	24	713R11	Ra-226	2.02	0.4	pCi/g
CR1	C1LP-048.2 (18-24)	12/13/2010	35.6639283	-108.49991	18	24	713R11	Ra-226	1.74 G	0.45	pCi/g
CR1	C1LP-052.2 (18-24)	12/13/2010	35.6637533	-108.499771	18	24	713R11	Ra-226	1.54	0.46	pCi/g
CR1	C1LP-053.2 (18-24)	12/13/2010	35.6641186	-108.499777	18	24	713R11	Ra-226	1.99 G	0.42	pCi/g
CR1	C1LP-053.4 Dup	12/13/2010	35.6641186	-108.499777	18	24	713R11	Ra-226	1.32	0.43	pCi/g
CR1	C1LP-059.2 (18-24)	12/13/2010	35.6646908	-108.499647	18	24	713R11	Ra-226	2.04 G	0.56	pCi/g
CR1	C1LP-064.2 (18-24)	12/13/2010	35.6648619	-108.499507	18	24	713R11	Ra-226	1.37	0.35	pCi/g
CR1	C1LP-070.2 (18-24)	12/13/2010	35.6641079	-108.499235	18	24	713R11	Ra-226	1.9	0.37	pCi/g
CR1	C1LP-075.2 (18-24)	12/13/2010	35.6646828	-108.499105	18	24	713R11	Ra-226	1.74 G	0.47	pCi/g
CR1	C1LP-081.2 (18-24)	12/13/2010	35.6643108	-108.498819	18	24	713R11	Ra-226	1.17	0.38	pCi/g
CR1	C1LW-013.2 (18-24)	12/14/2010	35.6652515	-108.503557	18	24	713R11	Ra-226	31.1	0.9	pCi/g
CR1	C1LW-020.2 (18-24)	12/14/2010	35.6658232	-108.503512	18	24	713R11	Ra-226	99 M3,G	2	pCi/g
CR1	C1LW-034.2 (18-24)	12/14/2010	35.6648644	-108.503012	18	24	713R11	Ra-226	154 M3,G	1	pCi/g
CR1	C1LW-050.2 (18-24)	12/14/2010	35.66468	-108.502583	18	24	713R11	Ra-226	75.6 M3,G	1.5	pCi/g
CR1	C1LW-062.2 (18-24)	12/14/2010	35.6650605	-108.502334	18	24	713R11	Ra-226	37.7 G	0.8	pCi/g
CR1	C1LW-067.2 (18-24)	12/14/2010	35.6648745	-108.502187	18	24	713R11	Ra-226	104	1	pCi/g
CR1	C1LW-067.2 (18-24) Dup	12/14/2010	35.6648745	-108.502187	18	24	713R11	Ra-226	102 M3	2	pCi/g
CR1	C1LW-069.2 (18-24)	12/14/2010	35.6656327	-108.502204	18	24	713R11	Ra-226	38.8	1	pCi/g
CR1	C1LW-090.2 (18-24)	12/14/2010	35.6656427	-108.501392	18	24	713R11	Ra-226	67.8 M3	1.1	pCi/g
CR1	C1LW-090.4 Dup	12/14/2010	35.6656427	-108.501392	18	24	713R11	Ra-226	76.4 M3	1.2	pCi/g
CR1	C1LW-097.2 (18-24)	12/14/2010	35.6654554	-108.500987	18	24	713R11	Ra-226	1.82	0.43	pCi/g
CR1	C1SS-082.3 (18-24)	12/15/2010	35.6629857	-108.499478	18	24	713R11	Ra-226	0.93 LT	0.42	pCi/g
CR1	C1LI-500 SS2 1.5-3	5/3/2011	35.6668364	-108.502316	18	36	713R11	Ra-226	1.03	0.51	pCi/g
CR1	C1LI-501 SS2 1.5-3	5/3/2011	35.6665962	-108.502944	18	36	713R11	Ra-226	14.3	0.5	pCi/g
CR1	C1LP-400 SS2 1.5-3	4/25/2011	35.6645408	-108.501319	18	36	713R11	Ra-226	28.7	1	pCi/g
CR1	C1LP-400 SS2 1.5-3 Dup	4/25/2011	35.6645408	-108.501319	18	36	713R11	Ra-226	31.3	0.8	pCi/g
CR1	C1LP-401 SS2 1.5-3	4/25/2011	35.6640736	-108.501375	18	36	713R11	Ra-226	18.5 G	0.8	pCi/g
CR1	C1LP-402 SS2 1.5-3	4/29/2011	35.6646723	-108.5003	18	36	713R11	Ra-226	1.98	0.56	pCi/g
CR1	C1LP-403 SS2 1.5-3	4/29/2011	35.6640345	-108.500584	18	36	713R11	Ra-226	24.3 G	0.7	pCi/g
CR1	C1LP-403 SS2 1.5-3 Dup	4/29/2011	35.6640345	-108.500584	18	36	713R11	Ra-226	27.6 G	0.8	pCi/g
CR1	C1LP-404 SS2 1.5-3	5/1/2011	35.664222	-108.499825	18	36	713R11	Ra-226	1.54 G	0.65	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	C1LP-404 SS2 1.5-3 Dup	5/1/2011	35.664222	-108.499825	18	36	713R11	Ra-226	1.78	0.43	pCi/g
CR1	C1LP-405 SS2 1.5-3	5/1/2011	35.6640588	-108.499182	18	36	713R11	Ra-226	1.57	0.38	pCi/g
CR1	C1LP-406 SS2 1.5-3	5/1/2011	35.6654968	-108.499143	18	36	713R11	Ra-226	1.54 G	0.44	pCi/g
CR1	C1LP-407 SS2 1.5-3	5/2/2011	35.6658597	-108.498441	18	36	713R11	Ra-226	3.44 G	0.5	pCi/g
CR1	C1LP-408 SS2 1.5-3	5/2/2011	35.6661682	-108.498101	18	36	713R11	Ra-226	4.46 G	0.53	pCi/g
CR1	C1LP-700 SS2 1.5-3	4/30/2011	35.663741	-108.500407	18	36	713R11	Ra-226	4.8	0.49	pCi/g
CR1	C1LP-700 SS2 1.5-3 Dup	4/30/2011	35.663741	-108.500407	18	36	713R11	Ra-226	5.09	0.49	pCi/g
CR1	C1LP-701 SS2 1.5-3	4/30/2011	35.6635129	-108.500075	18	36	713R11	Ra-226	3.14 G	0.48	pCi/g
CR1	C1LP-702 SS2 1.5-3	4/30/2011	35.6633178	-108.499525	18	36	713R11	Ra-226	1.38 G	0.59	pCi/g
CR1	C1LP-703 SS2 1.5-3	4/30/2011	35.6650352	-108.499164	18	36	713R11	Ra-226	1.14 G	0.58	pCi/g
CR1	C1LI-005.3 (30-36)	12/14/2010	35.6663944	-108.503553	30	36	713R11	Ra-226	1.63	0.48	pCi/g
CR1	C1LI-016.3 (30-36)	12/14/2010	35.6667753	-108.502749	30	36	713R11	Ra-226	2.88	0.39	pCi/g
CR1	C1LI-026.3 (30-36)	12/14/2010	35.6669753	-108.50235	30	36	713R11	Ra-226	1.98	0.55	pCi/g
CR1	C1LI-037.3 (30-36)	12/14/2010	35.6667797	-108.501957	30	36	713R11	Ra-226	4.71	0.57	pCi/g
CR1	C1LI-037.4 Dup	12/14/2010	35.6667797	-108.501957	30	36	713R11	Ra-226	5.36	0.48	pCi/g
CR1	C1LI-085.3 (30-36)	12/13/2010	35.6652767	-108.499514	30	36	713R11	Ra-226	1.47	0.52	pCi/g
CR1	C1LI-091.3 (30-36)	12/13/2010	35.665467	-108.499381	30	36	713R11	Ra-226	1.6 G	0.63	pCi/g
CR1	C1LI-099.3 (30-36)	12/13/2010	35.6664237	-108.499261	30	36	713R11	Ra-226	1.1	0.42	pCi/g
CR1	C1LI-107.3 (30-36)	12/14/2010	35.6670014	-108.499118	30	36	713R11	Ra-226	1.14 G	0.58	pCi/g
CR1	C1LI-110.3 (30-36)	12/14/2010	35.6660517	-108.498975	30	36	713R11	Ra-226	0.84 LT	0.35	pCi/g
CR1	C1LI-120.3 (30-36)	12/13/2010	35.6652921	-108.49871	30	36	713R11	Ra-226	1.33 G	0.48	pCi/g
CR1	C1LI-127.3 (30-36)	12/14/2010	35.6658533	-108.498576	30	36	713R11	Ra-226	2.6	0.48	pCi/g
CR1	C1LI-131.3 (30-36)	12/13/2010	35.6652826	-108.49844	30	36	713R11	Ra-226	0.89 LT	0.43	pCi/g
CR1	C1LI-140.3 (30-36)	12/13/2010	35.66566	-108.498258	30	36	713R11	Ra-226	1.33	0.39	pCi/g
CR1	C1LI-141.3 (30-36)	12/14/2010	35.6660451	-108.498177	30	36	713R11	Ra-226	1.64	0.5	pCi/g
CR1	C1LP-004.3 (30-36)	12/13/2010	35.664119	-108.502188	30	36	713R11	Ra-226	45.5 M3	1.1	pCi/g
CR1	C1LP-009.3 (30-36)	12/13/2010	35.6639221	-108.501523	30	36	713R11	Ra-226	6.89	0.52	pCi/g
CR1	C1LP-015.3 (30-36)	12/13/2010	35.6639346	-108.501254	30	36	713R11	Ra-226	4.62	0.43	pCi/g
CR1	C1LP-020.3 (30-36)	12/13/2010	35.6639251	-108.500984	30	36	713R11	Ra-226	29.2	0.7	pCi/g
CR1	C1LP-026.3 (30-36)	12/13/2010	35.6643085	-108.500718	30	36	713R11	Ra-226	26.5	0.7	pCi/g
CR1	C1LP-031.3 (30-36)	12/13/2010	35.6648889	-108.500588	30	36	713R11	Ra-226	2.14	0.4	pCi/g
CR1	C1LP-042.3 (30-36)	12/13/2010	35.6646878	-108.500183	30	36	713R11	Ra-226	1.65 G	0.41	pCi/g
CR1	C1LP-048.3 (30-36)	12/13/2010	35.6639283	-108.49991	30	36	713R11	Ra-226	1.31	0.44	pCi/g
CR1	C1LP-052.3 (30-36)	12/13/2010	35.6637533	-108.499771	30	36	713R11	Ra-226	1.81	0.57	pCi/g
CR1	C1LP-053.3 (30-36)	12/13/2010	35.6641186	-108.499777	30	36	713R11	Ra-226	2.14	0.57	pCi/g
CR1	C1LP-059.3 (30-36)	12/13/2010	35.6646908	-108.499647	30	36	713R11	Ra-226	2.1 G	0.58	pCi/g
CR1	C1LP-064.3 (30-36)	12/13/2010	35.6648619	-108.499507	30	36	713R11	Ra-226	1.3 G	0.49	pCi/g
CR1	C1LP-070.3 (30-36)	12/13/2010	35.6641079	-108.499235	30	36	713R11	Ra-226	6.83	0.59	pCi/g
CR1	C1LP-075.3 (30-36)	12/13/2010	35.6646828	-108.499105	30	36	713R11	Ra-226	1.48 G	0.49	pCi/g
CR1	C1LP-075.4 Dup	12/13/2010	35.6646828	-108.499105	30	36	713R11	Ra-226	1.69	0.47	pCi/g
CR1	C1LP-081.3 (30-36)	12/13/2010	35.6643108	-108.498819	30	36	713R11	Ra-226	1.04	0.44	pCi/g
CR1	C1LW-013.3 (30-36)	12/14/2010	35.6652515	-108.503557	30	36	713R11	Ra-226	38.6	0.8	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	C1LW-013.4	12/14/2010	35.6652515	-108.503557	30	36	713R11	Ra-226	38.7	0.9	pCi/g
CR1	C1LW-013.4 Dup	12/14/2010	35.6652515	-108.503557	30	36	713R11	Ra-226	37.5	0.7	pCi/g
CR1	C1LW-020.3 (30-36)	12/14/2010	35.6658232	-108.503512	30	36	713R11	Ra-226	189 M3,G	2	pCi/g
CR1	C1LW-034.3 (30-36)	12/14/2010	35.6648644	-108.503012	30	36	713R11	Ra-226	82 M3,G	1.4	pCi/g
CR1	C1LW-050.3 (30-36)	12/14/2010	35.66468	-108.502583	30	36	713R11	Ra-226	60.6 M3	1.2	pCi/g
CR1	C1LW-062.3 (30-36)	12/14/2010	35.6650605	-108.502334	30	36	713R11	Ra-226	48.8 G	0.9	pCi/g
CR1	C1LW-067.3 (30-36)	12/14/2010	35.6648745	-108.502187	30	36	713R11	Ra-226	99 M3,G	1	pCi/g
CR1	C1LW-067.4	12/14/2010	35.6648745	-108.502187	30	36	713R11	Ra-226	98 M3,G	2	pCi/g
CR1	C1LW-067.4 Dup	12/14/2010	35.6648745	-108.502187	30	36	713R11	Ra-226	97 M3	1	pCi/g
CR1	C1LW-069.3 (30-36)	12/14/2010	35.6656327	-108.502204	30	36	713R11	Ra-226	67.4 M3	1.2	pCi/g
CR1	C1LW-090.3 (30-36)	12/14/2010	35.6656427	-108.501392	30	36	713R11	Ra-226	56.9	0.9	pCi/g
CR1	C1LW-097.3 (30-36)	12/14/2010	35.6654554	-108.500987	30	36	713R11	Ra-226	2.25	0.42	pCi/g
CR1	C1LI-500 SS3 3-4.5	5/3/2011	35.6668364	-108.502316	36	54	713R11	Ra-226	1.62 G	0.62	pCi/g
CR1	C1LI-501 DUP 501	5/3/2011	35.6665962	-108.502944	36	54	713R11	Ra-226	1.07	0.32	pCi/g
CR1	C1LI-501 SS3 3-4.5	5/3/2011	35.6665962	-108.502944	36	54	713R11	Ra-226	1.14	0.4	pCi/g
CR1	C1LP-400 SS3 3-4.5	4/25/2011	35.6645408	-108.501319	36	54	713R11	Ra-226	2.4	0.54	pCi/g
CR1	C1LP-401 SS3 3-4.5	4/25/2011	35.6640736	-108.501375	36	54	713R11	Ra-226	30.7 G	0.9	pCi/g
CR1	C1LP-402 SS3 3-4.5	4/29/2011	35.6646723	-108.5003	36	54	713R11	Ra-226	3.15 G	0.44	pCi/g
CR1	C1LP-402 SS3 3-4.5 Dup	4/29/2011	35.6646723	-108.5003	36	54	713R11	Ra-226	3.29	0.43	pCi/g
CR1	C1LP-403 SS3 3-4.5	4/29/2011	35.6640345	-108.500584	36	54	713R11	Ra-226	16 G	0.8	pCi/g
CR1	C1LP-404 SS3 3-4.5	5/1/2011	35.664222	-108.499825	36	54	713R11	Ra-226	2.92	0.4	pCi/g
CR1	C1LP-405 SS3 3-4.5	5/1/2011	35.6640588	-108.499182	36	54	713R11	Ra-226	1.35 G	0.47	pCi/g
CR1	C1LP-406 SS3 3-4.5	5/1/2011	35.6654968	-108.499143	36	54	713R11	Ra-226	1.62 G	0.49	pCi/g
CR1	C1LP-407 SS3 3-4.5	5/2/2011	35.6658597	-108.498441	36	54	713R11	Ra-226	5.74	0.44	pCi/g
CR1	C1LP-408 SS3 3-4.5	5/2/2011	35.6661682	-108.498101	36	54	713R11	Ra-226	5.54 G	0.54	pCi/g
CR1	C1LP-700 SS3 3-4.5	4/30/2011	35.663741	-108.500407	36	54	713R11	Ra-226	39.1 G	0.9	pCi/g
CR1	C1LP-701 SS3 3-4.5	4/30/2011	35.6635129	-108.500075	36	54	713R11	Ra-226	3.94 G	0.52	pCi/g
CR1	C1LP-702 SS3 3-4.5	4/30/2011	35.6633178	-108.499525	36	54	713R11	Ra-226	1.2	0.43	pCi/g
CR1	C1LP-703 SS3 3-4.5	4/30/2011	35.6650352	-108.499164	36	54	713R11	Ra-226	1.13 G	0.5	pCi/g
CR1	C1LP-703 SS3 3-4.5 Dup	4/30/2011	35.6650352	-108.499164	36	54	713R11	Ra-226	1.13	0.41	pCi/g
CR1	C1LP-020.4 (48-54)	12/13/2010	35.6639251	-108.500984	48	54	713R11	Ra-226	29.1	0.9	pCi/g
CR1	C1LP-020.4 (48-54) Dup	12/13/2010	35.6639251	-108.500984	48	54	713R11	Ra-226	30	1	pCi/g
CR1	C1LI-501 SS10	5/3/2011	35.6665962	-108.502944	54	72	SW6010	ARSENIC	3.6	1.1	mg/kg
CR1	C1LI-501 SS4 4.5-6	5/3/2011	35.6665962	-108.502944	54	72	SW6010	ARSENIC	3.4	1	mg/kg
CR1	C1LI-501 SS10	5/3/2011	35.6665962	-108.502944	54	72	SW6010	MOLYBDENUM	1.1 U	1.1	mg/kg
CR1	C1LI-501 SS4 4.5-6	5/3/2011	35.6665962	-108.502944	54	72	SW6010	MOLYBDENUM	1 U	1	mg/kg
CR1	C1-1B008-5 (FD)	7/17/2015	35.6646504	-108.49905	54	72	Unknown	Ra-226	9.6	Unknown	pCi/g
CR1	C1-B001-5	7/13/2015	35.6660711	-108.503664	54	72	Unknown	Ra-226	0.868	Unknown	pCi/g
CR1	C1-B003-5	7/14/2015	35.6659976	-108.502431	54	72	Unknown	Ra-226	2.86	Unknown	pCi/g
CR1	C1-B006-5	7/17/2015	35.6648266	-108.50078	54	72	Unknown	Ra-226	0.59	Unknown	pCi/g
CR1	C1-B007-5	7/17/2015	35.6643482	-108.5006	54	72	Unknown	Ra-226	16.3	Unknown	pCi/g
CR1	C1-B008-5	7/17/2015	35.6646504	-108.49905	54	72	Unknown	Ra-226	1.9	Unknown	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1	C1LI-500 SS4 4.5-6	5/3/2011	35.6668364	-108.502316	54	72	713R11	Ra-226	2.09 G	0.43	pCi/g
CR1	C1LI-501 SS4 4.5-6	5/3/2011	35.6665962	-108.502944	54	72	713R11	Ra-226	0.67 LT	0.41	pCi/g
CR1	C1LP-400 SS4 4.5-6	4/25/2011	35.6645408	-108.501319	54	72	713R11	Ra-226	2.04	0.58	pCi/g
CR1	C1LP-401 SS4 4.5-6	4/25/2011	35.6640736	-108.501375	54	72	713R11	Ra-226	468 M3,G	3	pCi/g
CR1	C1LP-402 DUP 402	4/29/2011	35.6646723	-108.5003	54	72	713R11	Ra-226	14.9 G	0.5	pCi/g
CR1	C1LP-402 SS4 4.5-6	4/29/2011	35.6646723	-108.5003	54	72	713R11	Ra-226	16.2	0.6	pCi/g
CR1	C1LP-403 SS4 4.5-6	4/29/2011	35.6640345	-108.500584	54	72	713R11	Ra-226	59.8 M3,G	1.1	pCi/g
CR1	C1LP-404 SS4 4.5-6	5/1/2011	35.664222	-108.499825	54	72	713R11	Ra-226	1.84 G	0.58	pCi/g
CR1	C1LP-404 SS4 4.5-6 Dup	5/1/2011	35.664222	-108.499825	54	72	713R11	Ra-226	2.08 G	0.46	pCi/g
CR1	C1LP-405 SS4 4.5-6	5/1/2011	35.6640588	-108.499182	54	72	713R11	Ra-226	1.44 G	0.63	pCi/g
CR1	C1LP-406 SS4 4.5-6	5/1/2011	35.6654968	-108.499143	54	72	713R11	Ra-226	1.68 G	0.45	pCi/g
CR1	C1LP-407 DUP 407	5/2/2011	35.6658597	-108.498441	54	72	713R11	Ra-226	5.89	0.61	pCi/g
CR1	C1LP-407 SS4 4.5-6	5/2/2011	35.6658597	-108.498441	54	72	713R11	Ra-226	5.52	0.57	pCi/g
CR1	C1LP-408 SS4 4.5-6	5/2/2011	35.6661682	-108.498101	54	72	713R11	Ra-226	6.72 G	0.64	pCi/g
CR1	C1LP-408 SS4 4.5-6 Dup	5/2/2011	35.6661682	-108.498101	54	72	713R11	Ra-226	6.6 G	0.73	pCi/g
CR1	C1LP-700 SS4 4.5-6	4/30/2011	35.663741	-108.500407	54	72	713R11	Ra-226	34.8 M3	1	pCi/g
CR1	C1LP-701 SS4 4.5-6	4/30/2011	35.6635129	-108.500075	54	72	713R11	Ra-226	3.07 G	0.57	pCi/g
CR1	C1LP-702 SS4 4.5-6	4/30/2011	35.6633178	-108.499525	54	72	713R11	Ra-226	1.54 G	0.46	pCi/g
CR1	C1LP-703 SS4 4.5-6	4/30/2011	35.6650352	-108.499164	54	72	713R11	Ra-226	1.2 G	0.54	pCi/g
CR1	C1LI-501 SS10	5/3/2011	35.6665962	-108.502944	54	72	SW6010	SELENIUM	0.53 U	0.53	mg/kg
CR1	C1LI-501 SS4 4.5-6	5/3/2011	35.6665962	-108.502944	54	72	SW6010	SELENIUM	0.52 U	0.52	mg/kg
CR1	C1LI-501 SS10	5/3/2011	35.6665962	-108.502944	54	72	SW6010	VANADIUM	11	1.1	mg/kg
CR1	C1LI-501 SS4 4.5-6	5/3/2011	35.6665962	-108.502944	54	72	SW6010	VANADIUM	9.5	1	mg/kg
CR1E	CELA-001 (0-2)	5/6/2011	35.6649477	-108.490897	0	2	713R11	Ra-226	1.83 G	0.53	pCi/g
CR1E	CELA-001A.1 (0-2")	12/15/2010	35.6649422	-108.490893	0	2	713R11	Ra-226	1.6	0.54	pCi/g
CR1E	CELA-004.1 (0-2")	12/15/2010	35.6645728	-108.490624	0	2	713R11	Ra-226	2.46	0.49	pCi/g
CR1E	CELA-008.1 (0-2")	12/15/2010	35.6647603	-108.490491	0	2	713R11	Ra-226	1.31	0.49	pCi/g
CR1E	CELA-012.1 (0-2")	12/15/2010	35.6662795	-108.490503	0	2	713R11	Ra-226	2.24 G	0.53	pCi/g
CR1E	CELA-016.1 (0-2")	12/15/2010	35.6660879	-108.490371	0	2	713R11	Ra-226	4.93	0.63	pCi/g
CR1E	CELA-020.1 (0-2")	12/15/2010	35.6655228	-108.490225	0	2	713R11	Ra-226	1.69	0.45	pCi/g
CR1E	CELA-024.1 (0-2")	12/15/2010	35.6653285	-108.490085	0	2	713R11	Ra-226	1.26	0.59	pCi/g
CR1E	CELA-027.1 (0-2")	12/15/2010	35.6664685	-108.490101	0	2	713R11	Ra-226	2.24	0.41	pCi/g
CR1E	CELA-031.1 (0-2")	12/15/2010	35.6662824	-108.489968	0	2	713R11	Ra-226	2.34	0.43	pCi/g
CR1E	CELA-035.1 (0-2")	12/15/2010	35.6660909	-108.489832	0	2	713R11	Ra-226	1.96	0.66	pCi/g
CR1E	CELA-039.1 (0-2")	12/15/2010	35.6662839	-108.489699	0	2	713R11	Ra-226	2.21	0.38	pCi/g
CR1E	CELA-043.1 (0-2")	12/15/2010	35.6664715	-108.489566	0	2	713R11	Ra-226	5 G	0.57	pCi/g
CR1E	CELA-047.1 (0-2")	12/15/2010	35.6666673	-108.489429	0	2	713R11	Ra-226	2.62 G	0.42	pCi/g
CR1E	CELA-051.1 (0-2")	12/15/2010	35.6659187	-108.489157	0	2	713R11	Ra-226	3.17 G	0.49	pCi/g
CR1E	CELA-054.1 (0-2")	12/15/2010	35.6661008	-108.489024	0	2	713R11	Ra-226	1.64	0.47	pCi/g
CR1E	CELA-058.1 (0-2")	12/15/2010	35.6666674	-108.488891	0	2	713R11	Ra-226	37.8 G	1	pCi/g
CR1E	CELA-062.1 (0-2")	12/15/2010	35.6662953	-108.488622	0	2	713R11	Ra-226	3.73 G	0.55	pCi/g
CR1E	CELA-062.1 (0-2") Dup	12/15/2010	35.6662953	-108.488622	0	2	713R11	Ra-226	3.87 G	0.48	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CELA-062.2	12/15/2010	35.6662953	-108.488622	0	2	713R11	Ra-226	3.79 G	0.44	pCi/g
CR1E	CELA-066.1 (0-2")	12/15/2010	35.6668592	-108.488485	0	2	713R11	Ra-226	2.16	0.47	pCi/g
CR1E	CELA-066.1 (0-2") Dup	12/15/2010	35.6668592	-108.488485	0	2	713R11	Ra-226	1.68	0.46	pCi/g
CR1E	CELA-070.1 (0-2")	12/15/2010	35.6668607	-108.488216	0	2	713R11	Ra-226	4.25 G	0.88	pCi/g
CR1E	CELA-070.2	12/15/2010	35.6668607	-108.488216	0	2	713R11	Ra-226	7.7 G	0.6	pCi/g
CR1E	CELA-074.1 (0-2")	12/15/2010	35.667244	-108.487956	0	2	713R11	Ra-226	5.95 G	0.56	pCi/g
CR1E	CESS-037.1 (0-2)	12/15/2010	35.6650409	-108.489423	0	2	713R11	Ra-226	2.24	0.45	pCi/g
CR1E	CESS-041.1 (0-2)	12/15/2010	35.6654512	-108.489254	0	2	713R11	Ra-226	8.5 G	0.9	pCi/g
CR1E	CESS-041.2	12/15/2010	35.6654512	-108.489254	0	2	713R11	Ra-226	8.1 G	0.8	pCi/g
CR1E	CESS-060.1 (0-2)	12/15/2010	35.6664792	-108.488135	0	2	713R11	Ra-226	2.41	0.39	pCi/g
CR1E	CESS-069.1 (0-2)	12/15/2010	35.6672442	-108.487414	0	2	713R11	Ra-226	1.34	0.44	pCi/g
CR1E	CESS-070.1 (0-2)	12/15/2010	35.6640557	-108.490229	0	2	713R11	Ra-226	1.6	0.37	pCi/g
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	ALUMINUM	6000	15	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	ALUMINUM	4700	15	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	ALUMINUM	4700	15	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	ALUMINUM	4800	17	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	ALUMINUM	5300	15	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	ALUMINUM	8000	15	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	ALUMINUM	8400	16	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	ALUMINUM	7400	15	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	ALUMINUM	7600	15	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	ALUMINUM	5100	17	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	ALUMINUM	4600	15	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	ALUMINUM	4600	15	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	ALUMINUM	4000	15	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	ALUMINUM	4600	15	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	ALUMINUM	4800	15	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	ALUMINUM	4500	15	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	ALUMINUM	4800	16	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	ANTIMONY	0.051 J	0.1	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	ANTIMONY	0.039 J	0.1	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	ANTIMONY	0.069 J	0.1	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	ANTIMONY	0.056 J	0.11	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	ANTIMONY	0.1	0.1	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	ANTIMONY	0.055 J	0.1	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	ANTIMONY	0.058 J	0.1	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	ANTIMONY	0.085 J	0.1	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	ANTIMONY	0.23	0.1	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	ANTIMONY	0.1 J	0.11	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	ANTIMONY	0.11	0.1	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	ANTIMONY	0.13	0.1	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	ANTIMONY	0.064 J	0.1	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	ANTIMONY	0.097 J	0.1	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	ANTIMONY	0.091 J	0.1	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	ANTIMONY	0.031 UJ	0.1	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	ANTIMONY	0.038 J	0.1	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	ARSENIC	6.1	0.2	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	ARSENIC	4.5	0.2	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	ARSENIC	3.9	0.2	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	ARSENIC	4.1	0.23	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	ARSENIC	4	0.2	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	ARSENIC	8	0.2	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	ARSENIC	10	0.21	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	ARSENIC	6.5	0.2	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	ARSENIC	8.7	0.2	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	ARSENIC	5.7	0.22	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	ARSENIC	4.7	0.2	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	ARSENIC	4.8	0.2	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	ARSENIC	3.8	0.21	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	ARSENIC	4.9	0.2	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	ARSENIC	4.8	0.21	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	ARSENIC	5	0.2	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	ARSENIC	5.5	0.21	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	BARIUM	44	0.51	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	BARIUM	68	0.5	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	BARIUM	77	0.51	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	BARIUM	85	0.57	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	BARIUM	80	0.51	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	BARIUM	72	0.5	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	BARIUM	70	0.52	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	BARIUM	86	0.51	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	BARIUM	180	0.51	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	BARIUM	100	0.56	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	BARIUM	110	0.51	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	BARIUM	420	0.51	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	BARIUM	93	0.52	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	BARIUM	78	0.51	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	BARIUM	160	0.52	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	BARIUM	27	0.5	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	BARIUM	20	0.52	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	BERYLLIUM	0.54	0.051	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	BERYLLIUM	0.42	0.05	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	BERYLLIUM	0.42	0.051	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	BERYLLIUM	0.42	0.057	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	BERYLLIUM	0.49	0.051	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	BERYLLIUM	0.66	0.05	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	BERYLLIUM	0.76	0.052	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	BERYLLIUM	0.62	0.051	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	BERYLLIUM	1	0.051	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	BERYLLIUM	0.72	0.056	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	BERYLLIUM	0.63	0.051	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	BERYLLIUM	0.65	0.051	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	BERYLLIUM	0.43	0.052	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	BERYLLIUM	0.56	0.051	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	BERYLLIUM	0.56	0.052	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	BERYLLIUM	0.44	0.05	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	BERYLLIUM	0.45	0.052	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	CADMIUM	0.087 J	0.2	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	CADMIUM	0.049 J	0.2	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	CADMIUM	0.05 J	0.2	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	CADMIUM	0.052 J	0.23	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	CADMIUM	0.075 J	0.2	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	CADMIUM	0.088 J	0.2	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	CADMIUM	0.071 J	0.21	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	CADMIUM	0.14 J	0.2	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	CADMIUM	0.23	0.2	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	CADMIUM	0.15 J	0.22	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	CADMIUM	0.13 J	0.2	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	CADMIUM	0.14 J	0.2	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	CADMIUM	0.072 J	0.21	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	CADMIUM	0.12 J	0.2	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	CADMIUM	0.11 J	0.21	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	CADMIUM	0.061 J	0.2	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	CADMIUM	0.056 J	0.21	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	CHROMIUM	8	1	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	CHROMIUM	8.5	1	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	CHROMIUM	22	1	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	CHROMIUM	21	1.1	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	CHROMIUM	6.1	1	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	CHROMIUM	8.5	1	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	CHROMIUM	10	1	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	CHROMIUM	10	1	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	CHROMIUM	8.4	1	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	CHROMIUM	5.1	1.1	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	CHROMIUM	4.8	1	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	CHROMIUM	5.7	1	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	CHROMIUM	4.5	1	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	CHROMIUM	5.5	1	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	CHROMIUM	5.8	1	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	CHROMIUM	6.8	1	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	CHROMIUM	7.1	1	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	COBALT	4.6	0.51	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	COBALT	4.5	0.5	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	COBALT	4.6	0.51	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	COBALT	5.7	0.57	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	COBALT	4.1	0.51	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	COBALT	6.9	0.5	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	COBALT	9.3	0.52	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	COBALT	6.4	0.51	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	COBALT	10	0.51	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	COBALT	6.8	0.56	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	COBALT	5.9	0.51	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	COBALT	6.1	0.51	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	COBALT	4.1	0.52	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	COBALT	5.9	0.51	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	COBALT	5.3	0.52	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	COBALT	3.8	0.5	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	COBALT	4	0.52	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	COPPER	9.4	2	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	COPPER	7.7	2	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	COPPER	8.4	2	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	COPPER	8.1	2.3	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	COPPER	6.3	2	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	COPPER	13	2	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	COPPER	17	2.1	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	COPPER	14	2	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	COPPER	19	2	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	COPPER	12	2.2	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	COPPER	11	2	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	COPPER	11	2	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	COPPER	6.5	2.1	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	COPPER	9.8	2	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	COPPER	9.8	2.1	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	COPPER	6.8	2	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	COPPER	7.3	2.1	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	IRON	16000	20	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	IRON	12000	20	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	IRON	11000	20	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	IRON	11000	23	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	IRON	11000	20	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	IRON	21000	20	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	IRON	23000	21	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	IRON	17000	20	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	IRON	20000	20	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	IRON	12000	22	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	IRON	11000	20	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	IRON	11000	20	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	IRON	9700	21	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	IRON	12000	20	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	IRON	11000	21	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	IRON	12000	20	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	IRON	13000	21	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	LEAD	10	0.2	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	LEAD	7.8	0.2	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	LEAD	7	0.2	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	LEAD	6.9	0.23	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	LEAD	8.1	0.2	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	LEAD	13	0.2	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	LEAD	16	0.21	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	LEAD	13	0.2	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	LEAD	18	0.2	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	LEAD	12	0.22	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	LEAD	11	0.2	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	LEAD	11	0.2	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	LEAD	7.5	0.21	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	LEAD	9.9	0.2	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	LEAD	9.7	0.21	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	LEAD	7.9	0.2	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	LEAD	8.3	0.21	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	MANGANESE	120	0.76	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	MANGANESE	160	0.76	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	MANGANESE	150	0.76	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	MANGANESE	180	0.85	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	MANGANESE	140	0.76	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	MANGANESE	180	0.75	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	MANGANESE	190	0.79	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	MANGANESE	280	0.76	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	MANGANESE	290	0.76	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	MANGANESE	160	0.84	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	MANGANESE	160	0.76	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	MANGANESE	170	0.77	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	MANGANESE	140	0.77	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	MANGANESE	180	0.76	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	MANGANESE	180	0.77	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	MANGANESE	130	0.76	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	MANGANESE	120	0.78	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	MOLYBDENUM	0.36	0.2	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	MOLYBDENUM	0.24	0.2	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	MOLYBDENUM	0.21	0.2	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	MOLYBDENUM	0.21 J	0.23	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	MOLYBDENUM	0.24	0.2	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	MOLYBDENUM	0.2	0.2	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	MOLYBDENUM	0.23	0.21	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	MOLYBDENUM	0.37	0.2	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	MOLYBDENUM	0.4	0.2	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	MOLYBDENUM	0.19 J	0.22	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	MOLYBDENUM	0.25	0.2	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	MOLYBDENUM	0.4	0.2	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	MOLYBDENUM	0.19 J	0.21	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	MOLYBDENUM	0.27	0.2	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	MOLYBDENUM	0.21	0.21	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	MOLYBDENUM	0.34	0.2	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	MOLYBDENUM	0.38	0.21	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	NICKEL	9.8	2	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	NICKEL	10	2	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	NICKEL	20	2	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	NICKEL	20	2.3	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	NICKEL	5.7	2	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	NICKEL	11	2	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	NICKEL	13	2.1	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	NICKEL	11	2	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	NICKEL	13	2	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	NICKEL	7.5	2.2	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	NICKEL	7.4	2	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	NICKEL	7.9	2	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	NICKEL	5.3	2.1	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	NICKEL	7.1	2	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	NICKEL	7.2	2.1	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	NICKEL	7.4	2	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	NICKEL	8	2.1	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	713R15	Ra-226	1.59	0.56	pCi/g
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	713R15	Ra-226	6.22	0.5	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	713R15	Ra-226	3.21	0.48	pCi/g
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	713R15	Ra-226	3.12	0.38	pCi/g
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	713R15	Ra-226	1.76	0.54	pCi/g
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	713R15	Ra-226	1.69 J	0.51	pCi/g
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	713R15	Ra-226	1.67 J	0.34	pCi/g
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	713R15	Ra-226	3.8 J	0.68	pCi/g
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	713R15	Ra-226	1.59	0.43	pCi/g
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	713R15	Ra-226	1.16	0.48	pCi/g
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	713R15	Ra-226	1.5 J	0.54	pCi/g
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	713R15	Ra-226	3.11	0.46	pCi/g
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	713R15	Ra-226	4.58	0.62	pCi/g
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	713R15	Ra-226	13.9	0.6	pCi/g
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	713R15	Ra-226	1.81	0.29	pCi/g
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	713R15	Ra-226	1.37	0.37	pCi/g
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	713R15	Ra-226	1.39	0.43	pCi/g
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	SELENIUM	1.4	1	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	SELENIUM	1.9	1	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	SELENIUM	1.3	1	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	SELENIUM	1.1	1.1	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	SELENIUM	1.2	1	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	SELENIUM	1.6	1	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	SELENIUM	1.8	1	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	SELENIUM	2.1	1	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	SELENIUM	3.1	1	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	SELENIUM	1.8	1.1	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	SELENIUM	5	1	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	SELENIUM	1.8	1	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	SELENIUM	2.5	1	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	SELENIUM	4.7	1	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	SELENIUM	1.6	1	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	SELENIUM	1.2	1	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	SELENIUM	1.2	1	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	SILVER	0.06 J	0.12	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	SILVER	0.065 U	0.13	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	SILVER	0.063 J	0.11	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	SILVER	0.081 J	0.12	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	SILVER	0.076 J	0.12	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	SILVER	0.089 J	0.12	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	SILVER	0.064 U	0.13	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	SILVER	0.059 U	0.12	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	SILVER	0.059 U	0.12	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	SILVER	0.059 U	0.12	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	THALLIUM	0.2	0.01	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	THALLIUM	0.11	0.01	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	THALLIUM	0.1	0.01	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	THALLIUM	0.093	0.011	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	THALLIUM	0.099	0.01	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	THALLIUM	0.17	0.01	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	THALLIUM	0.2	0.01	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	THALLIUM	0.16	0.01	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	THALLIUM	0.22	0.01	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	THALLIUM	0.14	0.011	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	THALLIUM	0.13	0.01	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	THALLIUM	0.084	0.01	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	THALLIUM	0.11	0.01	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	THALLIUM	0.11	0.01	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	THALLIUM	0.14	0.01	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	THALLIUM	0.16	0.01	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	URANIUM	1	0.02	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	URANIUM	5.4	0.02	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	URANIUM	2.3	0.02	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	URANIUM	2.4	0.023	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	URANIUM	2.6	0.02	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	URANIUM	0.91	0.02	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	URANIUM	1	0.021	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	URANIUM	2.4	0.02	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	URANIUM	1.9	0.02	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	URANIUM	1.1	0.022	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	URANIUM	5.3	0.02	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	URANIUM	3.3	0.02	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	URANIUM	3.3	0.021	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	URANIUM	6.3	0.02	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	URANIUM	1.4	0.021	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	URANIUM	0.83	0.02	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	URANIUM	0.87	0.021	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	VANADIUM	12	0.51	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	VANADIUM	13	0.5	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	VANADIUM	14	0.51	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	VANADIUM	13	0.57	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	VANADIUM	14	0.51	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	VANADIUM	17	0.5	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	VANADIUM	18	0.52	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	VANADIUM	18	0.51	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	VANADIUM	23	0.51	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	VANADIUM	14	0.56	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	VANADIUM	13	0.51	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	VANADIUM	13	0.51	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	VANADIUM	12	0.52	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	VANADIUM	15	0.51	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	VANADIUM	13	0.52	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	VANADIUM	11	0.5	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	VANADIUM	11	0.52	mg/kg
CR1E	CR1E-SS05-0000-0003-01	5/19/2022	35.664557	-108.489454	0	3	SW6020	ZINC	46	10	mg/kg
CR1E	CR1E-SS06-0000-0003-01	5/19/2022	35.665434	-108.488911	0	3	SW6020	ZINC	33	10	mg/kg
CR1E	CR1E-SS07-0000-0003-01	5/19/2022	35.665828	-108.488623	0	3	SW6020	ZINC	32	10	mg/kg
CR1E	CR1E-SS07-0000-0003-02	5/19/2022	35.665828	-108.488623	0	3	SW6020	ZINC	31	11	mg/kg
CR1E	CR1E-SS08-0000-0003-01	5/19/2022	35.666966	-108.488662	0	3	SW6020	ZINC	40	10	mg/kg
CR1E	CR1E-SS09-0000-0003-01	5/19/2022	35.664733	-108.49064	0	3	SW6020	ZINC	60	10	mg/kg
CR1E	CR1E-SS10-0000-0003-01	5/19/2022	35.665086	-108.490244	0	3	SW6020	ZINC	65	10	mg/kg
CR1E	CR1E-SS11-0000-0003-01	5/19/2022	35.665393	-108.489297	0	3	SW6020	ZINC	71	10	mg/kg
CR1E	CR1E-SS12-0000-0003-01	5/19/2022	35.665819	-108.490253	0	3	SW6020	ZINC	80	10	mg/kg
CR1E	CR1E-SS13-0000-0003-01	5/19/2022	35.666222	-108.490271	0	3	SW6020	ZINC	49	11	mg/kg
CR1E	CR1E-SS14-0000-0003-01	5/19/2022	35.666028	-108.489317	0	3	SW6020	ZINC	47	10	mg/kg
CR1E	CR1E-SS15-0000-0003-01	5/19/2022	35.666507	-108.489822	0	3	SW6020	ZINC	47	10	mg/kg
CR1E	CR1E-SS16-0000-0003-01	5/19/2022	35.666619	-108.488931	0	3	SW6020	ZINC	36	10	mg/kg
CR1E	CR1E-SS17-0000-0003-01	5/19/2022	35.66629	-108.489	0	3	SW6020	ZINC	44	10	mg/kg
CR1E	CR1E-SS18-0000-0003-01	5/19/2022	35.667002	-108.488124	0	3	SW6020	ZINC	45	10	mg/kg
CR1E	CR1E-SS19-0000-0003-01	5/19/2022	35.664622	-108.490056	0	3	SW6020	ZINC	35	10	mg/kg
CR1E	CR1E-SS19-0000-0003-02	5/19/2022	35.664622	-108.490056	0	3	SW6020	ZINC	36	10	mg/kg
CR1E	CELI-503 SS1 0-1.5	5/5/2011	35.6670417	-108.488182	0	18	SW6010	ARSENIC	6.2	1.1	mg/kg
CR1E	CELI-503 SS5	5/5/2011	35.6670417	-108.488182	0	18	SW6010	ARSENIC	7.2	1.3	MG/KG
CR1E	CELI-503 SS1 0-1.5	5/5/2011	35.6670417	-108.488182	0	18	SW6010	MOLYBDENUM	1.1 U	1.1	mg/kg
CR1E	CELI-503 SS5	5/5/2011	35.6670417	-108.488182	0	18	SW6010	MOLYBDENUM	1.3 U	1.3	mg/kg
CR1E	CELI-502 SS1 0-1.5	5/5/2011	35.6670954	-108.488555	0	18	713R11	Ra-226	25.5 G	0.7	pCi/g
CR1E	CELI-503 SS1 0-1.5	5/5/2011	35.6670417	-108.488182	0	18	713R11	Ra-226	14.5	0.6	pCi/g
CR1E	CELP-409 SS1 0-1.5	5/4/2011	35.6657679	-108.489458	0	18	713R11	Ra-226	2.57 G	0.66	pCi/g
CR1E	CELI-503 SS1 0-1.5	5/5/2011	35.6670417	-108.488182	0	18	SW6010	SELENIUM	2.7 U	2.7	mg/kg
CR1E	CELI-503 SS5	5/5/2011	35.6670417	-108.488182	0	18	SW6010	SELENIUM	3.2 U	3.2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CELI-503 SS1 0-1.5	5/5/2011	35.6670417	-108.488182	0	18	SW6020	URANIUM	73	110	mg/kg
CR1E	CELI-503 SS1 0-1.5	5/5/2011	35.6670417	-108.488182	0	18	SW6010	VANADIUM	18	5.4	mg/kg
CR1E	CELI-503 SS5	5/5/2011	35.6670417	-108.488182	0	18	SW6010	VANADIUM	21	6.5	mg/kg
CR1E	CELA-001 (2-6)	5/6/2011	35.6649477	-108.490897	2	6	713R11	Ra-226	1.84 G	0.65	pCi/g
CR1E	CELA-004 (2-6)	5/6/2011	35.6645728	-108.490624	2	6	713R11	Ra-226	3.07	0.57	pCi/g
CR1E	CELA-004 (2-6) Dup	5/6/2011	35.6645728	-108.490624	2	6	713R11	Ra-226	3.48	0.37	pCi/g
CR1E	CELA-008 (2-6)	5/6/2011	35.6647603	-108.490491	2	6	713R11	Ra-226	1.53 G	0.44	pCi/g
CR1E	CELA-008 (2-6) Dup	5/6/2011	35.6647603	-108.490491	2	6	713R11	Ra-226	1.43 G	0.53	pCi/g
CR1E	CELA-012 (2-6)	5/4/2011	35.6662795	-108.490503	2	6	713R11	Ra-226	1.47	0.43	pCi/g
CR1E	CELA-016 (2-6)	5/4/2011	35.6660879	-108.490371	2	6	713R11	Ra-226	2.61	0.37	pCi/g
CR1E	CELA-020 (2-6)	5/6/2011	35.6655228	-108.490225	2	6	713R11	Ra-226	1.35	0.39	pCi/g
CR1E	CELA-024 (2-6)	5/6/2011	35.6653285	-108.490085	2	6	713R11	Ra-226	1.71 G	0.63	pCi/g
CR1E	CELA-027 (2-6)	5/4/2011	35.6664685	-108.490101	2	6	713R11	Ra-226	2.01	0.47	pCi/g
CR1E	CELA-031 (2-6)	5/4/2011	35.6662824	-108.489968	2	6	713R11	Ra-226	2.63 G	0.67	pCi/g
CR1E	CELA-035 (2-6)	5/4/2011	35.6660909	-108.489832	2	6	713R11	Ra-226	1.63	0.54	pCi/g
CR1E	CELA-039 (2-6)	5/4/2011	35.6662839	-108.489699	2	6	713R11	Ra-226	3.19 G	0.59	pCi/g
CR1E	CELA-043 (2-6)	5/4/2011	35.6664715	-108.489566	2	6	713R11	Ra-226	75.6	0.9	pCi/g
CR1E	CELA-047 (2-6)	5/4/2011	35.6666673	-108.489429	2	6	713R11	Ra-226	3.17 G	0.59	pCi/g
CR1E	CELA-051 (2-6)	5/6/2011	35.6659187	-108.489157	2	6	713R11	Ra-226	2.68 G	0.56	pCi/g
CR1E	CELA-054 (2-6)	5/6/2011	35.6661008	-108.489024	2	6	713R11	Ra-226	1.67 G	0.49	pCi/g
CR1E	CELA-058 (2-6)	5/5/2011	35.6666674	-108.488891	2	6	713R11	Ra-226	3.08 G	0.67	pCi/g
CR1E	CELA-062 (2-6)	5/5/2011	35.6662953	-108.488622	2	6	713R11	Ra-226	2.14 G	0.54	pCi/g
CR1E	CELA-066 (2-6)	5/5/2011	35.6668592	-108.488485	2	6	713R11	Ra-226	1.64 G	0.48	pCi/g
CR1E	CELA-070 (2-6)	5/5/2011	35.6668607	-108.488216	2	6	713R11	Ra-226	19 G	0.7	pCi/g
CR1E	CELA-074 (2-6)	5/5/2011	35.667244	-108.487956	2	6	713R11	Ra-226	7.4 G	0.7	pCi/g
CR1E	CELA-074 DUP	5/5/2011	35.667244	-108.487956	2	6	713R11	Ra-226	6.86 G	0.71	pCi/g
CR1E	CESS-037 (2-6)	5/6/2011	35.6650409	-108.489423	2	6	713R12	Ra-226	1.48 G	0.36	pCi/g
CR1E	CESS-041 (2-6)	5/6/2011	35.6654512	-108.489254	2	6	713R12	Ra-226	86.3 M3,G	1.6	pCi/g
CR1E	CESS-060 (2-6)	5/6/2011	35.6664792	-108.488135	2	6	713R12	Ra-226	4.34 G	0.53	pCi/g
CR1E	CESS-069 (2-6)	5/6/2011	35.6672442	-108.487414	2	6	713R11	Ra-226	2.27 G	0.5	pCi/g
CR1E	CELA-020 (6-12)	5/6/2011	35.6655228	-108.490225	6	12	713R11	Ra-226	1.52 G	0.47	pCi/g
CR1E	CELA-051 (6-12)	5/6/2011	35.6659187	-108.489157	6	12	713R11	Ra-226	89 M3,G	2	pCi/g
CR1E	CESS-041 (6-12)	5/6/2011	35.6654512	-108.489254	6	12	713R12	Ra-226	16.9	0.6	pCi/g
CR1E	CELA-074 (9-14)	5/5/2011	35.667244	-108.487956	9	14	713R11	Ra-226	3.67 G	0.52	pCi/g
CR1E	CELA-070 (9-15)	5/5/2011	35.6668607	-108.488216	9	15	713R11	Ra-226	2.67 G	0.46	pCi/g
CR1E	CELA-004 (10-16)	5/6/2011	35.6645728	-108.490624	10	16	713R11	Ra-226	1.65 G	0.59	pCi/g
CR1E	CELA-008 (12-18)	5/6/2011	35.6647603	-108.490491	12	18	713R11	Ra-226	3.03 G	0.64	pCi/g
CR1E	CELA-008 DUP	5/6/2011	35.6647603	-108.490491	12	18	713R11	Ra-226	3.56 G	0.52	pCi/g
CR1E	CELA-066 (12-18)	5/5/2011	35.6668592	-108.488485	12	18	713R11	Ra-226	45.3 M3,G	1	pCi/g
CR1E	CELA-062 (13-19)	5/5/2011	35.6662953	-108.488622	13	19	713R11	Ra-226	3.7 G	0.74	pCi/g
CR1E	CELA-024 (14-20)	5/6/2011	35.6653285	-108.490085	14	20	713R11	Ra-226	1.28 G	0.44	pCi/g
CR1E	CELA-001 (18-24)	5/6/2011	35.6649477	-108.490897	18	24	713R11	Ra-226	1.34	0.45	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CELA-012 (18-24)	5/4/2011	35.6662795	-108.490503	18	24	713R11	Ra-226	1.18	0.54	pCi/g
CR1E	CELA-016 (18-24)	5/4/2011	35.6660879	-108.490371	18	24	713R11	Ra-226	96 M3,G	1	pCi/g
CR1E	CELA-027 (18-24)	5/4/2011	35.6664685	-108.490101	18	24	713R11	Ra-226	112 M3	1	pCi/g
CR1E	CELA-031 (18-24)	5/4/2011	35.6662824	-108.489968	18	24	713R11	Ra-226	71.9 G	1	pCi/g
CR1E	CELA-031 (18-24) Dup	5/4/2011	35.6662824	-108.489968	18	24	713R11	Ra-226	71	0.8	pCi/g
CR1E	CELA-035 (18-24)	5/4/2011	35.6660909	-108.489832	18	24	713R11	Ra-226	352 M3	2	pCi/g
CR1E	CELA-039 (18-24)	5/4/2011	35.6662839	-108.489699	18	24	713R11	Ra-226	194 M3	2	pCi/g
CR1E	CELA-043 (18-24)	5/4/2011	35.6664715	-108.489566	18	24	713R11	Ra-226	363 M3,G	3	pCi/g
CR1E	CELA-047 (18-24)	5/4/2011	35.6666673	-108.489429	18	24	713R11	Ra-226	59.5 M3	1.2	pCi/g
CR1E	CELA-047 (18-24) Dup	5/4/2011	35.6666673	-108.489429	18	24	713R11	Ra-226	58.9	0.9	pCi/g
CR1E	CELA-054 (18-24)	5/6/2011	35.6661008	-108.489024	18	24	713R11	Ra-226	83.3 M3	1.1	pCi/g
CR1E	CELA-058 (18-24)	5/5/2011	35.6666674	-108.488891	18	24	713R11	Ra-226	260 M3,G	3	pCi/g
CR1E	CELA-058 DUP	5/5/2011	35.6666674	-108.488891	18	24	713R11	Ra-226	261 M3,G	3	pCi/g
CR1E	CELI-502 SS2 1.5-3 Dup	5/5/2011	35.6670954	-108.488555	18	24	713R11	Ra-226	232 M3,G	2	pCi/g
CR1E	CESS-037 (18-24)	5/5/2011	35.6650409	-108.489423	18	24	713R12	Ra-226	1.2 G	0.48	pCi/g
CR1E	CESS-060 (18-24)	5/6/2011	35.6664792	-108.488135	18	24	713R12	Ra-226	1.65 G	0.51	pCi/g
CR1E	CESS-069 (18-24)	5/6/2011	35.6672442	-108.487414	18	24	713R11	Ra-226	3.79 G	0.61	pCi/g
CR1E	CELI-502 SS2 1.5-3	5/5/2011	35.6670954	-108.488555	18	36	713R11	Ra-226	220 M3,G	1	pCi/g
CR1E	CELI-503 SS2 1.5-3	5/5/2011	35.6670417	-108.488182	18	36	713R11	Ra-226	1.24	0.5	pCi/g
CR1E	CELP-409 SS2 1.5-3	5/4/2011	35.6657679	-108.489458	18	36	713R11	Ra-226	2.05 G	0.48	pCi/g
CR1E	CESS-037 (24-30)	5/5/2011	35.6650409	-108.489423	24	30	713R12	Ra-226	1.15 G	0.54	pCi/g
CR1E	CELA-039 (27-33)	5/4/2011	35.6662839	-108.489699	27	33	713R11	Ra-226	429 M3	2	pCi/g
CR1E	CELA-001 (30-36)	5/6/2011	35.6649477	-108.490897	30	36	713R11	Ra-226	1.49	0.39	pCi/g
CR1E	CELA-012 (30-36)	5/4/2011	35.6662795	-108.490503	30	36	713R11	Ra-226	1.13 G	0.5	pCi/g
CR1E	CELA-016 (30-36)	5/4/2011	35.6660879	-108.490371	30	36	713R11	Ra-226	74.2 M3,G	1.1	pCi/g
CR1E	CELA-027 (30-36)	5/4/2011	35.6664685	-108.490101	30	36	713R11	Ra-226	81.3 M3	1.1	pCi/g
CR1E	CELA-031 (30-36)	5/4/2011	35.6662824	-108.489968	30	36	713R11	Ra-226	151 M3,G	2	pCi/g
CR1E	CELA-031 (30-36) Dup	5/4/2011	35.6662824	-108.489968	30	36	713R11	Ra-226	128 M3,G	2	pCi/g
CR1E	CELA-035 (30-36)	5/4/2011	35.6660909	-108.489832	30	36	713R11	Ra-226	103 M3	1	pCi/g
CR1E	CELA-043 (30-36)	5/4/2011	35.6664715	-108.489566	30	36	713R11	Ra-226	35.8 M3	1	pCi/g
CR1E	CELA-047 (30-36)	5/4/2011	35.6666673	-108.489429	30	36	713R11	Ra-226	123 M3,G	1	pCi/g
CR1E	CELA-054 (30-36)	5/6/2011	35.6661008	-108.489024	30	36	713R11	Ra-226	65.5 M3	1.2	pCi/g
CR1E	CESS-060 (30-36)	5/6/2011	35.6664792	-108.488135	30	36	713R12	Ra-226	2.39 G	0.51	pCi/g
CR1E	CESS-060 (30-36) Dup	5/6/2011	35.6664792	-108.488135	30	36	713R12	Ra-226	1.78 G	0.55	pCi/g
CR1E	CESS-069 (30-36)	5/6/2011	35.6672442	-108.487414	30	36	713R12	Ra-226	2.9 G	0.47	pCi/g
CR1E	CELI-502 SS3 3-4.5	5/5/2011	35.6670954	-108.488555	36	54	SW6010	ARSENIC	2	1.1	mg/kg
CR1E	CELI-502 SS9	5/5/2011	35.6670954	-108.488555	36	54	SW6010	ARSENIC	2.8	1.1	mg/kg
CR1E	CELI-502 SS3 3-4.5	5/5/2011	35.6670954	-108.488555	36	54	SW6010	MOLYBDENUM	1.1 U	1.1	mg/kg
CR1E	CELI-502 SS9	5/5/2011	35.6670954	-108.488555	36	54	SW6010	MOLYBDENUM	1.8	1.1	mg/kg
CR1E	CELI-502 DUP 502	5/5/2011	35.6670954	-108.488555	36	54	713R11	Ra-226	90 M3,G	1	pCi/g
CR1E	CELI-502 SS3 3-4.5	5/5/2011	35.6670954	-108.488555	36	54	713R11	Ra-226	97 M3,G	2	pCi/g
CR1E	CELI-503 SS3 3-4.5	5/5/2011	35.6670417	-108.488182	36	54	713R11	Ra-226	1.03 G	0.6	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
CR1E	CELP-409 SS3 3-4.5	5/4/2011	35.6657679	-108.489458	36	54	713R11	Ra-226	1.6 G	0.47	pCi/g
CR1E	CELI-502 SS3 3-4.5	5/5/2011	35.6670954	-108.488555	36	54	SW6010	SELENIUM	0.53 U	0.53	mg/kg
CR1E	CELI-502 SS9	5/5/2011	35.6670954	-108.488555	36	54	SW6010	SELENIUM	23	0.53	mg/kg
CR1E	CELI-502 SS3 3-4.5	5/5/2011	35.6670954	-108.488555	36	54	SW6020	URANIUM	210	1100	mg/kg
CR1E	CELI-502 SS3 3-4.5	5/5/2011	35.6670954	-108.488555	36	54	SW6010	VANADIUM	11	1.1	mg/kg
CR1E	CELI-502 SS9	5/5/2011	35.6670954	-108.488555	36	54	SW6010	VANADIUM	28	1.1	mg/kg
CR1E	C1E-1B002-5 (FD)	7/19/2015	35.6663025	-108.489642	54	72	Unknown	Ra-226	1.33	Unknown	pCi/g
CR1E	C1E-B001-5	7/18/2015	35.6658978	-108.49003	54	72	Unknown	Ra-226	0.674	Unknown	pCi/g
CR1E	C1E-B002-5	7/19/2015	35.6663025	-108.489642	54	72	Unknown	Ra-226	1.23	Unknown	pCi/g
CR1E	C1E-B003-5	7/19/2015	35.6665262	-108.489713	54	72	Unknown	Ra-226	19.2	Unknown	pCi/g
CR1E	C1E-B004-5	7/19/2015	35.6666309	-108.488707	54	72	Unknown	Ra-226	1.02	Unknown	pCi/g
CR1E	C1E-B005-5	7/18/2015	35.6660932	-108.48908	54	72	Unknown	Ra-226	50	Unknown	pCi/g
CR1E	C1E-B006-5	7/18/2015	35.6655495	-108.489476	54	72	Unknown	Ra-226	0.932	Unknown	pCi/g
CR1E	CELI-502 SS4 4.5-6	5/5/2011	35.6670954	-108.488555	54	72	713R11	Ra-226	8.1 G	0.7	pCi/g
CR1E	CELI-503 SS4 4.5-6	5/5/2011	35.6670417	-108.488182	54	72	713R11	Ra-226	1.22	0.37	pCi/g
CR1E	CELP-409 DUP 409	5/4/2011	35.6657679	-108.489458	54	72	713R11	Ra-226	1.98 G	0.48	pCi/g
CR1E	CELP-409 SS4 4.5-6	5/4/2011	35.6657679	-108.489458	54	72	713R11	Ra-226	2.14 G	0.68	pCi/g
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	ARSENIC	5.3	Unknown	mg/kg
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	ARSENIC	5.2	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	ARSENIC	5.6	Unknown	mg/kg
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	BARIUM	66	Unknown	mg/kg
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	BARIUM	73	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	BARIUM	78	Unknown	mg/kg
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	CADMIUM	0.078 J	Unknown	mg/kg
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	CADMIUM	0.14	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	CADMIUM	0.12	Unknown	mg/kg
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	CHROMIUM	7.1	Unknown	mg/kg
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	CHROMIUM	7.5	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	CHROMIUM	8.2	Unknown	mg/kg
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	LEAD	8.6	Unknown	mg/kg
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	LEAD	11	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	LEAD	11	Unknown	mg/kg
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	MOLYBDENUM	0.5	Unknown	mg/kg
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	MOLYBDENUM	0.55 J	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	MOLYBDENUM	0.53 J	Unknown	mg/kg
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	Ra-226	2.15	Unknown	mg/kg
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	Ra-226	5.88	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	Ra-226	8.21	Unknown	mg/kg
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	SELENIUM	1.8	Unknown	mg/kg
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	SELENIUM	2.5	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	SELENIUM	2.9	Unknown	mg/kg
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	SILVER	0.5 U	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	SILVER	0.49 U	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	SILVER	0.45 U	Unknown	mg/kg
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	URANIUM	0.87	Unknown	mg/kg
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	URANIUM	1.1	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	URANIUM	1.3	Unknown	mg/kg
KMP NN	KMP-13-00	7/19/2017	35.660042	-108.490344	0	2	Unknown	VANADIUM	15	Unknown	mg/kg
KMP NN	KMP-14-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	VANADIUM	17	Unknown	mg/kg
KMP NN	KMP-14D-00	7/19/2017	35.659959	-108.488751	0	2	Unknown	VANADIUM	17	Unknown	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	ALUMINUM	6200	15	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	ALUMINUM	6900	15	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	ALUMINUM	5600	15	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	ANTIMONY	0.09 J	0.1	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	ANTIMONY	0.065 J	0.1	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	ANTIMONY	0.046 J	0.1	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	ARSENIC	5.4	0.2	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	ARSENIC	5.9	0.21	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	ARSENIC	4.9	0.21	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	BARIUM	66	0.51	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	BARIUM	75	0.52	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	BARIUM	56	0.52	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	BERYLLIUM	0.52	0.051	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	BERYLLIUM	0.56	0.052	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	BERYLLIUM	0.5	0.052	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	CADMIUM	0.089 J	0.2	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	CADMIUM	0.085 J	0.21	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	CADMIUM	0.082 J	0.21	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	CHROMIUM	7.3	1	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	CHROMIUM	7.8	1	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	CHROMIUM	6	1	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	COBALT	4.6	0.51	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	COBALT	5.2	0.52	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	COBALT	4.1	0.52	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	COPPER	8.3	2	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	COPPER	9.3	2.1	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	COPPER	7.4	2.1	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	IRON	14000	20	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	IRON	15000	21	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	IRON	12000	21	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	LEAD	9.8	0.2	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	LEAD	11	0.21	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	LEAD	9.3	0.21	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	MANGANESE	200	0.77	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	MANGANESE	220	0.77	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	MANGANESE	190	0.77	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	MOLYBDENUM	0.36	0.2	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	MOLYBDENUM	0.33	0.21	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	MOLYBDENUM	0.35	0.21	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	NICKEL	7.7	2	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	NICKEL	8.4	2.1	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	NICKEL	6.8	2.1	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	713R15	Ra-226	4	0.49	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	713R15	Ra-226	3.78	0.47	pCi/g
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	713R15	Ra-226	2.8	0.44	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	SELENIUM	1.7	1	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	SELENIUM	1.9	1	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	SELENIUM	1.4	1	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	SILVER	0.059 U	0.12	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	SILVER	0.059 U	0.12	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	THALLIUM	0.13	0.01	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	THALLIUM	0.15	0.01	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	URANIUM	1.4	0.02	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	URANIUM	1.4	0.021	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	URANIUM	0.94	0.021	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	VANADIUM	14	0.51	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	VANADIUM	16	0.52	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	VANADIUM	12	0.52	mg/kg
KMP NN	KMP-SS49-0000-0003-01	5/19/2022	35.659839	-108.491057	0	3	SW6020	ZINC	42	10	mg/kg
KMP NN	KMP-SS49-0000-0003-02	5/19/2022	35.659839	-108.491057	0	3	SW6020	ZINC	45	10	mg/kg
KMP NN	KMP-SS74-0000-0003-01	5/19/2022	35.659863	-108.488353	0	3	SW6020	ZINC	36	10	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	ALUMINUM	6500	16	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	ANTIMONY	0.13	0.11	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	ARSENIC	5.6	0.22	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	BARIUM	82	0.55	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	BERYLLIUM	0.57	0.055	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	CADMIUM	0.16 J	0.22	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	CHROMIUM	7	1.1	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	COBALT	5.1	0.55	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	COPPER	11	2.2	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	IRON	14000	22	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	LEAD	13	0.22	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	MANGANESE	230	0.82	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	MOLYBDENUM	0.42	0.22	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	NICKEL	7.9	2.2	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	713R15	Ra-226	9.3 J	0.8	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	SELENIUM	2.4	1.1	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	SILVER	0.062 U	0.12	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	THALLIUM	0.15	0.011	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	URANIUM	6.2	0.022	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	VANADIUM	15	0.55	mg/kg
KMP NN	KMP-SB44-0000-0006-01	6/8/2022	35.659847	-108.490914	0	6	SW6020	ZINC	44	11	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	ALUMINUM	6800	16	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	ANTIMONY	0.093 J	0.1	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	ARSENIC	5.9	0.21	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	BARIUM	56	0.52	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	BERYLLIUM	0.57	0.052	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	CADMIUM	0.073 J	0.21	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	CHROMIUM	7.4	1	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	COBALT	5.1	0.52	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	COPPER	9	2.1	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	IRON	15000	21	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	LEAD	10	0.21	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	MANGANESE	210	0.78	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	MOLYBDENUM	0.37	0.21	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	NICKEL	7.8	2.1	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	713R15	Ra-226	2.13 J	0.61	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	SELENIUM	1.3	1	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	SILVER	0.06 U	0.12	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	THALLIUM	0.14	0.01	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	URANIUM	3.8	0.021	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	VANADIUM	14	0.52	mg/kg
KMP NN	KMP-SB43-0018-0024-01	6/8/2022	35.659847	-108.491192	18	24	SW6020	ZINC	41	10	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	ALUMINUM	6700	16	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	ANTIMONY	0.088 J	0.11	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	ARSENIC	5.7	0.21	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	BARIUM	74	0.53	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	BERYLLIUM	0.55	0.053	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	CADMIUM	0.06 J	0.21	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	CHROMIUM	7	1.1	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	COBALT	5.1	0.53	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	COPPER	8.1	2.1	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	IRON	14000	21	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	LEAD	9.5	0.21	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	MANGANESE	220	0.79	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	MOLYBDENUM	0.36	0.21	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	NICKEL	7.7	2.1	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	713R15	Ra-226	1.46 J	0.61	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	SELENIUM	1.2	1.1	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	SILVER	0.06 U	0.12	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	THALLIUM	0.14	0.011	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	URANIUM	0.64	0.021	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	VANADIUM	14	0.53	mg/kg
KMP NN	KMP-SB45-0060-0066-01	6/8/2022	35.659847	-108.490637	60	66	SW6020	ZINC	39	11	mg/kg
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	ARSENIC	6.9	Unknown	mg/kg
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	ARSENIC	5.2	Unknown	mg/kg
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	ARSENIC	4.5	Unknown	mg/kg
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	ARSENIC	7	Unknown	mg/kg
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	ARSENIC	4.7	Unknown	mg/kg
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	ARSENIC	4.5	Unknown	mg/kg
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	ARSENIC	9.2	Unknown	mg/kg
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	ARSENIC	4.8	Unknown	mg/kg
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	ARSENIC	5.3	Unknown	mg/kg
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	ARSENIC	5.2	Unknown	mg/kg
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	ARSENIC	5	Unknown	mg/kg
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	ARSENIC	7.2	Unknown	mg/kg
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	ARSENIC	7.5	Unknown	mg/kg
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	ARSENIC	7.6	Unknown	mg/kg
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	ARSENIC	6.6	Unknown	mg/kg
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	ARSENIC	6.5	Unknown	mg/kg
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	ARSENIC	5.3	Unknown	mg/kg
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	ARSENIC	5.7	Unknown	mg/kg
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	ARSENIC	4.9	Unknown	mg/kg
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	ARSENIC	4.9	Unknown	mg/kg
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	ARSENIC	6	Unknown	mg/kg
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	BARIUM	87	Unknown	mg/kg
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	BARIUM	140	Unknown	mg/kg
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	BARIUM	55	Unknown	mg/kg
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	BARIUM	90	Unknown	mg/kg
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	BARIUM	50	Unknown	mg/kg
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	BARIUM	51	Unknown	mg/kg
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	BARIUM	100	Unknown	mg/kg
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	BARIUM	55	Unknown	mg/kg
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	BARIUM	65	Unknown	mg/kg
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	BARIUM	92	Unknown	mg/kg
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	BARIUM	73	Unknown	mg/kg
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	BARIUM	89	Unknown	mg/kg
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	BARIUM	86	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	BARIUM	120	Unknown	mg/kg
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	BARIUM	90	Unknown	mg/kg
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	BARIUM	89	Unknown	mg/kg
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	BARIUM	74	Unknown	mg/kg
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	BARIUM	74	Unknown	mg/kg
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	BARIUM	52	Unknown	mg/kg
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	BARIUM	51	Unknown	mg/kg
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	BARIUM	63	Unknown	mg/kg
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	CADMIUM	0.12 J	Unknown	mg/kg
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	CADMIUM	0.12 U	Unknown	mg/kg
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	CADMIUM	0.075 J	Unknown	mg/kg
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	CADMIUM	0.12 J	Unknown	mg/kg
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	CADMIUM	0.072 J	Unknown	mg/kg
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	CADMIUM	0.12 U	Unknown	mg/kg
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	CADMIUM	0.14	Unknown	mg/kg
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	CADMIUM	0.069 J	Unknown	mg/kg
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	CADMIUM	0.087 J	Unknown	mg/kg
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	CADMIUM	0.096 J	Unknown	mg/kg
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	CADMIUM	0.13	Unknown	mg/kg
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	CADMIUM	0.12	Unknown	mg/kg
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	CADMIUM	0.14	Unknown	mg/kg
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	CADMIUM	0.14	Unknown	mg/kg
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	CADMIUM	0.15	Unknown	mg/kg
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	CADMIUM	0.14	Unknown	mg/kg
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	CADMIUM	0.08 J	Unknown	mg/kg
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	CADMIUM	0.098 J	Unknown	mg/kg
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	CADMIUM	0.059 J	Unknown	mg/kg
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	CADMIUM	0.12 U	Unknown	mg/kg
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	CADMIUM	0.11 J	Unknown	mg/kg
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	CHROMIUM	8.7	Unknown	mg/kg
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	CHROMIUM	7.1	Unknown	mg/kg
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	CHROMIUM	6.6	Unknown	mg/kg
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	CHROMIUM	9.5	Unknown	mg/kg
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	CHROMIUM	7.3	Unknown	mg/kg
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	CHROMIUM	6.9	Unknown	mg/kg
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	CHROMIUM	12	Unknown	mg/kg
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	CHROMIUM	6.8	Unknown	mg/kg
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	CHROMIUM	8.3	Unknown	mg/kg
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	CHROMIUM	6.9	Unknown	mg/kg
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	CHROMIUM	7.8	Unknown	mg/kg
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	CHROMIUM	9.9	Unknown	mg/kg
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	CHROMIUM	9.8	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	CHROMIUM	8.5	Unknown	mg/kg
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	CHROMIUM	10	Unknown	mg/kg
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	CHROMIUM	9.5	Unknown	mg/kg
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	CHROMIUM	7.2	Unknown	mg/kg
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	CHROMIUM	8	Unknown	mg/kg
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	CHROMIUM	7	Unknown	mg/kg
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	CHROMIUM	7	Unknown	mg/kg
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	CHROMIUM	7.6	Unknown	mg/kg
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	LEAD	12	Unknown	mg/kg
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	LEAD	8.3	Unknown	mg/kg
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	LEAD	8.6	Unknown	mg/kg
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	LEAD	13	Unknown	mg/kg
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	LEAD	8.5	Unknown	mg/kg
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	LEAD	7.7	Unknown	mg/kg
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	LEAD	17	Unknown	mg/kg
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	LEAD	10	Unknown	mg/kg
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	LEAD	9.9	Unknown	mg/kg
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	LEAD	8.9	Unknown	mg/kg
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	LEAD	11	Unknown	mg/kg
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	LEAD	14	Unknown	mg/kg
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	LEAD	13	Unknown	mg/kg
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	LEAD	13	Unknown	mg/kg
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	LEAD	14	Unknown	mg/kg
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	LEAD	14	Unknown	mg/kg
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	LEAD	10	Unknown	mg/kg
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	LEAD	11	Unknown	mg/kg
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	LEAD	8.7	Unknown	mg/kg
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	LEAD	8.1	Unknown	mg/kg
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	LEAD	9.6	Unknown	mg/kg
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	MOLYBDENUM	0.69 J	Unknown	mg/kg
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	MOLYBDENUM	0.52 J	Unknown	mg/kg
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	MOLYBDENUM	1.3 U	Unknown	mg/kg
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	MOLYBDENUM	0.57	Unknown	mg/kg
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	MOLYBDENUM	1.3 U	Unknown	mg/kg
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	MOLYBDENUM	0.52 J	Unknown	mg/kg
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	MOLYBDENUM	0.65 J	Unknown	mg/kg
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	MOLYBDENUM	1.2 U	Unknown	mg/kg
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	MOLYBDENUM	0.93 J	Unknown	mg/kg
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	MOLYBDENUM	0.51 J	Unknown	mg/kg
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	MOLYBDENUM	0.65 J	Unknown	mg/kg
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	MOLYBDENUM	0.64 J	Unknown	mg/kg
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	MOLYBDENUM	0.75 J	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	MOLYBDENUM	0.65 J	Unknown	mg/kg
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	MOLYBDENUM	0.74 J	Unknown	mg/kg
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	MOLYBDENUM	0.7 J	Unknown	mg/kg
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	MOLYBDENUM	0.7 J	Unknown	mg/kg
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	MOLYBDENUM	0.61 J	Unknown	mg/kg
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	MOLYBDENUM	0.54 J	Unknown	mg/kg
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	MOLYBDENUM	1.2 U	Unknown	mg/kg
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	MOLYBDENUM	0.8 J	Unknown	mg/kg
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	Ra-226	3.06	Unknown	pCi/g
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	Ra-226	1.41	Unknown	pCi/g
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	Ra-226	8.32	Unknown	pCi/g
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	Ra-226	2.67	Unknown	pCi/g
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	Ra-226	2.92	Unknown	pCi/g
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	Ra-226	2.22	Unknown	pCi/g
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	Ra-226	6.45	Unknown	pCi/g
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	Ra-226	5.36	Unknown	pCi/g
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	Ra-226	7.42	Unknown	pCi/g
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	Ra-226	7.77	Unknown	pCi/g
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	Ra-226	22.84	Unknown	pCi/g
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	Ra-226	6.67	Unknown	pCi/g
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	Ra-226	4.71	Unknown	pCi/g
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	Ra-226	48.54	Unknown	pCi/g
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	Ra-226	15.38	Unknown	pCi/g
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	Ra-226	16.44	Unknown	pCi/g
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	Ra-226	26.04	Unknown	pCi/g
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	Ra-226	13.7	Unknown	pCi/g
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	Ra-226	4.43	Unknown	pCi/g
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	Ra-226	4.35	Unknown	pCi/g
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	Ra-226	3.73	Unknown	pCi/g
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	SELENIUM	2.7	Unknown	mg/kg
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	SELENIUM	1.6	Unknown	mg/kg
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	SELENIUM	3.1	Unknown	mg/kg
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	SELENIUM	1.8	Unknown	mg/kg
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	SELENIUM	1.8	Unknown	mg/kg
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	SELENIUM	2	Unknown	mg/kg
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	SELENIUM	3.3	Unknown	mg/kg
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	SELENIUM	2.6	Unknown	mg/kg
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	SELENIUM	5	Unknown	mg/kg
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	SELENIUM	3.6	Unknown	mg/kg
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	SELENIUM	6.6	Unknown	mg/kg
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	SELENIUM	3.8	Unknown	mg/kg
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	SELENIUM	3.7	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	SELENIUM	21	Unknown	mg/kg
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	SELENIUM	5.6	Unknown	mg/kg
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	SELENIUM	5.5	Unknown	mg/kg
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	SELENIUM	8.8	Unknown	mg/kg
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	SELENIUM	6.2	Unknown	mg/kg
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	SELENIUM	2.5	Unknown	mg/kg
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	SELENIUM	2	Unknown	mg/kg
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	SELENIUM	1.9	Unknown	mg/kg
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	SILVER	0.53 U	Unknown	mg/kg
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	SILVER	0.5 U	Unknown	mg/kg
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	SILVER	0.53 U	Unknown	mg/kg
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	SILVER	0.21 U	Unknown	mg/kg
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	SILVER	0.52 U	Unknown	mg/kg
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	SILVER	0.49 U	Unknown	mg/kg
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	SILVER	0.58 U	Unknown	mg/kg
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	SILVER	0.49 U	Unknown	mg/kg
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	SILVER	0.56 U	Unknown	mg/kg
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	SILVER	0.51 U	Unknown	mg/kg
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	SILVER	0.51 U	Unknown	mg/kg
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	SILVER	0.5 U	Unknown	mg/kg
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	SILVER	0.52 U	Unknown	mg/kg
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	SILVER	0.45 U	Unknown	mg/kg
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	SILVER	0.49 U	Unknown	mg/kg
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	SILVER	0.46 U	Unknown	mg/kg
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	SILVER	0.46 U	Unknown	mg/kg
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	SILVER	0.5 U	Unknown	mg/kg
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	SILVER	0.45 U	Unknown	mg/kg
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	SILVER	0.48 U	Unknown	mg/kg
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	SILVER	0.51 U	Unknown	mg/kg
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	URANIUM	2.6	Unknown	mg/kg
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	URANIUM	9.7	Unknown	mg/kg
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	URANIUM	3.5	Unknown	mg/kg
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	URANIUM	1.3	Unknown	mg/kg
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	URANIUM	1.4	Unknown	mg/kg
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	URANIUM	2.8	Unknown	mg/kg
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	URANIUM	2.9	Unknown	mg/kg
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	URANIUM	2.1	Unknown	mg/kg
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	URANIUM	13	Unknown	mg/kg
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	URANIUM	4.2	Unknown	mg/kg
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	URANIUM	13	Unknown	mg/kg
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	URANIUM	3.6	Unknown	mg/kg
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	URANIUM	3.1	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	URANIUM	40	Unknown	mg/kg
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	URANIUM	11	Unknown	mg/kg
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	URANIUM	13	Unknown	mg/kg
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	URANIUM	18	Unknown	mg/kg
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	URANIUM	12	Unknown	mg/kg
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	URANIUM	4.8	Unknown	mg/kg
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	URANIUM	3.5	Unknown	mg/kg
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	URANIUM	2.8	Unknown	mg/kg
KMP UNC	KMP-01-00	7/18/2017	35.659423	-108.492172	0	2	Unknown	VANADIUM	21	Unknown	mg/kg
KMP UNC	KMP-02-00	7/18/2017	35.659438	-108.491379	0	2	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-03-00	7/18/2017	35.65946	-108.490578	0	2	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-04-00	7/18/2017	35.65878	-108.49234	0	2	Unknown	VANADIUM	21	Unknown	mg/kg
KMP UNC	KMP-05-00	7/18/2017	35.658795	-108.491547	0	2	Unknown	VANADIUM	17	Unknown	mg/kg
KMP UNC	KMP-06-00	7/18/2017	35.658817	-108.490746	0	2	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-07-00	7/18/2017	35.658175	-108.492052	0	2	Unknown	VANADIUM	26	Unknown	mg/kg
KMP UNC	KMP-08-00	7/18/2017	35.65819	-108.491259	0	2	Unknown	VANADIUM	17	Unknown	mg/kg
KMP UNC	KMP-09-00	7/18/2017	35.658213	-108.490459	0	2	Unknown	VANADIUM	22	Unknown	mg/kg
KMP UNC	KMP-10-00	7/18/2017	35.65764	-108.490873	0	2	Unknown	VANADIUM	18	Unknown	mg/kg
KMP UNC	KMP-15-00	7/18/2017	35.659695	-108.491137	0	2	Unknown	VANADIUM	23	Unknown	mg/kg
KMP UNC	KMP-16-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	VANADIUM	23	Unknown	mg/kg
KMP UNC	KMP-16D-00	7/18/2017	35.658292	-108.491842	0	2	Unknown	VANADIUM	22	Unknown	mg/kg
KMP UNC	KMP-17-00	7/19/2017	35.658397	-108.491778	0	2	Unknown	VANADIUM	41	Unknown	mg/kg
KMP UNC	KMP-18-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	VANADIUM	25	Unknown	mg/kg
KMP UNC	KMP-18D-00	7/19/2017	35.658584	-108.491524	0	2	Unknown	VANADIUM	24	Unknown	mg/kg
KMP UNC	KMP-19-00	7/19/2017	35.65865	-108.491373	0	2	Unknown	VANADIUM	26	Unknown	mg/kg
KMP UNC	KMP-20-00	7/19/2017	35.658809	-108.491224	0	2	Unknown	VANADIUM	22	Unknown	mg/kg
KMP UNC	KMP-21-00	7/19/2017	35.658901	-108.491165	0	2	Unknown	VANADIUM	17	Unknown	mg/kg
KMP UNC	KMP-22-00	7/19/2017	35.658405	-108.490563	0	2	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-23-00	7/18/2017	35.658984	-108.490548	0	2	Unknown	VANADIUM	18	Unknown	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	ALUMINUM	4000	15	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	ALUMINUM	4000	15	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	ALUMINUM	4900	15	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	ALUMINUM	5100	15	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	ALUMINUM	6000	15	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	ALUMINUM	6300	15	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	ALUMINUM	6500	15	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	ALUMINUM	6100	15	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	ALUMINUM	5000	15	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	ALUMINUM	7100	15	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	ALUMINUM	8300	16	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	ALUMINUM	5900	15	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	ALUMINUM	7100	15	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	ALUMINUM	6700	15	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	ALUMINUM	7000	15	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	ALUMINUM	6000	15	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	ALUMINUM	6300	15	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	ALUMINUM	6300	15	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	ALUMINUM	5900	15	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	ALUMINUM	6100	15	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	ALUMINUM	6100	15	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	ALUMINUM	5800	15	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	ALUMINUM	6900	15	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	ALUMINUM	7500	15	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	ALUMINUM	7500	15	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	ALUMINUM	6400	15	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	ALUMINUM	5900	15	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	ALUMINUM	6100	15	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	ALUMINUM	6400	15	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	ALUMINUM	6800	15	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	ALUMINUM	5700	15	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	ALUMINUM	5800	15	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	ALUMINUM	7600	15	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	ALUMINUM	7000	15	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	ALUMINUM	5400	15	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	ALUMINUM	6200	15	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	ANTIMONY	0.1	0.099	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	ANTIMONY	0.096 J	0.1	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	ANTIMONY	0.041 J	0.1	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	ANTIMONY	0.048 J	0.1	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	ANTIMONY	0.094 J	0.1	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	ANTIMONY	0.054 J	0.1	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	ANTIMONY	0.07 J	0.1	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	ANTIMONY	0.057 J	0.1	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	ANTIMONY	0.058 J	0.1	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	ANTIMONY	0.11	0.1	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	ANTIMONY	0.15	0.1	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	ANTIMONY	0.066 J	0.1	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	ANTIMONY	0.1 J	0.1	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	ANTIMONY	0.11	0.1	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	ANTIMONY	0.092 J	0.1	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	ANTIMONY	0.11	0.1	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	ANTIMONY	0.1	0.1	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	ANTIMONY	0.1 J	0.1	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	ANTIMONY	0.071 J	0.1	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	ANTIMONY	0.088 J	0.1	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	ANTIMONY	0.075 J	0.1	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	ANTIMONY	0.064 J	0.1	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	ANTIMONY	0.079 J	0.1	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	ANTIMONY	0.066 J	0.1	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	ANTIMONY	0.071 J	0.1	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	ANTIMONY	0.052 J	0.1	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	ANTIMONY	0.047 J	0.1	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	ANTIMONY	0.061 J	0.1	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	ANTIMONY	0.069 J	0.1	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	ANTIMONY	0.084 J	0.1	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	ANTIMONY	0.19	0.1	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	ANTIMONY	0.26	0.1	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	ANTIMONY	0.093 J	0.1	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	ANTIMONY	0.11	0.1	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	ANTIMONY	0.058 J	0.1	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	ANTIMONY	0.083 J	0.1	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	ARSENIC	4.3	0.2	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	ARSENIC	4.2	0.2	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	ARSENIC	4.1	0.2	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	ARSENIC	4.4	0.2	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	ARSENIC	5.3	0.2	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	ARSENIC	5.4	0.2	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	ARSENIC	5.6	0.2	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	ARSENIC	5.1	0.2	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	ARSENIC	4.3	0.2	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	ARSENIC	6.7	0.2	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	ARSENIC	7.5	0.21	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	ARSENIC	5	0.2	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	ARSENIC	6.1	0.2	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	ARSENIC	5.4	0.2	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	ARSENIC	6	0.2	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	ARSENIC	6	0.2	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	ARSENIC	5.4	0.2	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	ARSENIC	5.1	0.2	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	ARSENIC	4.8	0.2	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	ARSENIC	5	0.2	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	ARSENIC	5.2	0.2	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	ARSENIC	4.8	0.2	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	ARSENIC	6.2	0.2	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	ARSENIC	6.9	0.2	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	ARSENIC	6.5	0.2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	ARSENIC	6.1	0.2	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	ARSENIC	5.6	0.2	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	ARSENIC	5.6	0.2	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	ARSENIC	5.9	0.2	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	ARSENIC	6.7	0.2	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	ARSENIC	6.7	0.2	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	ARSENIC	7	0.2	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	ARSENIC	6.8	0.2	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	ARSENIC	6.5	0.2	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	ARSENIC	5.4	0.2	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	ARSENIC	5	0.2	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	BARIUM	110	0.5	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	BARIUM	98	0.5	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	BARIUM	75	0.5	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	BARIUM	63	0.51	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	BARIUM	52	0.5	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	BARIUM	58	0.51	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	BARIUM	62	0.5	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	BARIUM	51	0.5	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	BARIUM	46	0.5	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	BARIUM	85	0.51	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	BARIUM	97	0.52	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	BARIUM	52	0.51	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	BARIUM	65	0.51	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	BARIUM	64	0.5	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	BARIUM	70	0.5	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	BARIUM	66	0.51	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	BARIUM	70	0.5	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	BARIUM	59	0.51	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	BARIUM	50	0.5	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	BARIUM	52	0.5	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	BARIUM	57	0.5	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	BARIUM	49	0.51	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	BARIUM	99	0.51	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	BARIUM	91	0.51	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	BARIUM	74	0.5	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	BARIUM	59	0.51	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	BARIUM	54	0.5	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	BARIUM	64	0.5	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	BARIUM	60	0.51	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	BARIUM	92	0.51	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	BARIUM	170	0.51	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	BARIUM	160	0.51	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	BARIUM	62	0.51	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	BARIUM	170	0.51	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	BARIUM	38	0.51	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	BARIUM	67	0.51	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	BERYLLIUM	0.46	0.05	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	BERYLLIUM	0.45	0.05	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	BERYLLIUM	0.41	0.05	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	BERYLLIUM	0.44	0.051	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	BERYLLIUM	0.49	0.05	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	BERYLLIUM	0.54	0.051	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	BERYLLIUM	0.54	0.05	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	BERYLLIUM	0.5	0.05	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	BERYLLIUM	0.42	0.05	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	BERYLLIUM	0.63	0.051	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	BERYLLIUM	0.73	0.052	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	BERYLLIUM	0.49	0.051	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	BERYLLIUM	0.59	0.051	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	BERYLLIUM	0.54	0.05	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	BERYLLIUM	0.58	0.05	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	BERYLLIUM	0.49	0.051	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	BERYLLIUM	0.52	0.05	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	BERYLLIUM	0.51	0.051	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	BERYLLIUM	0.5	0.05	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	BERYLLIUM	0.5	0.05	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	BERYLLIUM	0.49	0.05	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	BERYLLIUM	0.47	0.051	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	BERYLLIUM	0.56	0.051	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	BERYLLIUM	0.6	0.051	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	BERYLLIUM	0.62	0.05	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	BERYLLIUM	0.51	0.051	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	BERYLLIUM	0.47	0.05	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	BERYLLIUM	0.48	0.05	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	BERYLLIUM	0.52	0.051	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	BERYLLIUM	0.59	0.051	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	BERYLLIUM	0.48	0.051	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	BERYLLIUM	0.49	0.051	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	BERYLLIUM	0.63	0.051	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	BERYLLIUM	0.6	0.051	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	BERYLLIUM	0.47	0.051	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	BERYLLIUM	0.49	0.051	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	CADMIUM	0.12 J	0.2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	CADMIUM	0.1 J	0.2	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	CADMIUM	0.075 J	0.2	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	CADMIUM	0.076 J	0.2	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	CADMIUM	0.088 J	0.2	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	CADMIUM	0.093 J	0.2	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	CADMIUM	0.11 J	0.2	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	CADMIUM	0.048 J	0.2	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	CADMIUM	0.048 J	0.2	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	CADMIUM	0.12 J	0.2	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	CADMIUM	0.13 J	0.21	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	CADMIUM	0.067 J	0.2	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	CADMIUM	0.11 J	0.2	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	CADMIUM	0.13 J	0.2	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	CADMIUM	0.093 J	0.2	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	CADMIUM	0.075 J	0.2	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	CADMIUM	0.11 J	0.2	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	CADMIUM	0.085 J	0.2	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	CADMIUM	0.082 J	0.2	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	CADMIUM	0.065 J	0.2	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	CADMIUM	0.083 J	0.2	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	CADMIUM	0.06 J	0.2	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	CADMIUM	0.1 J	0.2	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	CADMIUM	0.083 J	0.2	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	CADMIUM	0.13 J	0.2	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	CADMIUM	0.073 J	0.2	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	CADMIUM	0.063 J	0.2	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	CADMIUM	0.11 J	0.2	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	CADMIUM	0.079 J	0.2	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	CADMIUM	0.13 J	0.2	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	CADMIUM	0.14 J	0.2	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	CADMIUM	0.16 J	0.2	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	CADMIUM	0.12 J	0.2	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	CADMIUM	0.19 J	0.2	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	CADMIUM	0.071 J	0.2	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	CADMIUM	0.12 J	0.2	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	CHROMIUM	9.6	0.99	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	CHROMIUM	8.4	1	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	CHROMIUM	5.9	1	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	CHROMIUM	5.8	1	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	CHROMIUM	6.7	1	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	CHROMIUM	6.9	1	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	CHROMIUM	7.3	1	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	CHROMIUM	6.7	1	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	CHROMIUM	5.5	1	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	CHROMIUM	8.7	1	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	CHROMIUM	9.3	1	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	CHROMIUM	6.5	1	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	CHROMIUM	8.1	1	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	CHROMIUM	7.4	1	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	CHROMIUM	7.7	1	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	CHROMIUM	6.7	1	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	CHROMIUM	7.1	1	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	CHROMIUM	7	1	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	CHROMIUM	6.6	1	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	CHROMIUM	6.9	1	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	CHROMIUM	6.9	1	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	CHROMIUM	6.2	1	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	CHROMIUM	7.9	1	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	CHROMIUM	8.3	1	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	CHROMIUM	8.4	1	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	CHROMIUM	7.1	1	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	CHROMIUM	6.7	1	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	CHROMIUM	7	1	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	CHROMIUM	7.2	1	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	CHROMIUM	8.1	1	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	CHROMIUM	10 J	1	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	CHROMIUM	24 J	1	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	CHROMIUM	8.8	1	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	CHROMIUM	8.4	1	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	CHROMIUM	6.4	1	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	CHROMIUM	6.7	1	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	COBALT	4.7	0.5	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	COBALT	4.6	0.5	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	COBALT	4	0.5	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	COBALT	4.2	0.51	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	COBALT	4.4	0.5	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	COBALT	4.6	0.51	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	COBALT	5.1	0.5	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	COBALT	4.6	0.5	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	COBALT	4	0.5	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	COBALT	6	0.51	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	COBALT	6.7	0.52	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	COBALT	4.1	0.51	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	COBALT	5.4	0.51	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	COBALT	4.8	0.5	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	COBALT	5.3	0.5	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	COBALT	4.9	0.51	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	COBALT	4.6	0.5	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	COBALT	4.4	0.51	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	COBALT	4.3	0.5	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	COBALT	4.5	0.5	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	COBALT	4.6	0.5	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	COBALT	4.2	0.51	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	COBALT	5.5	0.51	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	COBALT	6	0.51	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	COBALT	5.7	0.5	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	COBALT	5.3	0.51	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	COBALT	4.9	0.5	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	COBALT	4.7	0.5	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	COBALT	5.2	0.51	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	COBALT	5.9	0.51	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	COBALT	4.9	0.51	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	COBALT	5.3	0.51	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	COBALT	5.5	0.51	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	COBALT	5.7	0.51	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	COBALT	5.1	0.51	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	COBALT	4.6	0.51	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	COPPER	9	2	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	COPPER	8.8	2	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	COPPER	7.2	2	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	COPPER	6.4	2	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	COPPER	7.7	2	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	COPPER	8	2	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	COPPER	8.9	2	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	COPPER	7	2	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	COPPER	5.3	2	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	COPPER	13	2	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	COPPER	15	2.1	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	COPPER	7.4	2	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	COPPER	10	2	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	COPPER	9.3	2	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	COPPER	9.5	2	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	COPPER	9.2	2	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	COPPER	8.8	2	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	COPPER	7.9	2	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	COPPER	7.1	2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	COPPER	7.7	2	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	COPPER	8.2	2	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	COPPER	6.5	2	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	COPPER	11	2	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	COPPER	11	2	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	COPPER	11	2	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	COPPER	9.2	2	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	COPPER	8.1	2	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	COPPER	8.8	2	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	COPPER	9.6	2	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	COPPER	13	2	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	COPPER	16	2	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	COPPER	18	2	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	COPPER	12	2	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	COPPER	14	2	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	COPPER	7.3	2	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	COPPER	8.7	2	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	IRON	9300	20	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	IRON	9000	20	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	IRON	11000	20	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	IRON	12000	20	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	IRON	13000	20	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	IRON	12000	20	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	IRON	17000	20	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	IRON	19000	21	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	IRON	13000	20	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	IRON	16000	20	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	IRON	16000	20	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	IRON	13000	20	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	IRON	13000	20	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	IRON	16000	20	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	IRON	17000	20	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	IRON	17000	20	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	IRON	15000	20	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	IRON	15000	20	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	IRON	16000	20	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	IRON	17000	20	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	IRON	19000	20	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	IRON	17000	20	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	IRON	16000	20	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	IRON	13000	20	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	LEAD	8.1	0.2	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	LEAD	8.1	0.2	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	LEAD	7.4	0.2	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	LEAD	7.9	0.2	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	LEAD	9.5	0.2	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	LEAD	10	0.2	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	LEAD	11	0.2	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	LEAD	8.5	0.2	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	LEAD	7.2	0.2	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	LEAD	12	0.2	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	LEAD	15	0.21	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	LEAD	9.1	0.2	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	LEAD	12	0.2	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	LEAD	11	0.2	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	LEAD	11	0.2	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	LEAD	10	0.2	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	LEAD	11	0.2	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	LEAD	9.3	0.2	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	LEAD	8.6	0.2	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	LEAD	9.1	0.2	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	LEAD	9.9	0.2	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	LEAD	8.3	0.2	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	LEAD	12	0.2	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	LEAD	12	0.2	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	LEAD	12	0.2	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	LEAD	10	0.2	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	LEAD	9.4	0.2	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	LEAD	11	0.2	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	LEAD	10	0.2	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	LEAD	13	0.2	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	LEAD	37 J	0.2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	LEAD	130 J	0.2	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	LEAD	14	0.2	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	LEAD	16	0.2	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	LEAD	9.2	0.2	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	LEAD	11	0.2	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	MANGANESE	160	0.75	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	MANGANESE	180	0.75	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	MANGANESE	180	0.75	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	MANGANESE	190	0.76	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	MANGANESE	200	0.75	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	MANGANESE	200	0.76	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	MANGANESE	210	0.75	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	MANGANESE	180	0.75	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	MANGANESE	180	0.75	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	MANGANESE	230	0.76	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	MANGANESE	270	0.78	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	MANGANESE	200	0.76	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	MANGANESE	210	0.77	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	MANGANESE	220	0.75	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	MANGANESE	220	0.76	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	MANGANESE	190	0.76	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	MANGANESE	200	0.75	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	MANGANESE	200	0.76	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	MANGANESE	190	0.75	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	MANGANESE	180	0.75	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	MANGANESE	210	0.76	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	MANGANESE	180	0.76	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	MANGANESE	230	0.76	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	MANGANESE	220	0.77	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	MANGANESE	230	0.75	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	MANGANESE	170	0.76	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	MANGANESE	160	0.75	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	MANGANESE	200	0.75	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	MANGANESE	200	0.76	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	MANGANESE	230	0.76	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	MANGANESE	240	0.76	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	MANGANESE	230	0.76	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	MANGANESE	230	0.76	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	MANGANESE	310	0.76	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	MANGANESE	210	0.76	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	MANGANESE	230	0.76	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	MOLYBDENUM	0.24	0.2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	MOLYBDENUM	0.24	0.2	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	MOLYBDENUM	0.26	0.2	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	MOLYBDENUM	0.25	0.2	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	MOLYBDENUM	0.45	0.2	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	MOLYBDENUM	0.34 J	0.2	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	MOLYBDENUM	0.29	0.2	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	MOLYBDENUM	0.37	0.2	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	MOLYBDENUM	0.28	0.2	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	MOLYBDENUM	0.44	0.2	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	MOLYBDENUM	0.55	0.21	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	MOLYBDENUM	0.46	0.2	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	MOLYBDENUM	0.58	0.2	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	MOLYBDENUM	0.38	0.2	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	MOLYBDENUM	0.46	0.2	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	MOLYBDENUM	0.61	0.2	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	MOLYBDENUM	0.35	0.2	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	MOLYBDENUM	0.31	0.2	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	MOLYBDENUM	0.6	0.2	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	MOLYBDENUM	0.56	0.2	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	MOLYBDENUM	0.33	0.2	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	MOLYBDENUM	0.32 J	0.2	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	MOLYBDENUM	0.36	0.2	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	MOLYBDENUM	0.3	0.2	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	MOLYBDENUM	0.42	0.2	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	MOLYBDENUM	0.27	0.2	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	MOLYBDENUM	0.24	0.2	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	MOLYBDENUM	0.41	0.2	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	MOLYBDENUM	0.3	0.2	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	MOLYBDENUM	0.42	0.2	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	MOLYBDENUM	1.4	0.2	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	MOLYBDENUM	1.6	0.2	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	MOLYBDENUM	0.45	0.2	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	MOLYBDENUM	0.46	0.2	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	MOLYBDENUM	0.4	0.2	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	MOLYBDENUM	0.33	0.2	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	NICKEL	11	2	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	NICKEL	10	2	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	NICKEL	7	2	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	NICKEL	6.3	2	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	NICKEL	7	2	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	NICKEL	7.4	2	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	NICKEL	7.8	2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	NICKEL	7.2	2	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	NICKEL	5.9	2	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	NICKEL	10	2	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	NICKEL	11	2.1	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	NICKEL	6.7	2	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	NICKEL	8.4	2	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	NICKEL	7.4	2	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	NICKEL	8.3	2	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	NICKEL	7.7	2	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	NICKEL	7.4	2	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	NICKEL	6.9	2	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	NICKEL	6.9	2	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	NICKEL	7.1	2	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	NICKEL	7.2	2	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	NICKEL	6.3	2	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	NICKEL	8.7	2	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	NICKEL	9.4	2	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	NICKEL	9.1	2	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	NICKEL	8.2	2	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	NICKEL	7.6	2	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	NICKEL	7.5	2	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	NICKEL	8.1	2	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	NICKEL	9.6	2	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	NICKEL	9.1	2	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	NICKEL	9.4	2	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	NICKEL	9.5	2	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	NICKEL	9.3	2	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	NICKEL	7.5	2	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	NICKEL	7.1	2	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	713R15	Ra-226	1.14	0.41	pCi/g
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	713R15	Ra-226	1.09	0.44	pCi/g
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	713R15	Ra-226	2.46 J	0.44	pCi/g
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	713R15	Ra-226	1.54	0.48	pCi/g
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	713R15	Ra-226	24.6	0.8	pCi/g
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	713R15	Ra-226	4.41	0.53	pCi/g
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	713R15	Ra-226	1.66	0.39	pCi/g
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	713R15	Ra-226	2.47	0.59	pCi/g
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	713R15	Ra-226	0.89 J	0.43	pCi/g
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	713R15	Ra-226	7.6 J	1.1	pCi/g
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	713R15	Ra-226	8.3 J	0.7	pCi/g
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	713R15	Ra-226	6.57 J	0.5	pCi/g
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	713R15	Ra-226	12 J	0.9	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	713R15	Ra-226	7.8	0.6	pCi/g
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	713R15	Ra-226	12	0.5	pCi/g
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	713R15	Ra-226	8.8	0.7	pCi/g
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	713R15	Ra-226	11.5	0.7	pCi/g
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	713R15	Ra-226	2.67	0.46	pCi/g
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	713R15	Ra-226	3.17	0.46	pCi/g
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	713R15	Ra-226	4.23 J	0.39	pCi/g
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	713R15	Ra-226	6.93	0.72	pCi/g
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	713R15	Ra-226	2.95	0.48	pCi/g
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	713R15	Ra-226	6.08 J	0.69	pCi/g
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	713R15	Ra-226	4.1	0.62	pCi/g
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	713R15	Ra-226	4.1 J	0.57	pCi/g
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	713R15	Ra-226	1.35 J	0.44	pCi/g
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	713R15	Ra-226	1.53	0.51	pCi/g
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	713R15	Ra-226	12.9 J	0.7	pCi/g
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	713R15	Ra-226	2.09 J	0.31	pCi/g
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	713R15	Ra-226	4.9 J	0.69	pCi/g
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	713R15	Ra-226	68.1 M3	1.1	pCi/g
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	713R15	Ra-226	57.9 M3	1	pCi/g
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	713R15	Ra-226	6.17 J	0.5	pCi/g
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	713R15	Ra-226	5.82 J	0.74	pCi/g
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	713R15	Ra-226	2.97 J	0.39	pCi/g
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	713R15	Ra-226	7.3	0.7	pCi/g
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	SELENIUM	0.97 J	0.99	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	SELENIUM	0.97 J	1	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	SELENIUM	1.2	1	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	SELENIUM	1.1	1	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	SELENIUM	6.3	1	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	SELENIUM	2.4	1	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	SELENIUM	1.4	1	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	SELENIUM	1.3	1	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	SELENIUM	0.99 J	1	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	SELENIUM	1.9	1	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	SELENIUM	2.8	1	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	SELENIUM	2.2	1	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	SELENIUM	3.3	1	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	SELENIUM	2.5	1	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	SELENIUM	3.5	1	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	SELENIUM	3	1	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	SELENIUM	3.9	1	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	SELENIUM	1.5	1	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	SELENIUM	1.7	1	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	SELENIUM	1.7	1	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	SELENIUM	2.1	1	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	SELENIUM	1.4	1	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	SELENIUM	2	1	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	SELENIUM	2	1	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	SELENIUM	1.7	1	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	SELENIUM	1.2	1	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	SELENIUM	1.2	1	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	SELENIUM	2.9	1	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	SELENIUM	1.3	1	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	SELENIUM	1.9	1	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	SELENIUM	9.1	1	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	SELENIUM	7.8	1	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	SELENIUM	2.2	1	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	SELENIUM	2	1	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	SELENIUM	1.2	1	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	SELENIUM	2.2	1	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	SILVER	0.062 J	0.12	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	SILVER	0.088 J	0.12	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	SILVER	0.057 J	0.11	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	SILVER	0.072 J	0.12	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	SILVER	0.073 J	0.12	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	SILVER	0.066 J	0.12	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	THALLIUM	0.097	0.0099	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	THALLIUM	0.095	0.01	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	THALLIUM	0.096	0.01	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	THALLIUM	0.1	0.01	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	THALLIUM	0.13	0.01	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	THALLIUM	0.13	0.01	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	THALLIUM	0.13	0.01	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	THALLIUM	0.093	0.01	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	THALLIUM	0.15	0.01	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	THALLIUM	0.18	0.01	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	THALLIUM	0.14	0.01	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	THALLIUM	0.14	0.01	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	THALLIUM	0.11	0.01	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	THALLIUM	0.11	0.01	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	THALLIUM	0.1	0.01	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	THALLIUM	0.14	0.01	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	THALLIUM	0.14	0.01	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	THALLIUM	0.15	0.01	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	THALLIUM	0.11	0.01	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	THALLIUM	0.14	0.01	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	THALLIUM	0.14	0.01	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	THALLIUM	0.15	0.01	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	THALLIUM	0.18	0.01	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	THALLIUM	0.16	0.01	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	THALLIUM	0.15	0.01	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	THALLIUM	0.11	0.01	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	URANIUM	0.99	0.02	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	URANIUM	0.88	0.02	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	URANIUM	1.7	0.02	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	URANIUM	0.83	0.02	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	URANIUM	13	0.02	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	URANIUM	4	0.02	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	URANIUM	1.2	0.02	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	URANIUM	3.3	0.02	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	URANIUM	0.61	0.02	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	URANIUM	2.2	0.02	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	URANIUM	5.9	0.021	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	URANIUM	5.1	0.02	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	URANIUM	5.9	0.02	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	URANIUM	2.6	0.02	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	URANIUM	19	0.02	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	URANIUM	5.6	0.02	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	URANIUM	8.5	0.02	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	URANIUM	3.2	0.02	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	URANIUM	4.7	0.02	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	URANIUM	5.7	0.02	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	URANIUM	4.3	0.02	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	URANIUM	4.6	0.02	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	URANIUM	3.4	0.02	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	URANIUM	3.1	0.02	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	URANIUM	0.94	0.02	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	URANIUM	0.72	0.02	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	URANIUM	0.63	0.02	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	URANIUM	1.4	0.02	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	URANIUM	0.7	0.02	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	URANIUM	1.2	0.02	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	URANIUM	19	0.02	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	URANIUM	25	0.02	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	URANIUM	1.3	0.02	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	URANIUM	1.4	0.02	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	URANIUM	0.72	0.02	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	URANIUM	4.5	0.02	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	VANADIUM	11	0.5	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	VANADIUM	11	0.5	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	VANADIUM	12	0.5	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	VANADIUM	13	0.51	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	VANADIUM	16	0.5	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	VANADIUM	14	0.51	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	VANADIUM	14	0.5	mg/kg
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	VANADIUM	13	0.5	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	VANADIUM	13	0.5	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	VANADIUM	16	0.51	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	VANADIUM	19	0.52	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	VANADIUM	14	0.51	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	VANADIUM	17	0.51	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	VANADIUM	15	0.5	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	VANADIUM	17	0.5	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	VANADIUM	15	0.51	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	VANADIUM	16	0.5	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	VANADIUM	14	0.51	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	VANADIUM	13	0.5	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	VANADIUM	14	0.5	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	VANADIUM	15	0.5	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	VANADIUM	13	0.51	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	VANADIUM	16	0.51	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	VANADIUM	16	0.51	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	VANADIUM	16	0.5	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	VANADIUM	14	0.51	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	VANADIUM	13	0.5	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	VANADIUM	15	0.5	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	VANADIUM	14	0.51	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	VANADIUM	16	0.51	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	VANADIUM	36	0.51	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	VANADIUM	33	0.51	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	VANADIUM	16	0.51	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	VANADIUM	16	0.51	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	VANADIUM	12	0.51	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	VANADIUM	14	0.51	mg/kg
KMP UNC	KMP-SS45-0000-0003-01	5/19/2022	35.659562	-108.493833	0	3	SW6020	ZINC	33	9.9	mg/kg
KMP UNC	KMP-SS45-0000-0003-02	5/19/2022	35.659562	-108.493833	0	3	SW6020	ZINC	32	10	mg/kg
KMP UNC	KMP-SS46-0000-0003-01	5/19/2022	35.659453	-108.493003	0	3	SW6020	ZINC	32	10	mg/kg
KMP UNC	KMP-SS47-0000-0003-01	5/19/2022	35.659543	-108.49221	0	3	SW6020	ZINC	34	10	mg/kg
KMP UNC	KMP-SS48-0000-0003-01	5/19/2022	35.659648	-108.491281	0	3	SW6020	ZINC	39	10	mg/kg
KMP UNC	KMP-SS50-0000-0003-01	5/19/2022	35.6595	-108.491	0	3	SW6020	ZINC	40	10	mg/kg
KMP UNC	KMP-SS51-0000-0003-01	5/19/2022	35.65919	-108.491	0	3	SW6020	ZINC	43	10	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SS52-0000-0003-01	5/19/2022	35.659169	-108.491722	0	3	SW6020	ZINC	37	10	mg/kg
KMP UNC	KMP-SS53-0000-0003-01	5/19/2022	35.659201	-108.492371	0	3	SW6020	ZINC	31	10	mg/kg
KMP UNC	KMP-SS54-0000-0003-01	5/19/2022	35.658712	-108.492621	0	3	SW6020	ZINC	51	10	mg/kg
KMP UNC	KMP-SS55-0000-0003-01	5/19/2022	35.658793	-108.492026	0	3	SW6020	ZINC	59	10	mg/kg
KMP UNC	KMP-SS56-0000-0003-01	5/19/2022	35.658831	-108.491366	0	3	SW6020	ZINC	38	10	mg/kg
KMP UNC	KMP-SS57-0000-0003-01	5/19/2022	35.658672	-108.491525	0	3	SW6020	ZINC	48	10	mg/kg
KMP UNC	KMP-SS58-0000-0003-01	5/19/2022	35.65853	-108.492	0	3	SW6020	ZINC	43	10	mg/kg
KMP UNC	KMP-SS59-0000-0003-01	5/19/2022	35.658334	-108.491827	0	3	SW6020	ZINC	47	10	mg/kg
KMP UNC	KMP-SS60-0000-0003-01	5/19/2022	35.658129	-108.492013	0	3	SW6020	ZINC	43	10	mg/kg
KMP UNC	KMP-SS61-0000-0003-01	5/19/2022	35.657958	-108.491301	0	3	SW6020	ZINC	41	10	mg/kg
KMP UNC	KMP-SS62-0000-0003-01	5/19/2022	35.658355	-108.491208	0	3	SW6020	ZINC	39	10	mg/kg
KMP UNC	KMP-SS63-0000-0003-01	5/19/2022	35.658917	-108.490612	0	3	SW6020	ZINC	39	10	mg/kg
KMP UNC	KMP-SS64-0000-0003-01	5/19/2022	35.658394	-108.49068	0	3	SW6020	ZINC	39	10	mg/kg
KMP UNC	KMP-SS65-0000-0003-01	5/19/2022	35.658535	-108.490274	0	3	SW6020	ZINC	40	10	mg/kg
KMP UNC	KMP-SS66-0000-0003-01	5/19/2022	35.658093	-108.490734	0	3	SW6020	ZINC	36	10	mg/kg
KMP UNC	KMP-SS67-0000-0003-01	5/19/2022	35.658057	-108.490414	0	3	SW6020	ZINC	48	10	mg/kg
KMP UNC	KMP-SS68-0000-0003-01	5/19/2022	35.65776	-108.491	0	3	SW6020	ZINC	47	10	mg/kg
KMP UNC	KMP-SS69-0000-0003-01	5/19/2022	35.65736	-108.492	0	3	SW6020	ZINC	51	10	mg/kg
KMP UNC	KMP-SS70-0000-0003-01	5/19/2022	35.657343	-108.490976	0	3	SW6020	ZINC	43	10	mg/kg
KMP UNC	KMP-SS70-0000-0003-02	5/19/2022	35.657343	-108.490976	0	3	SW6020	ZINC	39	10	mg/kg
KMP UNC	KMP-SS71-0000-0003-01	5/19/2022	35.656666	-108.491638	0	3	SW6020	ZINC	43	10	mg/kg
KMP UNC	KMP-SS72-0000-0003-01	5/19/2022	35.656683	-108.49091	0	3	SW6020	ZINC	47	10	mg/kg
KMP UNC	KMP-SS73-0000-0003-01	5/19/2022	35.658117	-108.493493	0	3	SW6020	ZINC	53	10	mg/kg
KMP UNC	KMP-SS75-0000-0003-01	5/19/2022	35.659492	-108.489461	0	3	SW6020	ZINC	95	10	mg/kg
KMP UNC	KMP-SS75-0000-0003-02	5/19/2022	35.659492	-108.489461	0	3	SW6020	ZINC	90	10	mg/kg
KMP UNC	KMP-SS76-0000-0003-01	5/19/2022	35.659031	-108.489527	0	3	SW6020	ZINC	53	10	mg/kg
KMP UNC	KMP-SS77-0000-0003-01	5/19/2022	35.658484	-108.488991	0	3	SW6020	ZINC	55	10	mg/kg
KMP UNC	KMP-SS78-0000-0003-01	5/19/2022	35.658169	-108.487842	0	3	SW6020	ZINC	39	10	mg/kg
KMP UNC	KMP-SS79-0000-0003-01	5/19/2022	35.658754	-108.491022	0	3	SW6020	ZINC	39	10	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	ALUMINUM	7000	16	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	ANTIMONY	0.081 J	0.1	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	ARSENIC	5.9	0.21	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	BARIUM	81	0.52	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	BERYLLIUM	0.6	0.052	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	CADMIUM	0.07 J	0.21	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	CHROMIUM	8.1	1	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	COBALT	5	0.52	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	COPPER	9.3	2.1	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	IRON	15000	21	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	LEAD	10	0.21	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	MANGANESE	200	0.78	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	MOLYBDENUM	0.41	0.21	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	NICKEL	8.7	2.1	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	713R15	Ra-226	1.27	0.4	pCi/g
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	SELENIUM	1.3	1	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	SILVER	0.059 U	0.12	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	THALLIUM	0.17	0.01	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	URANIUM	1.5	0.021	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	VANADIUM	14	0.52	mg/kg
KMP UNC	KMP-SB27-0000-0006-01	6/3/2022	35.659216	-108.489648	0	6	SW6020	ZINC	40	10	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	ALUMINUM	5500	16	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	ALUMINUM	8300	16	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	ALUMINUM	5400	15	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	ALUMINUM	7200	17	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	ANTIMONY	0.058 J	0.1	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	ANTIMONY	0.14	0.11	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	ANTIMONY	0.1	0.1	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	ANTIMONY	0.11 J	0.11	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	ARSENIC	4.7	0.21	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	ARSENIC	6.8	0.22	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	ARSENIC	5.3	0.2	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	ARSENIC	6	0.22	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	BARIUM	47	0.52	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	BARIUM	110	0.55	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	BARIUM	65	0.5	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	BARIUM	69	0.55	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	BERYLLIUM	0.47	0.052	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	BERYLLIUM	0.67	0.055	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	BERYLLIUM	0.44	0.05	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	BERYLLIUM	0.55	0.055	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	CADMIUM	0.045 J	0.21	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	CADMIUM	0.14 J	0.22	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	CADMIUM	0.11 J	0.2	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	CADMIUM	0.094 J	0.22	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	CHROMIUM	6.1	1	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	CHROMIUM	8.7	1.1	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	CHROMIUM	5.8	1	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	CHROMIUM	7.5	1.1	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	COBALT	4.4	0.52	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	COBALT	6	0.55	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	COBALT	4.2	0.5	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	COBALT	5.9	0.55	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	COPPER	6.6	2.1	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	COPPER	12	2.2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	COPPER	7.6	2	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	COPPER	9.8	2.2	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	IRON	12000	21	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	IRON	16000	22	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	IRON	12000	20	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	IRON	16000	22	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	LEAD	7.7	0.21	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	LEAD	13	0.22	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	LEAD	9.7	0.2	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	LEAD	11	0.22	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	MANGANESE	180	0.78	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	MANGANESE	270	0.82	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	MANGANESE	230	0.76	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	MANGANESE	250	0.83	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	MOLYBDENUM	0.67	0.21	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	MOLYBDENUM	0.48	0.22	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	MOLYBDENUM	0.62	0.2	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	MOLYBDENUM	0.5	0.22	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	NICKEL	6.5	2.1	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	NICKEL	9.7	2.2	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	NICKEL	6.1	2	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	NICKEL	8.9	2.2	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	713R15	Ra-226	1.81 J	0.44	pCi/g
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	713R15	Ra-226	1.16 J	0.57	pCi/g
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	713R15	Ra-226	27.1 J	0.8	pCi/g
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	713R15	Ra-226	1.4 J	0.59	pCi/g
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	SELENIUM	1.5	1	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	SELENIUM	1.5	1.1	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	SELENIUM	6.4	1	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	SELENIUM	1.3	1.1	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	SILVER	0.06 U	0.12	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	SILVER	0.067 J	0.12	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	SILVER	0.057 UJ	0.11	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	SILVER	0.063 UJ	0.13	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	THALLIUM	0.11	0.01	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	THALLIUM	0.17	0.011	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	THALLIUM	0.1	0.01	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	THALLIUM	0.13	0.011	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	URANIUM	23	0.021	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	URANIUM	5.9	0.022	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	URANIUM	30	0.02	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	URANIUM	1.4	0.022	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	VANADIUM	13	0.52	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	VANADIUM	17	0.55	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	VANADIUM	17	0.5	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	VANADIUM	16	0.55	mg/kg
KMP UNC	KMP-SB25-0006-0012-01	6/3/2022	35.659242	-108.491829	6	12	SW6020	ZINC	32	10	mg/kg
KMP UNC	KMP-SB26-0006-0012-01	6/3/2022	35.659916	-108.49061	6	12	SW6020	ZINC	48	11	mg/kg
KMP UNC	KMP-SB35-0006-0012-01	6/3/2022	35.658326	-108.491719	6	12	SW6020	ZINC	36	10	mg/kg
KMP UNC	KMP-SB38-0006-0012-01	6/3/2022	35.657432	-108.490829	6	12	SW6020	ZINC	44	11	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	ALUMINUM	7600	16	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	ALUMINUM	7700	16	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	ALUMINUM	8200	16	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	ANTIMONY	0.11	0.1	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	ANTIMONY	0.099 J	0.11	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	ANTIMONY	0.091 J	0.11	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	ARSENIC	6.5	0.21	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	ARSENIC	6.5	0.21	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	ARSENIC	6.7	0.21	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	BARIUM	85	0.52	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	BARIUM	90	0.53	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	BARIUM	92	0.53	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	BERYLLIUM	0.63	0.052	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	BERYLLIUM	0.63	0.053	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	BERYLLIUM	0.68	0.053	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	CADMIUM	0.12 J	0.21	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	CADMIUM	0.1 J	0.21	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	CADMIUM	0.08 J	0.21	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	CHROMIUM	8.4	1	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	CHROMIUM	8.4	1.1	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	CHROMIUM	9	1.1	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	COBALT	5.7	0.52	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	COBALT	5.7	0.53	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	COBALT	5.8	0.53	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	COPPER	11	2.1	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	COPPER	11	2.1	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	COPPER	11	2.1	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	IRON	16000	21	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	IRON	16000	21	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	IRON	16000	21	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	LEAD	12	0.21	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	LEAD	12	0.21	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	LEAD	11	0.21	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	MANGANESE	240	0.78	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	MANGANESE	250	0.79	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	MANGANESE	230	0.79	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	MOLYBDENUM	0.43	0.21	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	MOLYBDENUM	0.41	0.21	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	MOLYBDENUM	0.41	0.21	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	NICKEL	9.4	2.1	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	NICKEL	9.4	2.1	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	NICKEL	9.7	2.1	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	713R15	Ra-226	1.32 J	0.33	pCi/g
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	713R15	Ra-226	1.83 J	0.86	pCi/g
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	713R15	Ra-226	1.17 J	0.49	pCi/g
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	SELENIUM	1.3	1	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	SELENIUM	1.3	1.1	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	SELENIUM	1.5	1.1	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	SILVER	0.063 J	0.12	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	SILVER	0.066 J	0.12	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	SILVER	0.069 J	0.12	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	THALLIUM	0.18	0.01	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	THALLIUM	0.18	0.011	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	THALLIUM	0.18	0.011	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	URANIUM	1.8	0.021	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	URANIUM	1.6	0.021	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	URANIUM	0.8	0.021	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	VANADIUM	15	0.52	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	VANADIUM	16	0.53	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	VANADIUM	16	0.53	mg/kg
KMP UNC	KMP-SB26-0012-0018-01	6/3/2022	35.659916	-108.49061	12	18	SW6020	ZINC	45	10	mg/kg
KMP UNC	KMP-SB26-0012-0018-02	6/3/2022	35.659916	-108.49061	12	18	SW6020	ZINC	46	11	mg/kg
KMP UNC	KMP-SB27-0012-0018-01	6/3/2022	35.659216	-108.489648	12	18	SW6020	ZINC	46	11	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	ALUMINUM	6900	17	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	ALUMINUM	6000	16	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	ANTIMONY	0.1 J	0.12	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	ANTIMONY	0.064 J	0.11	mg/kg
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	ARSENIC	5.1	Unknown	mg/kg
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	ARSENIC	4.9	Unknown	mg/kg
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	ARSENIC	4.5	Unknown	mg/kg
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	ARSENIC	5	Unknown	mg/kg
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	ARSENIC	4.2	Unknown	mg/kg
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	ARSENIC	4	Unknown	mg/kg
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	ARSENIC	5.3	Unknown	mg/kg
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	ARSENIC	4.9	Unknown	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	ARSENIC	7	0.23	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	ARSENIC	5.1	0.22	mg/kg
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	BARIUM	190	Unknown	mg/kg
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	BARIUM	55	Unknown	mg/kg
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	BARIUM	43	Unknown	mg/kg
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	BARIUM	62	Unknown	mg/kg
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	BARIUM	74	Unknown	mg/kg
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	BARIUM	41	Unknown	mg/kg
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	BARIUM	47	Unknown	mg/kg
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	BARIUM	51	Unknown	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	BARIUM	60	0.58	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	BARIUM	44	0.55	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	BERYLLIUM	0.6	0.058	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	BERYLLIUM	0.51	0.055	mg/kg
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	CADMIUM	0.11 J	Unknown	mg/kg
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	CADMIUM	0.12 U	Unknown	mg/kg
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	CADMIUM	0.11 U	Unknown	mg/kg
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	CADMIUM	0.13 U	Unknown	mg/kg
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	CADMIUM	0.13 U	Unknown	mg/kg
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	CADMIUM	0.076 J	Unknown	mg/kg
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	CADMIUM	0.062	Unknown	mg/kg
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	CADMIUM	0.077 J	Unknown	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	CADMIUM	0.094 J	0.23	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	CADMIUM	0.054 J	0.22	mg/kg
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	CHROMIUM	8.1	Unknown	mg/kg
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	CHROMIUM	7	Unknown	mg/kg
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	CHROMIUM	7	Unknown	mg/kg
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	CHROMIUM	7.7	Unknown	mg/kg
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	CHROMIUM	8.6	Unknown	mg/kg
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	CHROMIUM	5.9	Unknown	mg/kg
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	CHROMIUM	7.8	Unknown	mg/kg
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	CHROMIUM	7.8	Unknown	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	CHROMIUM	7.6	1.2	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	CHROMIUM	6.6	1.1	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	COBALT	5.9	0.58	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	COBALT	4.7	0.55	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	COPPER	11	2.3	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	COPPER	7.4	2.2	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	IRON	16000	23	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	IRON	13000	22	mg/kg
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	LEAD	11	Unknown	mg/kg
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	LEAD	7.6	Unknown	mg/kg
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	LEAD	7.2	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	LEAD	9.1	Unknown	mg/kg
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	LEAD	6.7	Unknown	mg/kg
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	LEAD	6.4	Unknown	mg/kg
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	LEAD	8.5	Unknown	mg/kg
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	LEAD	7.9	Unknown	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	LEAD	12	0.23	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	LEAD	8.2	0.22	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	MANGANESE	220	0.86	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	MANGANESE	190	0.82	mg/kg
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	MOLYBDENUM	1.4	Unknown	mg/kg
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	MOLYBDENUM	0.64 J	Unknown	mg/kg
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	MOLYBDENUM	0.75 J	Unknown	mg/kg
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	MOLYBDENUM	0.79 J	Unknown	mg/kg
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	MOLYBDENUM	0.69 J	Unknown	mg/kg
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	MOLYBDENUM	0.76 J	Unknown	mg/kg
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	MOLYBDENUM	0.51 J	Unknown	mg/kg
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	MOLYBDENUM	1 J	Unknown	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	MOLYBDENUM	0.4	0.23	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	MOLYBDENUM	0.47	0.22	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	NICKEL	9	2.3	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	NICKEL	6.9	2.2	mg/kg
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	Ra-226	143.1	Unknown	pCi/g
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	Ra-226	8.3	Unknown	pCi/g
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	Ra-226	1.9	Unknown	pCi/g
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	Ra-226	3.1	Unknown	pCi/g
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	Ra-226	2.3	Unknown	pCi/g
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	Ra-226	3.2	Unknown	pCi/g
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	Ra-226	1.1	Unknown	pCi/g
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	Ra-226	1.3	Unknown	pCi/g
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	713R15	Ra-226	0.98 J	0.54	pCi/g
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	713R15	Ra-226	0.92 J	0.38	pCi/g
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	SELENIUM	37	Unknown	mg/kg
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	SELENIUM	3	Unknown	mg/kg
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	SELENIUM	1.4	Unknown	mg/kg
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	SELENIUM	3.3	Unknown	mg/kg
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	SELENIUM	1.6	Unknown	mg/kg
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	SELENIUM	1.6	Unknown	mg/kg
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	SELENIUM	1.7	Unknown	mg/kg
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	SELENIUM	1.3	Unknown	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	SELENIUM	1.4	1.2	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	SELENIUM	1.1 J	1.1	mg/kg
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	SILVER	0.52 U	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	SILVER	0.46 U	Unknown	mg/kg
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	SILVER	0.45 U	Unknown	mg/kg
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	SILVER	0.53 U	Unknown	mg/kg
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	SILVER	0.5 U	Unknown	mg/kg
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	SILVER	0.46 U	Unknown	mg/kg
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	SILVER	0.19	Unknown	mg/kg
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	SILVER	0.51 U	Unknown	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	SILVER	0.066 U	0.13	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	SILVER	0.062 U	0.12	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	THALLIUM	0.15	0.012	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	THALLIUM	0.12	0.011	mg/kg
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	URANIUM	110	Unknown	mg/kg
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	URANIUM	130	Unknown	mg/kg
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	URANIUM	24	Unknown	mg/kg
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	URANIUM	60	Unknown	mg/kg
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	URANIUM	22	Unknown	mg/kg
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	URANIUM	35	Unknown	mg/kg
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	URANIUM	4.3	Unknown	mg/kg
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	URANIUM	44	Unknown	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	URANIUM	2.2	0.023	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	URANIUM	60	0.022	mg/kg
KMP UNC	KMP-16-18	7/18/2017	35.658292	-108.491842	18	24	Unknown	VANADIUM	58	Unknown	mg/kg
KMP UNC	KMP-17-18	7/19/2017	35.658397	-108.491778	18	24	Unknown	VANADIUM	17	Unknown	mg/kg
KMP UNC	KMP-18-18	7/19/2017	35.658584	-108.491524	18	24	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-19-18	7/19/2017	35.65865	-108.491373	18	24	Unknown	VANADIUM	18	Unknown	mg/kg
KMP UNC	KMP-20-18	7/19/2017	35.658809	-108.491224	18	24	Unknown	VANADIUM	17	Unknown	mg/kg
KMP UNC	KMP-21-18	7/19/2017	35.658901	-108.491165	18	24	Unknown	VANADIUM	13	Unknown	mg/kg
KMP UNC	KMP-22-18	7/19/2017	35.658405	-108.490563	18	24	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-23-18	7/18/2017	35.658984	-108.490548	18	24	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	VANADIUM	15	0.58	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	VANADIUM	13	0.55	mg/kg
KMP UNC	KMP-SB24-0018-0024-01	6/3/2022	35.658718	-108.492772	18	24	SW6020	ZINC	46	12	mg/kg
KMP UNC	KMP-SB25-0018-0024-01	6/3/2022	35.659242	-108.491829	18	24	SW6020	ZINC	35	11	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	ALUMINUM	5600	15	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	ALUMINUM	6100	15	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	ANTIMONY	0.058 J	0.1	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	ANTIMONY	0.074 J	0.099	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	ARSENIC	4.9	0.21	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	ARSENIC	5.5	0.2	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	BARIUM	43	0.51	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	BARIUM	51	0.49	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	BERYLLIUM	0.48	0.051	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	BERYLLIUM	0.5	0.049	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	CADMIUM	0.047 J	0.21	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	CADMIUM	0.065 J	0.2	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	CHROMIUM	6.1	1	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	CHROMIUM	6.7	0.99	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	COBALT	5.2	0.51	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	COBALT	4.7	0.49	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	COPPER	6.4	2.1	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	COPPER	8	2	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	IRON	12000	21	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	IRON	13000	20	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	LEAD	7.9	0.21	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	LEAD	8.9	0.2	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	MANGANESE	170	0.77	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	MANGANESE	220	0.74	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	MOLYBDENUM	1.2	0.21	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	MOLYBDENUM	0.58	0.2	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	NICKEL	6.6	2.1	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	NICKEL	7.1	2	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	713R15	Ra-226	0.78 J	0.39	pCi/g
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	713R15	Ra-226	30.7	1	pCi/g
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	SELENIUM	2.9	1	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	SELENIUM	2.4	0.99	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	SILVER	0.056 UJ	0.11	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	THALLIUM	0.12	0.0099	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	URANIUM	0.86	0.021	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	URANIUM	24	0.02	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	VANADIUM	12	0.51	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	VANADIUM	14	0.49	mg/kg
KMP UNC	KMP-SB30-0030-0036-01	6/4/2022	35.65856	-108.49066	30	36	SW6020	ZINC	32	10	mg/kg
KMP UNC	KMP-SB36-0030-0036-01	6/3/2022	35.658143	-108.491879	30	36	SW6020	ZINC	38	9.9	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	ALUMINUM	5600	16	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	ALUMINUM	7900	15	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	ANTIMONY	0.063 J	0.11	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	ANTIMONY	0.11 J	0.1	mg/kg
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	ARSENIC	5	Unknown	mg/kg
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	ARSENIC	4.7	Unknown	mg/kg
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	ARSENIC	4.7	Unknown	mg/kg
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	ARSENIC	5.3	Unknown	mg/kg
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	ARSENIC	7.5	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	ARSENIC	5.3	Unknown	mg/kg
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	ARSENIC	4	Unknown	mg/kg
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	ARSENIC	4.9	Unknown	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	ARSENIC	4.9	0.21	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	ARSENIC	6.8	0.21	mg/kg
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	BARIUM	51	Unknown	mg/kg
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	BARIUM	43	Unknown	mg/kg
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	BARIUM	43	Unknown	mg/kg
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	BARIUM	55	Unknown	mg/kg
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	BARIUM	69	Unknown	mg/kg
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	BARIUM	57	Unknown	mg/kg
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	BARIUM	40	Unknown	mg/kg
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	BARIUM	54	Unknown	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	BARIUM	45	0.53	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	BARIUM	83	0.52	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	BERYLLIUM	0.47	0.053	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	BERYLLIUM	0.6	0.052	mg/kg
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	CADMIUM	0.12 U	Unknown	mg/kg
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	CADMIUM	0.12 U	Unknown	mg/kg
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	CADMIUM	0.13 U	Unknown	mg/kg
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	CADMIUM	0.13 U	Unknown	mg/kg
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	CADMIUM	0.076 J	Unknown	mg/kg
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	CADMIUM	0.067 J	Unknown	mg/kg
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	CADMIUM	0.12 U	Unknown	mg/kg
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	CADMIUM	0.13 U	Unknown	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	CADMIUM	0.053 J	0.21	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	CADMIUM	0.079 J	0.21	mg/kg
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	CHROMIUM	7.5	Unknown	mg/kg
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	CHROMIUM	6.9	Unknown	mg/kg
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	CHROMIUM	7.7	Unknown	mg/kg
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	CHROMIUM	7.4	Unknown	mg/kg
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	CHROMIUM	7.4	Unknown	mg/kg
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	CHROMIUM	8	Unknown	mg/kg
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	CHROMIUM	5.8	Unknown	mg/kg
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	CHROMIUM	8.2	Unknown	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	CHROMIUM	6.1	1.1	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	CHROMIUM	8.6	1	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	COBALT	4.4	0.53	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	COBALT	6.3	0.52	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	COPPER	6.7	2.1	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	COPPER	11	2.1	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	IRON	12000	21	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	IRON	17000	21	mg/kg
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	LEAD	8.3	Unknown	mg/kg
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	LEAD	7.3	Unknown	mg/kg
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	LEAD	8	Unknown	mg/kg
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	LEAD	7	Unknown	mg/kg
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	LEAD	12	Unknown	mg/kg
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	LEAD	8.9	Unknown	mg/kg
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	LEAD	6.4	Unknown	mg/kg
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	LEAD	8.2	Unknown	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	LEAD	7.9	0.21	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	LEAD	11	0.21	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	MANGANESE	170	0.8	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	MANGANESE	230	0.77	mg/kg
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	MOLYBDENUM	0.63 J	Unknown	mg/kg
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	MOLYBDENUM	0.58 J	Unknown	mg/kg
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	MOLYBDENUM	0.65 J	Unknown	mg/kg
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	MOLYBDENUM	0.67 J	Unknown	mg/kg
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	MOLYBDENUM	1.1 J	Unknown	mg/kg
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	MOLYBDENUM	0.75 J	Unknown	mg/kg
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	MOLYBDENUM	1.2 U	Unknown	mg/kg
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	MOLYBDENUM	1.3	Unknown	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	MOLYBDENUM	1.7	0.21	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	MOLYBDENUM	0.33 J	0.21	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	NICKEL	6.5	2.1	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	NICKEL	9.4	2.1	mg/kg
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	Ra-226	1.7	Unknown	pCi/g
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	Ra-226	3.4	Unknown	pCi/g
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	Ra-226	1.3	Unknown	pCi/g
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	Ra-226	1.7	Unknown	pCi/g
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	Ra-226	1.3	Unknown	pCi/g
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	Ra-226	1.6	Unknown	pCi/g
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	Ra-226	0.9	Unknown	pCi/g
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	Ra-226	1.3	Unknown	pCi/g
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	713R15	Ra-226	0.93 J	0.39	pCi/g
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	713R15	Ra-226	1.14 J	0.45	pCi/g
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	SELENIUM	1.4	Unknown	mg/kg
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	SELENIUM	2.3	Unknown	mg/kg
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	SELENIUM	1.7	Unknown	mg/kg
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	SELENIUM	2	Unknown	mg/kg
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	SELENIUM	1.5	Unknown	mg/kg
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	SELENIUM	2.1	Unknown	mg/kg
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	SELENIUM	1.4	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	SELENIUM	1.5	Unknown	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	SELENIUM	1.1 J	1.1	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	SELENIUM	1.3	1	mg/kg
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	SILVER	0.48 U	Unknown	mg/kg
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	SILVER	0.47 U	Unknown	mg/kg
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	SILVER	0.5 U	Unknown	mg/kg
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	SILVER	0.5 U	Unknown	mg/kg
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	SILVER	0.5 U	Unknown	mg/kg
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	SILVER	0.5 U	Unknown	mg/kg
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	SILVER	0.5 U	Unknown	mg/kg
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	SILVER	0.52 U	Unknown	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	SILVER	0.061 U	0.12	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	SILVER	0.059 UJ	0.12	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	THALLIUM	0.11	0.011	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	THALLIUM	0.15	0.01	mg/kg
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	URANIUM	37	Unknown	mg/kg
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	URANIUM	58	Unknown	mg/kg
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	URANIUM	38	Unknown	mg/kg
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	URANIUM	32	Unknown	mg/kg
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	URANIUM	32	Unknown	mg/kg
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	URANIUM	22	Unknown	mg/kg
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	URANIUM	0.77	Unknown	mg/kg
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	URANIUM	52	Unknown	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	URANIUM	180	0.021	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	URANIUM	0.63	0.021	mg/kg
KMP UNC	KMP-16-36	7/18/2017	35.658292	-108.491842	36	42	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-17-36	7/19/2017	35.658397	-108.491778	36	42	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-18-36	7/19/2017	35.658584	-108.491524	36	42	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-19-36	7/19/2017	35.65865	-108.491373	36	42	Unknown	VANADIUM	17	Unknown	mg/kg
KMP UNC	KMP-20-36	7/19/2017	35.658809	-108.491224	36	42	Unknown	VANADIUM	17	Unknown	mg/kg
KMP UNC	KMP-21-36	7/19/2017	35.658901	-108.491165	36	42	Unknown	VANADIUM	17	Unknown	mg/kg
KMP UNC	KMP-22-36	7/19/2017	35.658405	-108.490563	36	42	Unknown	VANADIUM	13	Unknown	mg/kg
KMP UNC	KMP-23-36	7/18/2017	35.658984	-108.490548	36	42	Unknown	VANADIUM	16	Unknown	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	VANADIUM	12	0.53	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	VANADIUM	16	0.52	mg/kg
KMP UNC	KMP-SB28-0036-0042-01	6/4/2022	35.658964	-108.490576	36	42	SW6020	ZINC	32	11	mg/kg
KMP UNC	KMP-SB38-0036-0042-01	6/3/2022	35.657432	-108.490829	36	42	SW6020	ZINC	48	10	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	ALUMINUM	6400	16	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	ANTIMONY	0.065 J	0.11	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	ARSENIC	5.4	0.21	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	BARIUM	57	0.53	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	BERYLLIUM	0.53	0.053	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	CADMIUM	0.064 J	0.21	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	CHROMIUM	6.8	1.1	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	COBALT	4.7	0.53	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	COPPER	7.4	2.1	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	IRON	14000	21	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	LEAD	8.6	0.21	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	MANGANESE	200	0.8	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	MOLYBDENUM	1.4	0.21	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	NICKEL	7.3	2.1	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	713R15	Ra-226	0.93 J	0.44	pCi/g
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	SELENIUM	1.1	1.1	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	SILVER	0.061 U	0.12	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	THALLIUM	0.13	0.011	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	URANIUM	190	0.021	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	VANADIUM	13	0.53	mg/kg
KMP UNC	KMP-SB28-0042-0048-01	6/4/2022	35.658964	-108.490576	42	48	SW6020	ZINC	36	11	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	ALUMINUM	9600	16	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	ALUMINUM	5000	15	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	ALUMINUM	5300	15	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	ALUMINUM	5400	16	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	ANTIMONY	0.11 J	0.11	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	ANTIMONY	0.063 J	0.1	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	ANTIMONY	0.058 J	0.1	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	ANTIMONY	0.05 J	0.1	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	ARSENIC	8.5	0.21	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	ARSENIC	4.9	0.21	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	ARSENIC	5	0.2	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	ARSENIC	4.8	0.21	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	BARIUM	110	0.54	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	BARIUM	60	0.51	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	BARIUM	55	0.51	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	BARIUM	41	0.52	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	BERYLLIUM	0.85	0.054	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	BERYLLIUM	0.42	0.051	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	BERYLLIUM	0.43	0.051	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	BERYLLIUM	0.45	0.052	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	CADMIUM	0.1 J	0.21	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	CADMIUM	0.043 J	0.21	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	CADMIUM	0.048 J	0.2	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	CADMIUM	0.05 J	0.21	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	CHROMIUM	11	1.1	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	CHROMIUM	5.6	1	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	CHROMIUM	5.6	1	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	CHROMIUM	6	1	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	COBALT	7.9	0.54	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	COBALT	4.1	0.51	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	COBALT	3.9	0.51	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	COBALT	4.3	0.52	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	COPPER	14	2.1	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	COPPER	5.5	2.1	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	COPPER	5.6	2	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	COPPER	6.9	2.1	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	IRON	22000	21	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	IRON	13000	21	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	IRON	14000	20	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	IRON	12000	21	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	LEAD	15	0.21	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	LEAD	7.3	0.21	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	LEAD	7.4	0.2	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	LEAD	8.1	0.21	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	MANGANESE	300	0.8	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	MANGANESE	290	0.77	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	MANGANESE	310	0.77	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	MANGANESE	170	0.78	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	MOLYBDENUM	0.53 J	0.21	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	MOLYBDENUM	0.39	0.21	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	MOLYBDENUM	0.34	0.2	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	MOLYBDENUM	0.44	0.21	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	NICKEL	12	2.1	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	NICKEL	5.9	2.1	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	NICKEL	6.1	2	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	NICKEL	6.3	2.1	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	713R15	Ra-226	1.56 J	0.53	pCi/g
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	713R15	Ra-226	0.82 J	0.48	pCi/g
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	713R15	Ra-226	0.8 J	0.44	pCi/g
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	713R15	Ra-226	3.57	0.47	pCi/g
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	SELENIUM	1.8	1.1	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	SELENIUM	1.1	1	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	SELENIUM	0.98 J	1	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	SELENIUM	1.5	1	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	SILVER	0.11 J	0.12	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	SILVER	0.059 U	0.12	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	SILVER	0.059 U	0.12	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	THALLIUM	0.21	0.011	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	THALLIUM	0.1	0.01	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	THALLIUM	0.1	0.01	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	URANIUM	1.1	0.021	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	URANIUM	0.59	0.021	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	URANIUM	0.58	0.02	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	URANIUM	20	0.021	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	VANADIUM	20	0.54	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	VANADIUM	13	0.51	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	VANADIUM	13	0.51	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	VANADIUM	12	0.52	mg/kg
KMP UNC	KMP-SB24-0048-0054-01	6/3/2022	35.658718	-108.492772	48	54	SW6020	ZINC	60	11	mg/kg
KMP UNC	KMP-SB29-0048-0054-01	6/4/2022	35.65859	-108.490409	48	54	SW6020	ZINC	31	10	mg/kg
KMP UNC	KMP-SB29-0048-0054-02	6/4/2022	35.65859	-108.490409	48	54	SW6020	ZINC	31	10	mg/kg
KMP UNC	KMP-SB34-0048-0054-01	6/3/2022	35.658631	-108.491402	48	54	SW6020	ZINC	34	10	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	ALUMINUM	5600	16	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	ALUMINUM	7600	16	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	ALUMINUM	7900	16	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	ANTIMONY	0.043 J	0.1	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	ANTIMONY	0.087 J	0.11	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	ANTIMONY	0.099 J	0.11	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	ARSENIC	5.1	0.21	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	ARSENIC	6	0.21	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	ARSENIC	6.4	0.21	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	BARIUM	44	0.52	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	BARIUM	90	0.53	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	BARIUM	86	0.54	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	BERYLLIUM	0.47	0.052	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	BERYLLIUM	0.61	0.053	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	BERYLLIUM	0.69	0.054	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	CADMIUM	0.05 J	0.21	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	CADMIUM	0.063 J	0.21	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	CADMIUM	0.081 J	0.21	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	CHROMIUM	6	1	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	CHROMIUM	8	1.1	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	CHROMIUM	8.5	1.1	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	COBALT	4.5	0.52	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	COBALT	5.5	0.53	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	COBALT	6.2	0.54	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	COPPER	6.8	2.1	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	COPPER	9.6	2.1	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	COPPER	11	2.1	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	IRON	13000	21	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	IRON	15000	21	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	IRON	17000	21	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	LEAD	7.8	0.21	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	LEAD	10	0.21	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	LEAD	11	0.21	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	MANGANESE	190	0.78	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	MANGANESE	240	0.8	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	MANGANESE	240	0.81	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	MOLYBDENUM	0.3	0.21	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	MOLYBDENUM	0.41	0.21	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	MOLYBDENUM	0.39	0.21	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	NICKEL	6.7	2.1	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	NICKEL	8.6	2.1	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	NICKEL	9.3	2.1	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	713R15	Ra-226	0.7 J	0.44	pCi/g
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	713R15	Ra-226	1.48 J	0.54	pCi/g
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	713R15	Ra-226	1.05 J	0.5	pCi/g
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	SELENIUM	1.1	1	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	SELENIUM	1.3	1.1	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	SELENIUM	1.4	1.1	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	SILVER	0.059 U	0.12	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	SILVER	0.061 U	0.12	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	SILVER	0.061 U	0.12	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	THALLIUM	0.16	0.011	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	THALLIUM	0.17	0.011	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	URANIUM	0.66	0.021	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	URANIUM	0.76	0.021	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	URANIUM	1	0.021	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	VANADIUM	12	0.52	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	VANADIUM	15	0.53	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	VANADIUM	17	0.54	mg/kg
KMP UNC	KMP-SB33-0054-0060-01	6/3/2022	35.658445	-108.491212	54	60	SW6020	ZINC	33	10	mg/kg
KMP UNC	KMP-SB41-0054-0060-01	6/4/2022	35.659569	-108.491192	54	60	SW6020	ZINC	43	11	mg/kg
KMP UNC	KMP-SB42-0054-0060-01	6/8/2022	35.659569	-108.492026	54	60	SW6020	ZINC	47	11	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	ALUMINUM	5900	16	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	ALUMINUM	5900	16	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	ALUMINUM	6900	16	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	ALUMINUM	5500	15	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	ALUMINUM	5000	15	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	ANTIMONY	0.063 J	0.11	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	ANTIMONY	0.063 J	0.11	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	ANTIMONY	0.057 J	0.1	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	ANTIMONY	0.049 J	0.1	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	ANTIMONY	0.042 J	0.1	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	ARSENIC	6.3	0.21	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	ARSENIC	5.3	0.21	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	ARSENIC	6.3	0.21	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	ARSENIC	5	0.21	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	ARSENIC	4.6	0.21	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	BARIUM	50	0.53	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	BARIUM	49	0.53	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	BARIUM	59	0.52	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	BARIUM	46	0.51	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	BARIUM	35	0.51	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	BERYLLIUM	0.52	0.053	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	BERYLLIUM	0.5	0.053	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	BERYLLIUM	0.61	0.052	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	BERYLLIUM	0.46	0.051	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	BERYLLIUM	0.43	0.051	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	CADMIUM	0.051 J	0.21	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	CADMIUM	0.051 J	0.21	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	CADMIUM	0.061 J	0.21	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	CADMIUM	0.051 J	0.21	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	CADMIUM	0.044 J	0.21	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	CHROMIUM	6.5	1.1	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	CHROMIUM	6.4	1.1	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	CHROMIUM	7.8	1	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	CHROMIUM	8.2	1	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	CHROMIUM	7.7	1	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	COBALT	5.2	0.53	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	COBALT	5	0.53	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	COBALT	5.7	0.52	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	COBALT	4.3	0.51	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	COBALT	4.3	0.51	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	COPPER	7.1	2.1	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	COPPER	7.1	2.1	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	COPPER	9.8	2.1	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	COPPER	7.2	2.1	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	COPPER	6.6	2.1	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	IRON	14000	21	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	IRON	13000	21	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	IRON	16000	21	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	IRON	12000	21	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	IRON	12000	21	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	LEAD	8.8	0.21	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	LEAD	8.3	0.21	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	LEAD	11	0.21	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	LEAD	8.1	0.21	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	LEAD	7.2	0.21	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	MANGANESE	190	0.79	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	MANGANESE	180	0.79	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	MANGANESE	200	0.79	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	MANGANESE	180	0.77	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	MANGANESE	190	0.77	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	MOLYBDENUM	0.37	0.21	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	MOLYBDENUM	0.38	0.21	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	MOLYBDENUM	0.36	0.21	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	MOLYBDENUM	0.91	0.21	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	MOLYBDENUM	0.81	0.21	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	NICKEL	7.2	2.1	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	NICKEL	7	2.1	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	NICKEL	8.8	2.1	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	NICKEL	6.6	2.1	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	NICKEL	6.3	2.1	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	713R15	Ra-226	0.88 J	0.32	pCi/g
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	713R15	Ra-226	0.95 J	0.48	pCi/g
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	713R15	Ra-226	1.43 J	0.47	pCi/g
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	713R15	Ra-226	2.09	0.51	pCi/g
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	713R15	Ra-226	1.02	0.37	pCi/g
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	SELENIUM	1.2	1.1	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	SELENIUM	1.1	1.1	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	SELENIUM	1.4	1	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	SELENIUM	1.6	1	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	SELENIUM	0.99 J	1	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	SILVER	0.06 U	0.12	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	SILVER	0.06 U	0.12	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	SILVER	0.061 J	0.12	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	SILVER	0.059 U	0.12	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	SILVER	0.058 U	0.12	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	THALLIUM	0.13	0.011	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	THALLIUM	0.13	0.011	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	THALLIUM	0.17	0.01	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	THALLIUM	0.12	0.01	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	THALLIUM	0.1	0.01	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	URANIUM	160	0.021	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	URANIUM	150	0.021	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	URANIUM	0.8	0.021	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	URANIUM	14	0.021	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	URANIUM	1.9	0.021	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	VANADIUM	13	0.53	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	VANADIUM	12	0.53	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	VANADIUM	14	0.52	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	VANADIUM	13	0.51	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	VANADIUM	12	0.51	mg/kg
KMP UNC	KMP-SB28-0060-0066-01	6/4/2022	35.658964	-108.490576	60	66	SW6020	ZINC	35	11	mg/kg
KMP UNC	KMP-SB28-0060-0066-02	6/4/2022	35.658964	-108.490576	60	66	SW6020	ZINC	35	11	mg/kg
KMP UNC	KMP-SB31-0060-0066-01	6/4/2022	35.658122	-108.490535	60	66	SW6020	ZINC	44	10	mg/kg
KMP UNC	KMP-SB32-0060-0066-01	6/4/2022	35.658833	-108.491113	60	66	SW6020	ZINC	33	10	mg/kg
KMP UNC	KMP-SB33-0060-0066-01	6/3/2022	35.658445	-108.491212	60	66	SW6020	ZINC	38	10	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	ALUMINUM	6400	15	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	ANTIMONY	0.07 J	0.1	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	ARSENIC	5.1	0.21	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	BARIUM	55	0.52	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	BERYLLIUM	0.51	0.052	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	CADMIUM	0.06 J	0.21	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	CHROMIUM	6.6	1	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	COBALT	4.5	0.52	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	COPPER	7.2	2.1	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	IRON	13000	21	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	LEAD	8	0.21	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	MANGANESE	190	0.77	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	MOLYBDENUM	0.32	0.21	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	NICKEL	6.8	2.1	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	713R15	Ra-226	1.19	0.37	pCi/g
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	SELENIUM	1.3	1	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	SILVER	0.059 U	0.12	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	THALLIUM	0.12	0.01	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	URANIUM	28	0.021	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	VANADIUM	13	0.52	mg/kg
KMP UNC	KMP-SB40-0054-0060-01	6/4/2022	35.659292	-108.49147	65	60	SW6020	ZINC	34	10	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	ALUMINUM	5500	15	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	ALUMINUM	7000	15	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	ANTIMONY	0.046 J	0.1	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	ANTIMONY	0.099 J	0.1	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	ARSENIC	4.9	0.2	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	ARSENIC	6.2	0.21	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	BARIUM	47	0.5	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	BARIUM	58	0.51	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	BERYLLIUM	0.44	0.05	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	BERYLLIUM	0.57	0.051	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	CADMIUM	0.052 J	0.2	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	CADMIUM	0.07 J	0.21	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	CHROMIUM	6.6	1	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	CHROMIUM	7.5	1	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	COBALT	4.3	0.5	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	COBALT	5.4	0.51	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	COPPER	7.2	2	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	COPPER	9.5	2.1	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	IRON	12000	20	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	IRON	15000	21	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	LEAD	8.4	0.2	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	LEAD	10	0.21	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	MANGANESE	180	0.75	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	MANGANESE	200	0.77	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	MOLYBDENUM	0.41	0.2	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	MOLYBDENUM	0.39	0.21	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	NICKEL	6.4	2	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	NICKEL	8.2	2.1	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	713R15	Ra-226	4.55	0.52	pCi/g
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	713R15	Ra-226	8.7 J	0.6	pCi/g
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	SELENIUM	1.7	1	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	SELENIUM	2	1	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	SILVER	0.057 U	0.11	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	SILVER	0.058 UJ	0.12	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	THALLIUM	0.11	0.01	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	THALLIUM	0.15	0.01	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	URANIUM	4	0.02	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	URANIUM	7.1	0.021	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	VANADIUM	13	0.5	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	VANADIUM	15	0.51	mg/kg
KMP UNC	KMP-SB33-0066-0072-01	6/3/2022	35.658445	-108.491212	66	72	SW6020	ZINC	36	10	mg/kg
KMP UNC	KMP-SB37-0066-0072-01	6/3/2022	35.657957	-108.491269	66	72	SW6020	ZINC	42	10	mg/kg
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	ARSENIC	7.6	Unknown	mg/kg
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	ARSENIC	6.4	Unknown	mg/kg
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	ARSENIC	11	Unknown	mg/kg
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	BARIUM	74	Unknown	mg/kg
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	BARIUM	59	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	BARIUM	59	Unknown	mg/kg
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	CADMIUM	0.063 J	Unknown	mg/kg
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	CADMIUM	0.12 U	Unknown	mg/kg
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	CADMIUM	0.064 J	Unknown	mg/kg
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	CHROMIUM	5.5	Unknown	mg/kg
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	CHROMIUM	5.5	Unknown	mg/kg
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	CHROMIUM	6.7	Unknown	mg/kg
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	LEAD	9.1	Unknown	mg/kg
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	LEAD	7.8	Unknown	mg/kg
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	LEAD	9	Unknown	mg/kg
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	MOLYBDENUM	0.62 J	Unknown	mg/kg
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	MOLYBDENUM	0.52 J	Unknown	mg/kg
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	MOLYBDENUM	0.81 J	Unknown	mg/kg
Arroyo NN	CRPA-004.1 (0-2)	12/11/2010	35.6609489	-108.492682	0	2	713R11	Ra-226	1.2 G	0.46	pCi/g
Arroyo NN	CRPA-005.1 (0-2)	12/11/2010	35.6609379	-108.492681	0	2	713R11	Ra-226	1.1 G	0.52	pCi/g
Arroyo NN	CRPA-006.1 (0-2)	12/11/2010	35.6608914	-108.492634	0	2	713R11	Ra-226	1.84 G	0.65	pCi/g
Arroyo NN	CRPA-007.1 (0-2)	12/11/2010	35.663502	-108.489999	0	2	713R11	Ra-226	1.2 G	0.43	pCi/g
Arroyo NN	CRPA-007.1 (0-2) Dup	12/11/2010	35.663502	-108.489999	0	2	713R11	Ra-226	1.33 G	0.51	pCi/g
Arroyo NN	CRPA-008.1 (0-2)	12/11/2010	35.6634773	-108.489992	0	2	713R11	Ra-226	1.08 G	0.57	pCi/g
Arroyo NN	CRPA-009.1 (0-2)	12/11/2010	35.6634691	-108.489992	0	2	713R11	Ra-226	1.2 G	0.39	pCi/g
Arroyo NN	CRPA-010.1 (0-2)	12/11/2010	35.6652361	-108.488896	0	2	713R11	Ra-226	1.23 G	0.57	pCi/g
Arroyo NN	CRPA-011.1 (0-2)	12/11/2010	35.6652059	-108.488889	0	2	713R11	Ra-226	1.23 G	0.45	pCi/g
Arroyo NN	CRPA-011.4 Dup	12/11/2010	35.6652059	-108.488889	0	2	713R11	Ra-226	1.36 G	0.48	pCi/g
Arroyo NN	CRPA-012.1 (0-2)	12/11/2010	35.6652252	-108.488869	0	2	713R11	Ra-226	1.29 G	0.53	pCi/g
Arroyo NN	CRPA-013.1 (0-2)	12/11/2010	35.6658514	-108.488413	0	2	713R11	Ra-226	1.22 G	0.62	pCi/g
Arroyo NN	CRPA-014.1 (0-2)	12/11/2010	35.6667842	-108.487636	0	2	713R11	Ra-226	1.79 G	0.57	pCi/g
Arroyo NN	CRPA-U1.1 (0-2)	12/11/2010	35.6675871	-108.486484	0	2	713R11	Ra-226	1.69 G	0.46	pCi/g
Arroyo NN	CRPA-U1.4 Dup	12/11/2010	35.6675871	-108.486484	0	2	713R11	Ra-226	1.43 G	0.66	pCi/g
Arroyo NN	CRUA-001.1 (0-2)	12/9/2010	35.6657521	-108.510332	0	2	713R11	Ra-226	0.99 LT	0.35	pCi/g
Arroyo NN	CRUA-002.1 (0-2)	12/9/2010	35.6657302	-108.510318	0	2	713R11	Ra-226	0.78 LT	0.34	pCi/g
Arroyo NN	CRUA-003.1 (0-2)	12/9/2010	35.665741	-108.510352	0	2	713R11	Ra-226	1.23 G	0.46	pCi/g
Arroyo NN	CRUA-003.1 (0-2) Dup	12/9/2010	35.665741	-108.510352	0	2	713R11	Ra-226	1.1	0.36	pCi/g
Arroyo NN	CRUA-004.1 (0-2)	12/9/2010	35.6654039	-108.509221	0	2	713R11	Ra-226	1.14	0.38	pCi/g
Arroyo NN	CRUA-004.4 Dup	12/9/2010	35.6654039	-108.509221	0	2	713R11	Ra-226	1.2	0.41	pCi/g
Arroyo NN	CRUA-005.1 (0-2)	12/9/2010	35.6654016	-108.509154	0	2	713R11	Ra-226	0.66 LT	0.47	pCi/g
Arroyo NN	CRUA-005.1 (0-2) Dup	12/9/2010	35.6654016	-108.509154	0	2	713R11	Ra-226	0.73 LT	0.39	pCi/g
Arroyo NN	CRUA-006.1 (0-2)	12/9/2010	35.6653931	-108.509191	0	2	713R11	Ra-226	0.8 LT	0.37	pCi/g
Arroyo NN	CRUA-007.1 (0-2)	12/9/2010	35.6639899	-108.50663	0	2	713R11	Ra-226	1.42 G	0.6	pCi/g
Arroyo NN	CRUA-008.1 (0-2)	12/9/2010	35.663979	-108.506614	0	2	713R11	Ra-226	1.32	0.42	pCi/g
Arroyo NN	CRUA-009.1 (0-2)	12/9/2010	35.6639815	-108.506644	0	2	713R11	Ra-226	0.7 LT	0.47	pCi/g
Arroyo NN	CRUA-010.1 (0-2)	12/10/2010	35.6643344	-108.505448	0	2	713R11	Ra-226	1.51	0.31	pCi/g
Arroyo NN	CRUA-011.1 (0-2)	12/10/2010	35.66437	-108.505462	0	2	713R11	Ra-226	1.11	0.44	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
Arroyo NN	CRUA-012.1 (0-2)	12/10/2010	35.664389	-108.505499	0	2	713R11	Ra-226	0.73 LT	0.34	pCi/g
Arroyo NN	CRUA-012.1 (0-2) Dup	12/10/2010	35.664389	-108.505499	0	2	713R11	Ra-226	0.62 LT,TI	0.48	pCi/g
Arroyo NN	CRUA-013.1 (0-2)	12/10/2010	35.6640912	-108.504221	0	2	713R11	Ra-226	1.38 G	0.39	pCi/g
Arroyo NN	CRUA-014.1 (0-2)	12/10/2010	35.6641022	-108.504221	0	2	713R11	Ra-226	1.05 G	0.52	pCi/g
Arroyo NN	CRUA-015.1 (0-2)	12/10/2010	35.664094	-108.504211	0	2	713R11	Ra-226	1.19	0.42	pCi/g
Arroyo NN	CRUA-016.1 (0-2)	12/10/2010	35.663831	-108.503098	0	2	713R11	Ra-226	0.8 LT,G	0.36	pCi/g
Arroyo NN	CRUA-016.1 (0-2) Dup	12/10/2010	35.663831	-108.503098	0	2	713R11	Ra-226	0.79 LT,TI	0.44	pCi/g
Arroyo NN	CRUA-017.1 (0-2)	12/10/2010	35.6638339	-108.503071	0	2	713R11	Ra-226	1.38	0.49	pCi/g
Arroyo NN	CRUA-017.1 (0-2) Dup	12/10/2010	35.6638339	-108.503071	0	2	713R11	Ra-226	1.07	0.47	pCi/g
Arroyo NN	CRUA-018.1 (0-2)	12/10/2010	35.66382	-108.503091	0	2	713R11	Ra-226	1.27 G	0.48	pCi/g
Arroyo NN	CRUA-019.1 (0-2)	12/10/2010	35.6636112	-108.502116	0	2	713R11	Ra-226	0.94 LT,G	0.55	pCi/g
Arroyo NN	CRUA-020.1 (0-2)	12/10/2010	35.663644	-108.502137	0	2	713R11	Ra-226	0.79 LT	0.43	pCi/g
Arroyo NN	CRUA-020.4 Dup	12/10/2010	35.663644	-108.502137	0	2	713R11	Ra-226	1.35	0.41	pCi/g
Arroyo NN	CRUA-021.1 (0-2)	12/10/2010	35.6636112	-108.502113	0	2	713R11	Ra-226	0.93 LT	0.46	pCi/g
Arroyo NN	CRUA-022.1 (0-2)	12/10/2010	35.6637156	-108.501114	0	2	713R11	Ra-226	0.75 LT,G	0.42	pCi/g
Arroyo NN	CRUA-022.1 (0-2) Dup	12/10/2010	35.6637156	-108.501114	0	2	713R11	Ra-226	0.76 LT,G	0.49	pCi/g
Arroyo NN	CRUA-023.1 (0-2)	12/10/2010	35.66371	-108.501141	0	2	713R11	Ra-226	0.67 LT,TI	0.41	pCi/g
Arroyo NN	CRUA-023.1 (0-2) Dup	12/10/2010	35.66371	-108.501141	0	2	713R11	Ra-226	0.74 LT	0.44	pCi/g
Arroyo NN	CRUA-024.1 (0-2)	12/10/2010	35.6637129	-108.501114	0	2	713R11	Ra-226	0.92 LT	0.45	pCi/g
Arroyo NN	CRUA-025.1 (0-2)	12/10/2010	35.6630845	-108.499984	0	2	713R11	Ra-226	0.49 LT,G,TI	0.46	pCi/g
Arroyo NN	CRUA-026.1 (0-2)	12/10/2010	35.6631118	-108.500015	0	2	713R11	Ra-226	0.75 LT,G	0.54	pCi/g
Arroyo NN	CRUA-027.1 (0-2)	12/10/2010	35.6631202	-108.499988	0	2	713R11	Ra-226	1.06	0.43	pCi/g
Arroyo NN	CRUA-028.1 (0-2)	12/10/2010	35.6628508	-108.499528	0	2	713R11	Ra-226	0.68 LT,G	0.59	pCi/g
Arroyo NN	CRUA-029.1 (0-2)	12/10/2010	35.66287	-108.499521	0	2	713R11	Ra-226	1.57	0.36	pCi/g
Arroyo NN	CRUA-030.1 (0-2)	12/10/2010	35.662884	-108.499488	0	2	713R11	Ra-226	0.93 LT,G	0.3	pCi/g
Arroyo NN	CRUA-031.1 (0-2)	12/10/2010	35.6621985	-108.499236	0	2	713R11	Ra-226	1.37	0.44	pCi/g
Arroyo NN	CRUA-031.4 Dup	12/10/2010	35.6621985	-108.499236	0	2	713R11	Ra-226	1.55	0.44	pCi/g
Arroyo NN	CRUA-032.1 (0-2)	12/10/2010	35.6621878	-108.499192	0	2	713R11	Ra-226	1.67	0.43	pCi/g
Arroyo NN	CRUA-032.1 (0-2) Dup	12/10/2010	35.6621878	-108.499192	0	2	713R11	Ra-226	1.3	0.37	pCi/g
Arroyo NN	CRUA-033.1 (0-2)	12/10/2010	35.6622016	-108.499186	0	2	713R11	Ra-226	1.54 G	0.53	pCi/g
Arroyo NN	CRUA-034.1 (0-2)	12/10/2010	35.660668	-108.498294	0	2	713R11	Ra-226	0.98 LT,G	0.43	pCi/g
Arroyo NN	CRUA-034.1 (0-2) Dup	12/10/2010	35.660668	-108.498294	0	2	713R11	Ra-226	0.74 LT	0.44	pCi/g
Arroyo NN	CRUA-035.1 (0-2)	12/10/2010	35.6606763	-108.498291	0	2	713R11	Ra-226	1.14	0.42	pCi/g
Arroyo NN	CRUA-036.1 (0-2)	12/10/2010	35.6606681	-108.498278	0	2	713R11	Ra-226	0.89 LT	0.36	pCi/g
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	Ra-226	0.84	Unknown	pCi/g
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	Ra-226	0.81 J	Unknown	pCi/g
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	Ra-226	0.94	Unknown	pCi/g
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	SELENIUM	1.1 J	Unknown	mg/kg
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	SELENIUM	1.1 J	Unknown	mg/kg
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	SELENIUM	1.5	Unknown	mg/kg
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	SILVER	0.46 U	Unknown	mg/kg
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	SILVER	0.47 U	Unknown	mg/kg

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	SILVER	0.47 U	Unknown	mg/kg
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	URANIUM	0.64	Unknown	mg/kg
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	URANIUM	0.57	Unknown	mg/kg
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	URANIUM	0.69	Unknown	mg/kg
Arroyo NN	KMP-11-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	VANADIUM	16	Unknown	mg/kg
Arroyo NN	KMP-11D-00	7/18/2017	35.660042	-108.491651	0	2	Unknown	VANADIUM	16	Unknown	mg/kg
Arroyo NN	KMP-12-00	7/18/2017	35.660276	-108.49119	0	2	Unknown	VANADIUM	25	Unknown	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	ALUMINUM	4700	15	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	ANTIMONY	0.042 J	0.1	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	ARSENIC	4.4	0.2	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	BARIUM	59	0.51	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	BERYLLIUM	0.38	0.051	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	CADMIUM	0.045 J	0.2	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	CHROMIUM	5.1	1	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	COBALT	4	0.51	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	COPPER	5.1	2	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	IRON	12000	20	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	LEAD	7.3	0.2	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	MANGANESE	200	0.76	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	MOLYBDENUM	0.24	0.2	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	NICKEL	5.5	2	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	713R15	Ra-226	0.86 J	0.33	pCi/g
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	SELENIUM	1	1	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	SILVER	0.058 U	0.12	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	THALLIUM	0.092	0.01	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	URANIUM	0.59	0.02	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	VANADIUM	12	0.51	mg/kg
Arroyo NN	KMA-SS02-0000-0003-01	5/19/2022	35.660713	-108.490604	0	3	SW6020	ZINC	31	10	mg/kg
Arroyo NN	RWPR-SS-028 (0-6)	10/8/2010	35.6638706	-108.503384	0	6	713R11	Ra-226	1.26 G	0.54	pCi/g
Arroyo NN	RWPR-SS-029 (0-6)	10/7/2010	35.6639114	-108.503943	0	6	713R11	Ra-226	0.79 LT,G	0.53	pCi/g
Arroyo NN	RWPR-SS-028 (0-6)	10/8/2010	35.6638706	-108.503384	0	6	SW6020	URANIUM	0.78	11	mg/kg
Arroyo NN	RWPR-SS-029 (0-6)	10/7/2010	35.6639114	-108.503943	0	6	SW6020	URANIUM	2.9	10	mg/kg
Arroyo NN	RWPR-SS-028 (1.5-2)	10/8/2010	35.6638706	-108.503384	1.5	2	713R11	Ra-226	1.15	0.43	pCi/g
Arroyo NN	RWPR-SS-028 (1.5-2)	10/8/2010	35.6638706	-108.503384	1.5	2	SW6020	URANIUM	1.2	10	mg/kg
Arroyo NN	CRUA-009.2 (2-4)	12/9/2010	35.6639815	-108.506644	2	4	713R11	Ra-226	1.13 G	0.6	pCi/g
Arroyo NN	CRPA-004.2 (2-6)	12/11/2010	35.6609489	-108.492682	2	6	713R11	Ra-226	1.37 G	0.67	pCi/g
Arroyo NN	CRPA-005.2 (2-6)	12/11/2010	35.6609379	-108.492681	2	6	713R11	Ra-226	1.76 G	0.5	pCi/g
Arroyo NN	CRPA-007.2 (2-6)	12/11/2010	35.663502	-108.489999	2	6	713R11	Ra-226	1.43 G	0.62	pCi/g
Arroyo NN	CRPA-007.2 (2-6) Dup	12/11/2010	35.663502	-108.489999	2	6	713R11	Ra-226	1.21 G	0.56	pCi/g
Arroyo NN	CRPA-009.2 (2-6)	12/11/2010	35.6634691	-108.489992	2	6	713R11	Ra-226	1.42 G	0.54	pCi/g
Arroyo NN	CRPA-010.2 (2-6)	12/11/2010	35.6652361	-108.488896	2	6	713R11	Ra-226	1.6 G	0.66	pCi/g
Arroyo NN	CRPA-011.2 (2-6)	12/11/2010	35.6652059	-108.488889	2	6	713R11	Ra-226	0.92 LT,G	0.74	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
Arroyo NN	CRPA-012.2 (2-6)	12/11/2010	35.6652252	-108.488869	2	6	713R11	Ra-226	1.31 G	0.7	pCi/g
Arroyo NN	CRPA-013.2 (2-6)	12/11/2010	35.6658514	-108.488413	2	6	713R11	Ra-226	1.12 G	0.59	pCi/g
Arroyo NN	CRPA-014.2 (2-6)	12/11/2010	35.6667842	-108.487636	2	6	713R11	Ra-226	1.81 G	0.47	pCi/g
Arroyo NN	CRPA-U1.2 (2-6)	12/11/2010	35.6675871	-108.486484	2	6	713R11	Ra-226	1.46 G	0.65	pCi/g
Arroyo NN	CRUA-001.2 (2-6)	12/9/2010	35.6657521	-108.510332	2	6	713R11	Ra-226	1.12 G	0.42	pCi/g
Arroyo NN	CRUA-002.2 (2-6)	12/9/2010	35.6657302	-108.510318	2	6	713R11	Ra-226	0.85 LT,G	0.46	pCi/g
Arroyo NN	CRUA-003.2 (2-6)	12/9/2010	35.665741	-108.510352	2	6	713R11	Ra-226	1.55 G	0.62	pCi/g
Arroyo NN	CRUA-004.2 (2-6)	12/9/2010	35.6654039	-108.509221	2	6	713R11	Ra-226	1 G	0.53	pCi/g
Arroyo NN	CRUA-005.2 (2-6)	12/9/2010	35.6654016	-108.509154	2	6	713R11	Ra-226	0.71 LT,G	0.35	pCi/g
Arroyo NN	CRUA-006.2 (2-6)	12/9/2010	35.6653931	-108.509191	2	6	713R11	Ra-226	0.41 LT,G	0.33	pCi/g
Arroyo NN	CRUA-007.2 (2-6)	12/9/2010	35.6639899	-108.50663	2	6	713R11	Ra-226	1.54 G	0.69	pCi/g
Arroyo NN	CRUA-008.2 (2-6)	12/9/2010	35.663979	-108.506614	2	6	713R11	Ra-226	1.67	0.48	pCi/g
Arroyo NN	CRUA-008.4 Dup	12/9/2010	35.663979	-108.506614	2	6	713R11	Ra-226	1.96	0.54	pCi/g
Arroyo NN	CRUA-010.2 (2-6)	12/10/2010	35.6643344	-108.505448	2	6	713R11	Ra-226	1.82 G	0.48	pCi/g
Arroyo NN	CRUA-011.2 (2-6)	12/10/2010	35.66437	-108.505462	2	6	713R11	Ra-226	1.52	0.5	pCi/g
Arroyo NN	CRUA-012.2 (2-6)	12/10/2010	35.664389	-108.505499	2	6	713R11	Ra-226	1.23	0.39	pCi/g
Arroyo NN	CRUA-015.2 (2-6)	12/10/2010	35.664094	-108.504211	2	6	713R11	Ra-226	1.33	0.41	pCi/g
Arroyo NN	CRUA-017.2 (2-6)	12/10/2010	35.6638339	-108.503071	2	6	713R11	Ra-226	0.93 LT	0.43	pCi/g
Arroyo NN	CRUA-018.2 (2-6)	12/10/2010	35.66382	-108.503091	2	6	713R11	Ra-226	2.32 G	0.67	pCi/g
Arroyo NN	CRUA-020.2 (2-6)	12/10/2010	35.663644	-108.502137	2	6	713R11	Ra-226	3.05	0.52	pCi/g
Arroyo NN	CRUA-021.2 (2-6)	12/10/2010	35.6636112	-108.502113	2	6	713R11	Ra-226	2.02 G	0.48	pCi/g
Arroyo NN	CRUA-023.2 (2-6)	12/10/2010	35.66371	-108.501141	2	6	713R11	Ra-226	1.51	0.46	pCi/g
Arroyo NN	CRUA-024.2 (2-6)	12/10/2010	35.6637129	-108.501114	2	6	713R11	Ra-226	1.47	0.42	pCi/g
Arroyo NN	CRUA-026.2 (2-6)	12/10/2010	35.6631118	-108.500015	2	6	713R11	Ra-226	1.56 G	0.59	pCi/g
Arroyo NN	CRUA-026.4 Dup	12/10/2010	35.6631118	-108.500015	2	6	713R11	Ra-226	1.26 G	0.43	pCi/g
Arroyo NN	CRUA-027.2 (2-6)	12/10/2010	35.6631202	-108.499988	2	6	713R11	Ra-226	1.15 G	0.37	pCi/g
Arroyo NN	CRUA-028.2 (2-6)	12/10/2010	35.6628508	-108.499528	2	6	713R11	Ra-226	1.01 G	0.52	pCi/g
Arroyo NN	CRUA-029.2 (2-6)	12/10/2010	35.66287	-108.499521	2	6	713R11	Ra-226	1.53	0.49	pCi/g
Arroyo NN	CRUA-030.2 (2-6)	12/10/2010	35.662884	-108.499488	2	6	713R11	Ra-226	1.63	0.32	pCi/g
Arroyo NN	CRUA-031.2 (2-6)	12/10/2010	35.6621985	-108.499236	2	6	713R11	Ra-226	1.47	0.39	pCi/g
Arroyo NN	CRUA-032.2 (2-6)	12/10/2010	35.6621878	-108.499192	2	6	713R11	Ra-226	1.52	0.39	pCi/g
Arroyo NN	CRUA-033.2 (2-6)	12/10/2010	35.6622016	-108.499186	2	6	713R11	Ra-226	1.61 G	0.53	pCi/g
Arroyo NN	CRUA-034.2 (2-6)	12/10/2010	35.660668	-108.498294	2	6	713R11	Ra-226	1.38	0.46	pCi/g
Arroyo NN	CRUA-034.2 (2-6) Dup	12/10/2010	35.660668	-108.498294	2	6	713R11	Ra-226	0.82 LT	0.44	pCi/g
Arroyo NN	CRUA-035.2 (2-6)	12/10/2010	35.6606763	-108.498291	2	6	713R11	Ra-226	1.12 G	0.46	pCi/g
Arroyo NN	CRUA-036.2 (2-6)	12/10/2010	35.6606681	-108.498278	2	6	713R11	Ra-226	0.66 LT	0.44	pCi/g
Arroyo NN	RWPR-SS-028 (2.5-3)	10/8/2010	35.6638706	-108.503384	2.5	3	713R11	Ra-226	2.2	0.46	pCi/g
Arroyo NN	RWPR-SS-028 (2.5-3)	10/8/2010	35.6638706	-108.503384	2.5	3	SW6020	URANIUM	1.5	10	mg/kg
Arroyo NN	RWPR-SS-029 (6-9)	10/7/2010	35.6639114	-108.503943	6	9	713R11	Ra-226	1.07	0.53	pCi/g
Arroyo NN	RWPR-SS-029 (6-9)	10/7/2010	35.6639114	-108.503943	6	9	SW6020	URANIUM	2.5	11	mg/kg
Arroyo NN	CRUA-003.3 (6-11)	12/9/2010	35.665741	-108.510352	6	11	713R11	Ra-226	1.93 G	0.6	pCi/g
Arroyo NN	CRPA-007.3 (6-12)	12/11/2010	35.663502	-108.489999	6	12	713R11	Ra-226	1.46 G	0.46	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
Arroyo NN	CRUA-007.3 (6-12)	12/9/2010	35.6639899	-108.50663	6	12	713R11	Ra-226	1.71 G	0.58	pCi/g
Arroyo NN	CRUA-030.3 (6-12)	12/10/2010	35.662884	-108.499488	6	12	713R11	Ra-226	1.39	0.33	pCi/g
Arroyo NN	CRUA-030.3 (6-12) Dup	12/10/2010	35.662884	-108.499488	6	12	713R11	Ra-226	1.47	0.46	pCi/g
Arroyo NN	CRPA-004.3 (7-13)	12/11/2010	35.6609489	-108.492682	7	13	713R11	Ra-226	1.45 G	0.47	pCi/g
Arroyo NN	CRPA-010.3 (9-15)	12/11/2010	35.6652361	-108.488896	9	15	713R11	Ra-226	1.95 G	0.52	pCi/g
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	ALUMINUM	4200	16	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	ANTIMONY	0.064 J	0.1	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	ARSENIC	5.6	0.21	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	BARIUM	75	0.52	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	BERYLLIUM	0.39	0.052	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	CADMIUM	0.073 J	0.21	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	CHROMIUM	4.5	1	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	COBALT	4.5	0.52	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	COPPER	5.1	2.1	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	IRON	15000	21	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	LEAD	8	0.21	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	MANGANESE	400	0.79	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	MOLYBDENUM	0.45	0.21	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	NICKEL	5.5	2.1	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	713R15	Ra-226	0.75 J	0.35	pCi/g
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	SELENIUM	0.9 J	1	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	SILVER	0.06 U	0.12	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	THALLIUM	0.082	0.01	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	URANIUM	0.56	0.021	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	VANADIUM	13	0.52	mg/kg
Arroyo NN	KMA-SS02-0012-0018-01	5/19/2022	35.660713	-108.490604	12	18	SW6020	ZINC	32	10	mg/kg
Arroyo NN	CRUA-002.3 (13-19)	12/9/2010	35.6657302	-108.510318	13	19	713R11	Ra-226	0.95 LT	0.55	pCi/g
Arroyo NN	CRPA-U1.3 (14-20)	12/11/2010	35.6675871	-108.486484	14	20	713R11	Ra-226	2.19 G	0.61	pCi/g
Arroyo NN	CRUA-001.3 (14-20)	12/9/2010	35.6657521	-108.510332	14	20	713R11	Ra-226	1.12 G	0.44	pCi/g
Arroyo NN	CRUA-004.3 (14-20)	12/9/2010	35.6654039	-108.509221	14	20	713R11	Ra-226	1.63 G	0.39	pCi/g
Arroyo NN	CRPA-011.3 (15-21)	12/11/2010	35.6652059	-108.488889	15	21	713R11	Ra-226	1.28 G	0.64	pCi/g
Arroyo NN	CRUA-009.3 (16-22)	12/9/2010	35.6639815	-108.506644	16	22	713R11	Ra-226	1.28 G	0.39	pCi/g
Arroyo NN	CRUA-008.3 (18-24)	12/9/2010	35.663979	-108.506614	18	24	713R11	Ra-226	1.75 G	0.56	pCi/g
Arroyo NN	CRPA-005.3 (30-36)	12/11/2010	35.6609379	-108.492681	30	36	713R11	Ra-226	2.66 G	0.58	pCi/g
Arroyo NN	CRPA-012.3 (30-36)	12/11/2010	35.6652252	-108.488869	30	36	713R11	Ra-226	1.21 G	0.57	pCi/g
Arroyo NN	CRPA-013.3 (30-36)	12/11/2010	35.6658514	-108.488413	30	36	713R11	Ra-226	1.27 G	0.57	pCi/g
Arroyo NN	CRPA-013.3 (30-36) Dup	12/11/2010	35.6658514	-108.488413	30	36	713R11	Ra-226	1.06 G	0.65	pCi/g
Arroyo NN	CRUA-005.3 (30-36)	12/9/2010	35.6654016	-108.509154	30	36	713R11	Ra-226	1.17	0.5	pCi/g
Arroyo NN	CRUA-006.3 (30-36)	12/9/2010	35.6653931	-108.509191	30	36	713R11	Ra-226	1.25 G	0.56	pCi/g
Arroyo NN	CRUA-010.3 (30-36)	12/10/2010	35.6643344	-108.505448	30	36	713R11	Ra-226	1.51 G	0.48	pCi/g
Arroyo NN	CRUA-010.3 (30-36) Dup	12/10/2010	35.6643344	-108.505448	30	36	713R11	Ra-226	1.27	0.48	pCi/g
Arroyo NN	CRUA-011.3 (30-36)	12/10/2010	35.66437	-108.505462	30	36	713R11	Ra-226	1.89 G	0.45	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
Arroyo NN	CRUA-012.3 (30-36)	12/10/2010	35.664389	-108.505499	30	36	713R11	Ra-226	1.89 G	0.44	pCi/g
Arroyo NN	CRUA-015.3 (30-36)	12/10/2010	35.664094	-108.504211	30	36	713R11	Ra-226	2.66 G	0.5	pCi/g
Arroyo NN	CRUA-015.4 Dup	12/10/2010	35.664094	-108.504211	30	36	713R11	Ra-226	2.59 G	0.52	pCi/g
Arroyo NN	CRUA-017.3 (30-36)	12/10/2010	35.6638339	-108.503071	30	36	713R11	Ra-226	2.22	0.46	pCi/g
Arroyo NN	CRUA-018.3 (30-36)	12/10/2010	35.66382	-108.503091	30	36	713R11	Ra-226	2.93 G	0.49	pCi/g
Arroyo NN	CRUA-020.3 (30-36)	12/10/2010	35.663644	-108.502137	30	36	713R11	Ra-226	3.28 G	0.65	pCi/g
Arroyo NN	CRUA-021.3 (30-36)	12/10/2010	35.6636112	-108.502113	30	36	713R11	Ra-226	1.94 G	0.52	pCi/g
Arroyo NN	CRUA-023.3 (30-36)	12/10/2010	35.66371	-108.501141	30	36	713R11	Ra-226	2.45	0.43	pCi/g
Arroyo NN	CRUA-024.3 (30-36)	12/10/2010	35.6637129	-108.501114	30	36	713R11	Ra-226	1.95 G	0.43	pCi/g
Arroyo NN	CRUA-026.3 (30-36)	12/10/2010	35.6631118	-108.500015	30	36	713R11	Ra-226	2.82 G	0.54	pCi/g
Arroyo NN	CRUA-027.3 (30-36)	12/10/2010	35.6631202	-108.499988	30	36	713R11	Ra-226	1.41 G	0.4	pCi/g
Arroyo NN	CRUA-028.3 (30-36)	12/10/2010	35.6628508	-108.499528	30	36	713R11	Ra-226	1.42 G	0.43	pCi/g
Arroyo NN	CRUA-029.3 (30-36)	12/10/2010	35.66287	-108.499521	30	36	713R11	Ra-226	1.54	0.45	pCi/g
Arroyo NN	CRUA-031.3 (30-36)	12/10/2010	35.6621985	-108.499236	30	36	713R11	Ra-226	2	0.57	pCi/g
Arroyo NN	CRUA-032.3 (30-36)	12/10/2010	35.6621878	-108.499192	30	36	713R11	Ra-226	2.06	0.46	pCi/g
Arroyo NN	CRUA-033.3 (30-36)	12/10/2010	35.6622016	-108.499186	30	36	713R11	Ra-226	3.05 G	0.64	pCi/g
Arroyo NN	CRUA-034.3 (30-36)	12/10/2010	35.660668	-108.498294	30	36	713R11	Ra-226	1.62	0.45	pCi/g
Arroyo NN	CRUA-035.3 (30-36)	12/10/2010	35.6606763	-108.498291	30	36	713R11	Ra-226	1.64	0.44	pCi/g
Arroyo NN	CRUA-036.3 (30-36)	12/10/2010	35.6606681	-108.498278	30	36	713R11	Ra-226	2.09 G	0.54	pCi/g
Arroyo UNC	CRPA-001.1 (0-2)	12/11/2010	35.6565449	-108.496193	0	2	713R11	Ra-226	0.79 LT	0.44	pCi/g
Arroyo UNC	CRPA-001.1 (0-2) Dup	12/11/2010	35.6565449	-108.496193	0	2	713R11	Ra-226	0.59 LT	0.46	pCi/g
Arroyo UNC	CRPA-002.1 (0-2)	12/11/2010	35.6565366	-108.4962	0	2	713R11	Ra-226	1.07 G	0.37	pCi/g
Arroyo UNC	CRPA-002.1 (0-2) Dup	12/11/2010	35.6565366	-108.4962	0	2	713R11	Ra-226	0.72 LT,TI	0.43	pCi/g
Arroyo UNC	CRPA-003.1 (0-2)	12/11/2010	35.6565341	-108.496166	0	2	713R11	Ra-226	0.84 LT,TI	0.56	pCi/g
Arroyo UNC	CRUA-037.1 (0-2)	12/10/2010	35.6566466	-108.496686	0	2	713R11	Ra-226	0.79 LT	0.48	pCi/g
Arroyo UNC	CRUA-038.1 (0-2)	12/10/2010	35.6566744	-108.496632	0	2	713R11	Ra-226	0.74 LT	0.31	pCi/g
Arroyo UNC	CRUA-039.1 (0-2)	12/10/2010	35.6566965	-108.496605	0	2	713R11	Ra-226	0.58 LT,G,TI	0.5	pCi/g
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	ALUMINUM	4400	15	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	ANTIMONY	0.055 J	0.099	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	ARSENIC	4.6	0.2	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	BARIUM	48	0.5	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	BERYLLIUM	0.37	0.05	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	CADMIUM	0.054 J	0.2	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	CHROMIUM	4.9	0.99	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	COBALT	4.4	0.5	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	COPPER	4.7	2	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	IRON	13000	20	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	LEAD	7.5	0.2	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	MANGANESE	240	0.74	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	MOLYBDENUM	0.28	0.2	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	NICKEL	5.5	2	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	713R15	Ra-226	0.85 J	0.4	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Exposure Unit	Sample ID	Sample Date	Latitude	Longitude	Sample Top Depth (inches bgs)	Sample Bottom Depth (inches bgs)	Analytical Method	Analyte	Result and Qualifier	Reporting Limit	Unit
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	SELENIUM	1.3	0.99	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	SILVER	0.057 U	0.11	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	THALLIUM	0.091	0.0099	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	URANIUM	0.53	0.02	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	VANADIUM	12	0.5	mg/kg
Arroyo UNC	KMA-SS01-0000-0003-01	5/19/2022	35.659642	-108.493534	0	3	SW6020	ZINC	30	9.9	mg/kg
Arroyo UNC	CRPA-001.2 (2-6)	12/11/2010	35.6565449	-108.496193	2	6	713R11	Ra-226	1.36 G	0.55	pCi/g
Arroyo UNC	CRPA-002.2 (2-6)	12/11/2010	35.6565366	-108.4962	2	6	713R11	Ra-226	1.02 G	0.6	pCi/g
Arroyo UNC	CRPA-003.2 (2-6)	12/11/2010	35.6565341	-108.496166	2	6	713R11	Ra-226	1.55 G	0.52	pCi/g
Arroyo UNC	CRUA-037.2 (2-6)	12/10/2010	35.6566466	-108.496686	2	6	713R11	Ra-226	1.09 G	0.54	pCi/g
Arroyo UNC	CRUA-037.4 Dup	12/10/2010	35.6566466	-108.496686	2	6	713R11	Ra-226	0.77 LT,G	0.46	pCi/g
Arroyo UNC	CRUA-038.2 (2-6)	12/10/2010	35.6566744	-108.496632	2	6	713R11	Ra-226	0.68 LT	0.49	pCi/g
Arroyo UNC	CRUA-039.2 (2-6)	12/10/2010	35.6566965	-108.496605	2	6	713R11	Ra-226	0.86 LT,G,TI	0.5	pCi/g
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	ALUMINUM	4700	16	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	ANTIMONY	0.067 J	0.1	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	ARSENIC	4.8	0.21	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	BARIUM	62	0.52	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	BERYLLIUM	0.4	0.052	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	CADMIUM	0.055 J	0.21	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	CHROMIUM	5	1	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	COBALT	3.9	0.52	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	COPPER	5.4	2.1	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	IRON	15000	21	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	LEAD	7.5	0.21	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	MANGANESE	280	0.78	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	MOLYBDENUM	0.28	0.21	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	NICKEL	5.8	2.1	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	713R15	Ra-226	0.82 J	0.61	pCi/g
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	SELENIUM	0.91 J	1	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	SILVER	0.059 U	0.12	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	THALLIUM	0.086	0.01	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	URANIUM	0.62	0.021	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	VANADIUM	13	0.52	mg/kg
Arroyo UNC	KMA-SS01-0012-0018-01	5/19/2022	35.659642	-108.493534	12	18	SW6020	ZINC	33	10	mg/kg
Arroyo UNC	CRPA-001.3 (30-36)	12/11/2010	35.6565449	-108.496193	30	36	713R11	Ra-226	1.17 G	0.61	pCi/g
Arroyo UNC	CRPA-001.4 Dup	12/11/2010	35.6565449	-108.496193	30	36	713R11	Ra-226	0.96 LT,G	0.53	pCi/g
Arroyo UNC	CRPA-002.3 (30-36)	12/11/2010	35.6565366	-108.4962	30	36	713R11	Ra-226	1.01 G	0.55	pCi/g
Arroyo UNC	CRPA-003.3 (30-36)	12/11/2010	35.6565341	-108.496166	30	36	713R11	Ra-226	1.2 G	0.45	pCi/g
Arroyo UNC	CRUA-037.3 (30-36)	12/10/2010	35.6566466	-108.496686	30	36	713R11	Ra-226	1.83 G	0.36	pCi/g
Arroyo UNC	CRUA-038.3 (30-36)	12/10/2010	35.6566744	-108.496632	30	36	713R11	Ra-226	0.69 LT,G	0.5	pCi/g
Arroyo UNC	CRUA-039.3 (30-36)	12/10/2010	35.6566965	-108.496605	30	36	713R11	Ra-226	0.57 LT,G	0.51	pCi/g

Attachment C-1. Data Used in the Risk Assessment

Notes:

bgs	Below ground surface
CR1	Quivira Church Rock Mine No. 1
CR1E	Quivira Church Rock Mine No. 1 East
G	Sample density differs by more than 15 percent of the laboratory control sample density
J	Estimated concentration
Kerr-McGee	Kerr-McGee Corporation
KMP	Kerr-McGee Ponds
LT	Less than
M3	The requested minimum detectable concentration was not met, but the reported activity is greater than the reported minimum detectable concentration
mg/kg	Milligram per kilogram
NN	Navajo Nation
pCi/g	Picocurie per gram
Ra-226	Radium-226
TI	Nuclide identification is tentative
U	Not detected
UJ	Not detected; the detection limit is estimated
UNC	United Nuclear Corporation

APPENDIX D

ENVIRONMENTAL METRICS ANALYSIS

Table D-1. Environmental Metrics Assessment Summary

Alternative	Energy Use[1]	Air Pollutants[2]	Water Use[3]	Water Quality Impacts[4]	Ecosystem Impact[5]	Materials[6]	Overall Greenness Score[7]
Alternative 1: No Action	8	8	8	8	8	8	**48**
Alternative 2: Consolidate and Cap All Waste On Site.	5	5	4	4	5	5	**28**
Alternative 3: Dispose of All Mine Waste Off Site at Red Rock Disposal Facility.	3	3	2	3	4	6	**21**
Alternative 4: Dispose of All Mine Waste Off Site at RCRA C or LLRW Facility.	1	1	1	1	1	6	**11**

Notes:

A rating system of 1 through 8 is used where 8 is best and 1 is worst.

[1] Total energy use and percentage of renewable energy

[2] Air pollutants and greenhouse gas emissions

[3] Water use

[4] Impacts on water resources

[5] Protecting ecosystem services

[6] Materials management and waste reduction

[7] Overall greenneess score was calculated by summing the score in each of the six core elements.

LLRW Low-level radioactive waste

RCRA Resource Conservation and Recovery Act

Table D-2. Estimated Risk of Injuries and Fatalities and Greenhouse Gas Emissions from Onsite and Offsite Trucking

Alternative	Truckloads of Waste	Miles Round Trip to Transport Waste	Truckloads of Offsite Fill	Miles Round Trip to Import Fill and Cover	Water Truck Mileage	Total Miles	Estimated Injuries from Offsite Trucking[1]	Estimated Fatalities from Offsite Trucking[1]	Estimated Greenhouse Gas Emissions from Offsite Trucking[2] (metric tons CO_2e)
1: No Action	0	0	0	0	0	0	0	0	0
2: Consolidate and Cap All Mine Waste On Site	57,140	6	22,370	5	236,600	691,290	0.224	0.0104	1,200
3: Dispose of All Mine Waste Off Site at Red Rocks Disposal Facility	76,180	88	18,330	5	266,900	7,062,390	2.29	0.1066	12,500
4: Dispose of All Mine Waste Off Site at a RCRA C or LLRW Facility	76,180	1,250	18,330	5	987,900	96,304,550	31.20	1.4542	170,900

Notes:

[1] A rate of 32.4 injuries and 1.51 fatalities per 100 million large truck miles traveled was calculated as shown below using data from 2011 to 2020 from the National Center for Statistics and Analysis (2022).

Year	People Killed in Crashes Involving Large Trucks	Number of Large Trucks Involved in Injuries	Large-Truck Miles Traveled (millions)	Injury Rate per 100 Million Large-Truck-Miles Traveled	Fatality Rate per 100 Million Large-Truck-Miles Traveled
2011	3,633	62,534	267,594	23.37	1.36
2012	3,825	76,621	269,207	28.46	1.42
2013	3,921	73,089	275,017	26.58	1.43
2014	3,749	88,473	279,132	31.70	1.34
2015	4,075	87,307	279,844	31.20	1.46
2016	4,562	102,080	287,895	35.46	1.58
2017	4,805	106,733	297,593	35.87	1.61
2018	4,909	112,253	304,864	36.82	1.61
2019	5,033	118,527	300,050	39.50	1.68
2020	4,842	106,902	302,141	35.38	1.60
Average from 2011 - 2020				32.43 injuries per 100 million miles traveled	
				1.51 fatalities per 100 million miles traveled	

[2] Metric tons of CO_2e per large truck mile traveled was calculated as shown below using data and methods from the U.S. Environmental Protection Agency (2022) Greenhouse Gases Equivalencies Calculator. Carbon dioxide emissions per gallon of diesel fuel was obtained from the U.S. Energy Information Administration (2022). Mileage for combination trucks (Classification Types 8-13) was obtained from Federal Highway Administration (2018) highway statistics based on 2012 and 2013 data.

$$\frac{22.38 \text{ lb } CO_2/\text{gallon diesel fuel}}{2{,}205 \text{ lb } CO_2/\text{metric ton } CO_2} \times \frac{1 \ CO_2e}{0.986 \ CO_2} \times \frac{1}{5.8 \text{ miles/gallon}} = 0.001775 \text{ metric tons } CO_2e \text{ miles traveled}$$

CO_2e Carbon dioxide equivalent

LLRW Low-level radioactive waste

RCRA Resource Conservation and Recovery Act

References:

Federal Highway Administration. 2018. "Annual Vehicle Distance Traveled in Miles and Related Data - 2013 by Highway Category and Vehicle Type: Table M-1." Revised May. https://www.fhwa.dot.gov/policyinformation/statistics/2013/vm1.cfm.

National Center for Statistics and Analysis. 2022. "Large Trucks: 2020 Data." Traffic Safety Facts. Report No. DOT HS 813 286. National Highway Traffic Safety Administration. April. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813286.

U.S. Energy Information Administration. 2022. "Frequently Asked Questions: How Much Carbon Dioxide Is Produced from U.S. Gasoline and Diesel Fuel Consumption?" Last updated May 10. https://www.eia.gov/tools/faqs/faq.php?id=307&t=11.

U.S. Environmental Protection Agency. 2022. "Greenhouse Gases Equivalencies Calculator - Calculations and References." Last updated June 23. https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references.

APPENDIX E

COST ANALYSIS

Table E-1. Alternative 2

Cost Estimate Summary

Site: Quivira Tronox Mines Site
Location: Navajo Nation, New Mexico
Phase: Feasibility Study (-30% to +50%)
Base Year: 2023
Date: August 2023

Alternative 2. Consolidate and Cap All Mine Waste On Site

Direct Capital Costs

Description	Quantity	Unit	Unit Cost	Total Cost
Field Overhead and Oversight Costs:				
Field Overhead and Oversight	35	Months	36,715.18	$1,285,000
Mobilization/Demobilization	8	Each	54,148.02	$433,200
Travel, Lodging and Per Diem	525	Ea Person per MO	5,505	$2,890,100
Voluntary Alternative Housing	1	Lump Sum	2,000,000	$2,000,000
SUBTOTAL				**$6,608,000**
General Site Work Costs:				
Fence Construction/Repair - Equipment Storage Area	1,000	LF	$28.24	$28,200
Clearing and Grubbing	63	AC	$1,331.54	$83,700
Land Surveying	63	AC	$697.34	$43,800
SUBTOTAL				**$156,000**
Earthwork Costs:				
Excavation of Mine Waste (Excavate and Load into Trucks)	1,005,500	BCY	$2.16	$2,173,900
Excavation of Mine Waste - Dozer Scraping (25% of Volume, In Addition to Excavator)	251,375	BCY	$2.68	$673,700
General Backfill from Off-Site (Import, Place, Compact)	109,951	LCY	$30.69	$3,374,800
General Backfill from On-Site (Import, Place, Compact)	256,551	LCY	$12.11	$3,107,400
Soil Cap	64,533	CCY	$34.10	$2,200,800
Site Restoration	63	AC	$23,807.26	$1,496,500
Erosion and Sediment Control	251	AC-YR	$735.10	$184,800
Dust Control	696	Day	$7,907.84	$5,502,000
Pipeline Arroyo Sloping, Armoring, and Road Rebuilding	1	Lump Sum	$293,147.53	$293,148
Shaft Closure	2	Each	$109,522.20	$219,044
Adit Closure	2	Each	$50,000	$100,000
SUBTOTAL				**$19,326,000**
Transportation and Disposal Costs:				
Hauling to CR-2, Placing, Compaction, and Covering	1,256,875	LCY	$11.52	$14,479,200
Dust Control	667	Day	$7,907.84	$5,277,500
SUBTOTAL				**$19,756,700**
Total Direct Capital Costs (Rounded to Nearest $1,000)				**$45,847,000**

Indirect Capital Costs

Description	%	Total Cost
Permitting/Planning/Institutional Controls	4%	$1,254,712
Professional/Tech. - Project Management	5%	$1,568,390
Professional/Tech. - Remedial Design	5%	$1,568,390
Professional/Tech. - Construction Mgmt.	6%	$1,882,068
Total Indirect Capital Costs (Rounded to Nearest $1,000)		**$6,274,000**

Total Capital Costs

Description	%	Total Cost
Subtotal Capital Costs		$52,121,000
Contingency Allowance	15%	$7,758,150
Total Capital Cost (Rounded to Nearest $1,000)		**$59,879,000**

Maintenance Costs

Description	%	Total Cost
Present Worth of 10, 30, and 100 Years Maintenance Costs Depending on Activity (Rounded to the Nearest $1,000)	**7.0%**	$1,377,000
Contingency Allowance (25%)	**25%**	$344,300
Total Present Worth Maintenance Costs (Rounded to Nearest $1,000)		**$1,721,000**
Total Cost (Rounded to Nearest $1,000)		**$61,600,000**

Notes:
x1.25 Expansion Factor Used for all LCY quantities
x0.9 Compaction Factor Used for all CCY quantities

AC	Acre
BCY	Bank Cubic Yard
CCY	Compacted Cubic Yard
CF	Cubic Foot
EA	Each
LCY	Loose Cubic Yard
LF	Linear Foot
MO	Month
YR	Year

Table E-2. Alternative 2 Cost Estimating Assumptions

Alternative 2 Assumptions	
Mobilization/Demobilization	
Total Time (Days)	**3**
Clearing and Grubbing	
Total Acres	63
Daily Output	4
Total Clearing Time (Days)	16
Hauling	
Total Material (CY)	1,321,408
Daily Output (CY/trip)	22
Trip/Day/Truck	15
# of Trucks	6
Total Time (Days)	667
Site Restoration	
Total Area (Acres)	63
Volume per Acre of Imported Borrow (CY/Acre)	807
Daily Output for Importing Borrow (CY/Day/Dozer)	1,000
# of Dozers	4
Total Site Restoration Time (Days)	13
Inspection and Maintenance	
Total Cap and Restoration Area Requiring Regrading (SY)	48,400
Total Cap and Restoration Area Requiring Hydroseeding Revegetation (SY)	304,242
Duration of Inspection & Maintenance of Cap (years)	100
Duration of Inspection & Maintenance of Restored Excavation Areas (years)	30
Present Worth Interest Rate (%)	7.0%
Area of repository cap requiring regrading each year (0-10) (%)	10%
Area of repository cap requiring regrading each year (10-30) (%)	5%
Area of repository cap requiring revegetation each year (0-10)(%)	25%
Area of repository cap requiring revegetation each year (10-30)(%)	10%
Areas not capped of requiring regrading each year (0-10) (%)	10%
Areas not capped of requiring regrading each year (10-30) (%)	5%
Areas not capped requiring revegetation each year (0-10) (%)	25%
Areas not capped requiring revegetation each year (10-30) (%)	10%
Equipment mobilization cost for annual maintenance ($)	666
Total Job Duration (Excluding Maintenance)	
Working Days (Assume 240 days/year)	699
Working Months	35
Actual 9 Months (Assume 180 working days/year) to Account for Weather	47
Working Years	2.9
Actual Years (Assume 180 working days/year)	3.9
Total Job Duration	**4 Years**

Notes:

CY Cubic Yard

MO Month

SY Square Yard

Table E-3. Alternative 3

Cost Estimate Summary

Site: Quivira Tronox Mines Site
Location: Navajo Nation, New Mexico
Phase: Feasibility Study (-30% to +50%)
Base Year: 2023
Date: August 2023

Alternative 3. Dispose of All Mine Waste Off Site at Red Rock Disposal Facility

Direct Capital Costs				
Description	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Field Overhead and Oversight Costs:				
Field Overhead and Oversight	42	MO	36,715	$1,542,000
Mobilization/Demobilization	10	EA	54,148	$541,500
Travel, Lodging and Per Diem	630	Ea Person per MO	5,505	$3,468,200
Voluntary Alternative Housing	1	Lump Sum	2,000,000	$2,000,000
SUBTOTAL				**$7,552,000**
General Site Work Costs:				
Fence Construction/Repair - Equipment Storage Area	1,000	LF	$28.24	$28,200
Clearing and Grubbing	63	AC	$1,332	$83,700
Land Surveying	63	AC	$697	$43,800
SUBTOTAL				**$156,000**
Earthwork Costs:				
Excavation of Mine Waste (Excavate and Load into Trucks)	1,005,500	BCY	$2.16	$2,173,900
Excavation of Mine Waste - Dozer Scraping (25% of Volume, In Addition to Excavator)	251,375	BCY	$2.68	$673,700
General Backfill from Off-Site (Import, Place, Compact)	109,951	LCY	$30.69	$3,374,800
General Backfill from On-Site (Import, Place, Compact)	256,551	LCY	$12.11	$3,107,400
Site Restoration	63	AC	$23,807	$1,496,500
Erosion and Sediment Control	314	AC-YR	$735	$231,000
Dust Control	822	Day	$3,954	$3,249,600
Shaft Closure	2	Each	$109,522	$219,000
Adit Closure	2	Each	$50,000	$100,000
SUBTOTAL				**$14,626,000**
Transportation and Disposal Costs:				
Hauling to Red Rocks Disposal Facility	1,256,875	LCY	$12.90	$16,213,700
Disposal of Contaminated Soil - Red Rocks Disposal Facility	1,256,875	LCY	$82.50	$103,692,200
Dust Control	793	Day	$7,908	$6,274,700
SUBTOTAL				**$126,180,600**
Total Direct Capital Costs (Rounded to Nearest $1,000)				**$148,515,000**

Indirect Capital Costs		
Description	**%**	**Total Cost**
Permitting/Planning/Institutional Controls	4%	$1,792,912
Professional/Technician - Project Management	5%	$2,241,140
Professional/Technician - Remedial Design	5%	$2,241,140
Professional/Technician - Construction Management.	6%	$2,689,368
Total Indirect Capital Costs (Rounded to Nearest $1,000)		**$8,965,000**

Total Capital Costs		
Description	**%**	**Total Cost**
Subtotal Capital Costs		$157,480,000
Contingency Allowance	15%	$23,622,000
Total Capital Cost (Rounded to Nearest $1,000)		**$181,102,000**

Maintenance Costs		
Description		**Total Cost**
Present Worth of 10 and 30 Years Maintenance Costs Depending on Activity (Rounded to the Nearest $1,000)	**7.0%**	$1,148,000
Contingency Allowance	**25%**	$287,000
Total Present Worth Maintenance Costs (Rounded to Nearest $1,000)		**$1,435,000**
Total Cost (Rounded to Nearest $1,000)		**$182,537,000**

Notes:
x1.25 Expansion Factor Used for all LCY quantities
x0.9 Compaction Factor Used for all CCY quantities

AC	Acre
BCY	Bank Cubic Yard
CCY	Compacted Cubic Yard
CF	Cubic Foot
EA	Each
LCY	Loose Cubic Yard
LF	Linear Foot
MO	Month
YR	Year

Table E-4. Alternative 3 Cost Estimating Assumptions

Alternative 3 Assumptions	
Mobilization/Demobilization	
Total Time (Days)	**3.00**
Clearing and Grubbing	
Total Acres	63
Daily Output	4
Total Clearing Time (Days)	**15.7**
Hauling	
Total Material (CY)	1,256,875
Daily Output (CY/trip)	17
Trip/Day/Truck	4
# of Trucks	24
Total Time (Days)	**793**
Site Restoration	
Total Area (Acres)	63
Volume per Acre of Imported Borrow (CY/Acre)	807
Daily Output for Importing Borrow (CY/Day/Dozer)	1,000
# of Dozers	4
Total Site Restoration Time (Days)	**12.7**
Inspection and Maintenance	
Total Restored Excavation Area Requiring Regrading (SY)	304,242
Total Restored Excavation Area Requiring Hydroseeding Revegetation (SY)	304,242
Duration of Inspection & Maintenance of Restored Excavation Areas (years)	30
Present Worth Interest Rate (%)	7.0%
Areas requiring regrading each year (0-10) (%)	10%
Areas requiring regrading each year (10-30) (%)	5%
Areas requiring revegetation each year (0-10) (%)	25%
Areas requiring revegetation each year (10-30) (%)	10%
Equipment mobilization cost for annual maintenance ($)	666
Total Job Duration (Excluding Maintenance)	
Working Days (Assume 240 days/year)	825
Working Months	42
Actual 9 Months (Assume 180 working days/year) to Account for Weather	56
Working Years	3.4
Actual Years (Assume 180 working days/year)	4.6
Total Job Duration	**4 Years 7 Months**

Notes:

CY Cubic Yard

MO Month

SY Square Yard

Table E-5. Alternative 4

Cost Estimate Summary

Site: Quivira Tronox Mines Site
Location: Navajo Nation, New Mexico
Phase: Feasibility Study (-30% to +50%)
Base Year: 2023
Date: August 2023

Alternative 4. Dispose of All Mine Waste Off Site at a Resource Conservation and Recovery Act C or Low-Level Radioactive Waste Facility

Direct Capital Costs				
Description	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Field Overhead and Oversight Costs:				
Field Overhead and Oversight	154	MO	36,715	$5,654,100
Mobilization/Demobilization	36	EA	54,148	$1,949,300
Travel, Lodging and Per Diem	2,310	Ea Person per MO	5,505	$12,716,600
Voluntary Alternative Housing	1	Lump Sum	2,000,000	$2,000,000
SUBTOTAL				**$22,320,000**
General Site Work Costs:				
Fence Construction/Repair - Equipment Storage Area	1,000	LF	$28.24	$28,200
Clearing and Grubbing	63	AC	$1,332	$83,700
Land Surveying	63	AC	$697	$43,800
SUBTOTAL				**$156,000**
Earthwork Costs:				
Excavation of Mine Waste (Excavate and Load into Trucks)	1,005,500	BCY	$2.16	$2,173,900
Excavation of Mine Waste - Dozer Scraping (25% of Volume, In Addition to Excavator)	251,375	BCY	$2.68	$673,700
General Backfill from Off-Site (Import, Place, Compact)	109,951	LCY	$30.69	$3,374,800
General Backfill from On-Site (Import, Place, Compact)	256,551	LCY	$12.11	$3,107,400
Site Restoration	63	AC	$23,807	$1,496,500
Erosion and Sediment Control	1,131	AC-YR	$735	$831,800
Dust Control	3,075	Day	$3,954	$12,159,700
Shaft Closure	2	EA	$109,522	$219,000
Adit Closure	2	EA	$50,000	$100,000
SUBTOTAL				**$24,137,000**
Transportation and Disposal Costs:				
Hauling to Clean Harbors Facility, Deer Trail, CO	1,256,875	LCY	$180	$226,237,500
Disposal Contaminated Soil at Clean Harbors Facility, Deer Trail, CO	1,256,875	LCY	$105	$131,971,900
Dust Control	3,047	Day	$7,908	$24,094,900
SUBTOTAL				**$382,304,300**
Total Direct Capital Costs (Rounded to Nearest $1,000)				**$428,917,000**

Indirect Capital Costs		
Description	**%**	**Total Cost**
Permitting/Planning/Institutional Controls	4%	$11,877,804
Professional/Technician - Project Management	5%	$14,847,255
Professional/Technician - Remedial Design	5%	$14,847,255
Professional/Technician - Construction Management	6%	$17,816,706
Total Indirect Capital Costs (Rounded to Nearest $1,000)		**$59,389,000**

Total Capital Costs		
Description	**%**	**Total Cost**
Subtotal Capital Costs		$488,306,000
Contingency Allowance	15%	$73,245,900
Total Capital Cost (Rounded to Nearest $1,000)		**$561,552,000**

Maintenance Costs		
Description	**%**	**Total Cost**
Present Worth of 10 and 30 Years Maintenance Costs Depending on Activity (Rounded to the Nearest $1,000)	**7.0%**	$1,148,000
Contingency Allowance	**25%**	$287,000
Total Present Worth Maintenance Costs (Rounded to Nearest $1,000)		**$1,435,000**
Total Cost (Rounded to Nearest $1,000)		**$562,987,000**

Notes:
x1.25 Expansion Factor Used for all LCY quantities
x0.9 Compaction Factor Used for all CCY quantities

AC	Acre
BCY	Bank Cubic Yard
CCY	Compacted Cubic Yard
CF	Cubic Foot
EA	Each
LCY	Loose Cubic Yard
LF	Linear Foot
MO	Month
YR	Year

Table E-6. Alternative 4 Cost Estimating Assumptions

Alternative 4 Assumptions	
Mobilization/Demobilization	
Total Time (Days)	**3.00**
Clearing and Grubbing	
Total Acres	63
Daily Output	4
Total Clearing Time (Days)	**15.7**
Hauling	
Total Material (CY)	1,256,875
Daily Output (CY/trip)	25
Trip/Day/Truck	17
Total Time (Days)	3,047
Site Restoration	
Total Area (Acres)	63
Volume per Acre of Imported Borrow (CY/Acre)	807
Daily Output for Importing Borrow (CY/Day/Dozer)	1,000
# of Dozers	4
Total Site Restoration Time (Days)	**12.7**
Inspection and Maintenance	
Total Restored Excavation Area Requiring Regrading (SY)	304,242
Total Restored Excavation Area Requiring Hydroseeding Revegetation (SY)	304,242
Duration of Inspection & Maintenance of Restored Excavation Areas (years)	30
Present Worth Interest Rate (%)	7.0%
Areas requiring regrading each year (0-10) (%)	10%
Areas requiring regrading each year (10-30) (%)	5%
Areas requiring revegetation each year (0-10) (%)	25%
Areas requiring revegetation each year (10-30) (%)	10%
Equipment mobilization cost for annual maintenance ($)	666
Total Job Duration (Excluding Maintenance)	
Working Days (Assume 240 days/year)	3,079
Working Months	154
Actual 9 Months (Assume 180 working days/year) to Account for Weather	205
Working Years	12.8
Actual Years (Assume 180 working days/year)	17.1
Total Job Duration	**17 Years 1 Month**

Notes:

CY Cubic Yard

MO Month

SY Square Yard

Table E-7. Unit Cost Breakdown

Cost Item	Cost Source	Unit Cost	Unit	Description
Support Structures				
Trailers	015213200350	$264.86	Month	Office trailer, furnished, rent per month, 32 foot x 8 foot, excluding hookups
Storage Boxes	015213201250	$95.73	Month	Storage boxes, rent per month, 20 foot x 8 foot
Field Office Lights/HVAC	015213400160	$177.57	Month	Field office expense, field office lights & HVAC
Telephone/internet	015213400140	$95.23	Month	Field office expense, telephone bill; average bill/month, incl. long distance
Portable Toilets	015433406410	$220.92	Month	Rent toilet portable chemical
Field Office Equipment	015213400100	$248.99	Month	Field office expense, office equipment rental, average
Field Office Supplies	015213400120	$98.70	Month	Field office expense, office supplies, average
Trash	Engineering Estimate	$435.00	Month	No markup
Air Monitoring Equipment Rental CR-1	Vendor Quote	$1,975.00	Month	1 @ $1,250/month MultiRAE Pro Pumped 10.6 electron volt and 1 @ $725/month SKC Particulate Monitor (Field Environmental Instruments published quote)
Air Monitoring Equipment Rental CR-1E	Vender Quote	$1,975.00	Month	1 @ $1,250/month MultiRAE Pro Pumped 10.6 electron volt and 1 @ $725/month SKC Particulate Monitor (Field Environmental Instruments published quote)
Rental trucks 4-wheel drive	015433407200	$1,578.00	Month	Rent truck pickup 3/4 ton 4 wheel drive
4-wheel drive truck fuel	Engineering Estimate	$1,792.00	Month	No markup (Weeks x 4 = Months)
Rental cars	Vendor Quote	$1,505.00	Month	Weeks x 4 = Months
Rental car fuel	Engineering Estimate	$916.36	Month	No markup (Weeks x 4 = Months)
Submersible Pump (Month)	015433404700	$520.74	Month	Rent pump submersible electric 2 inch diameter, 120 GPM
Truck Scales (Month)	Engineering Estimate	$200.00	Month	No markup
Security - Night Watchman	Engineering Estimate	$20.00	Hour	No markup. 432 hours/ month. Looks like they assumed 6-14 hour shifts and 1-24 hour shift per week for 4 weeks.
Voluntary Alternative Housing	Per USEPA direction	$2,000,000.00	Lump Sum	
Mobilization/Demobilization				
Mobilization/Demobilization of Trailers/Storage Boxes	015436501300	$284.87	Each	Mobilization or demobilization, delivery charge for equipment, hauled on 3 ton capacity towed trailer. 50 mile roundtrip.
Temporary Electric Connect/Disconnect	262713102240	$3,379.81	Each	Meter center, main circuit breaker, rainproof, Single Phase, 3 Wire, 120/240 Volt, 400 Ampere
Large Equipment Mobilization/Demobilization	015436501600	$2,598.31	Each	Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer. 50 miles roundtrip.
Small Equipment	015436501400	$665.88	Each	Mobilization or demobilization, delivery charge for equipment, hauled on 20-ton capacity towed trailer. 50 miles roundtrip.
Travel, Lodging, and Per Diem				
Travel/Airfare	Engineering Estimate	$350.00	Month	1.5 trips per month @ $350
Lodging and Per Diem	CONUS Rate	$166.00	Day	CONUS rate for Gallup, NM as of 10/2023
Fence Construction/Repair				
Fence Construction/Repair	323113200200	$28.24	LF	Fence, chain link industrial, galvanized steel, 3 strands barb wire, 2 inch posts @ 10 foot on center, 9 gauge wire, 6 foot high, Schedule 40, includes excavation, & concrete
Clearing and Grubbing				
Clear and Grub	311313100300	$1,331.54	Acre	Selective clearing, brush, light clearing, with dozer, ball and chain, excludes removal offsite
Land Surveying				
Topographical Survey, Average	22113090050	$697.34	Acre	Topographical surveying, conventional, average
Excavation of Mine Waste				
Excavate, place in stockpile (no utilities)	312316435700	$2.16	BCY	Excavator, hydraulic, crawler mtd., 4.5 CY capacity = 340 CY/hour. Add 15% for loading into trucks. 2720 CY/Day
Excavating - Dozer	312316465530	$2.68	BCY	Dozer, open site, sand and gravel, 460 HP dozer, 150 foot haul, assuming 25% of waste requiring dozer
General Backfill from Off-Site				
Import Borrow Soil, includes delivery	312323150020 + 312323151800	$27.54	LCY	Material only, bank run gravel + Delivery charge, minimum 20 tons, 1 hour round trip, add. B34B Crew. Assume 1.5 tons/CY
Place/compact backfill/cover material	312323170020 + 312323235600	$3.15	LCY	Spread dumped material, no compaction by dozer + Compaction sheepsfoot or wobbly wheel roller, 6 inch lifts, 2 passes

Table E-7. Unit Cost Breakdown

Cost Item	Cost Source	Unit Cost	Unit	Description
General Backfill from On-Site				
Excavate, place in stockpile (no utilities)	312316465530	$2.68	BCY	Excavating, bulk, dozer, open site, bank measure, sand and gravel, 460 HP dozer, 150 foot haul
Load stockpiles to trucks	312316435700	$2.16	BCY	Excavator, hydraulic, crawler mtd., 4.5 CY capacity = 340 CY/hour. Add 15% for loading into trucks. 2,720 CY/Day
Off-road truck, 22 CY, 10 MPH, 2 mile cycle	312323205110	$4.12	LCY	Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 minute load/wait/unload, 22 CY truck, cycle 2 mile, 10 MPH, excludes loading equipment. Daily Output 374 LCY/Day
Place/compact backfill/cover material	312323170020 + 312323235600	$3.15	LCY	Spread dumped material, no compaction by dozer + Compaction sheepsfoot or wobbly wheel roller, 6 inch lifts, 2 passes
On-Site Transportation				
Hauling to CR-2	312323205110	$8.37	LCY	Cycle hauling (wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 minute load/wait/unload, 22 CY truck, cycle 4 mile, 15 MPH, excludes loading equipment. Added the difference between the 2 mile cycle and the 4 mile cycle to get a 10 mile cycle to get 6 miles round trip
Place/compact backfill/cover material	312323170020 + 312323235600	$3.15	LCY	Spread dumped material, no compaction by dozer + Compaction sheepsfoot or wobbly wheel roller, 6 inch lifts, 2 passes
Transporting Waste from CR-1E to CR-1				
On-road truck, 20 CY, 10 MPH, 4 mile cycle	312323204040	$3.51	LCY	Cycle hauling (wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 minute load/wait/unload, 20 CY truck, cycle 4 miles, 25 MPH, excludes loading equipment. 380 CY/Day
Place/compact backfill/cover material	312323170020 + 312323235600	$3.15	LCY	Spread dumped material, no compaction by dozer + Compaction sheepsfoot or wobbly wheel roller, 6 inch lifts, 2 passes
Site Restoration				
Import Borrow Soil, includes delivery	312323150020 + 312323151800	$20.49	LCY	Material only, bank run gravel + Delivery charge, minimum 20 tons, 1 hour round trip, add. B34B Crew. Assume 1.5 tons/CY. 1,000 CY/Day
Place/compact vegetative layer	312323170020 + 312323235600	$3.15	LCY	Spread dumped material, no compaction by dozer + Compaction sheepsfoot or wobbly wheel roller, 6 inch lifts, 2 passes
Hydroseeding	329219145400	$56.01	MSF	Seeding athletic fields, seeding utility mix with mulch and fertilizer, 7 pounds per MSF, hydro or air seeding
Fine Grading	312213200280	$0.22	SY	
Rough Grading		$5,269.30	SF	cost per 100,000 SF
Erosion and Sediment Control				
Silt Fence, Polypropylene, 3-ft High	312514161000	$2.75	LF	Synthetic erosion control, silt fence, install and remove, 3 feet high.
Straw waddles	312514160600	$3.94	LF	Straw in polymeric netting, biodegradable log
Dust Control				
Dust Control, Heavy	312323202510	$1,976.96	Truck/Day	Crew B59, 1 truck/trailer and 1 driver.
Unnamed Arroyo #2 Sloping and Armoring				
Excavate, place in stockpile (no utilities)	312316465400	$5.51	BCY	Excavating, bulk, dozer, open site, bank measure, sand and gravel, 300 HP dozer, 300 foot haul
Boulders loaded on truck	312316302800	$19.90	LCY	Boulders under 1/2 CY, loaded on truck, no hauling
Haul boulders	312316305420	$7.63	LCY	Haul boulders, 25 ton off-highway dump, 2 mile round trip
Place riprap	313713100200	$41.02	LCY	Rip-rap and rock lining, random, broken stone, 18 inch minimum thickness, machine placed for slope protection, not grouted. Unit given in SY, multiply by 18 inches to get volume unit cost.

Table E-7. Unit Cost Breakdown

Cost Item	Cost Source	Unit Cost	Unit	Description
Pipeline Arroyo Sloping, Armoring, and Road Rebuilding				
Excavate, place in stockpile (no utilities)	312316465400	$5.51	BCY	Excavating, bulk, dozer, open site, bank measure, sand and gravel, 300 HP dozer, 300 foot haul
Boulders loaded on truck	312316302800	$19.90	BCY	Boulders under 1/2 CY, loaded on truck, no hauling
Haul boulders	312316305420	$7.63	LCY	Haul boulders, 25 ton off-highway dump, 2 mile round trip
Place riprap	313713100200	$41.02	LCY	Rip-rap and rock lining, random, broken stone, 18 inch minimum thickness, machine placed for slope protection, not grouted. Unit given in SY, multiply by 18 inches to get volume unit cost.
Road Base	321123231513	$37.11	CCY	Base course drainage layers, aggregate base course for roadways and large paved areas, alternate method to figure base course, crushed stone, compacted, 3/4 inch, 12 inch deep
Gravel	015523500050	$8.76	SY	Temporary, roads, gravel fill, 4 inch gravel depth, excl surfacing
Road Grading	340113100310	$565.90	Mile	Maintenance grading of roadways, roadway, 4 passes, 3 MPH
Import and Install Geotextile Fabric				
Mirafi 160N/O Orange Nonwoven Geotextile Fabric	Vender Quote, ACF West Geosynthetics	$1.81	SY	Import and place Mirafi 160N/O Orange Nonwoven Geotextile Fabric
Shaft Closure				
Excavation	312316130050	$8.57	BCY	Excavating trench or continuous footing, common earth, 3/8 CY excavator, 1 foot to 4 foot deep
Concrete Delivered	33113350150	$131.10	CY	Heavyweight concrete delivered 2000 psi
Forming	31113456150	$134.85	Each	12 foot x 12 foot footing form
Placing Concrete	33113704350	$25.71	CY	Place, level and consolidate, over 10 CY pumped
Hauling of Off-Site Licensed Facility				
Hauling to Clean Harbors Facility, Deer Trail, Colorado	312323204114	$180.00	LCY	600 loaded miles x $5/loaded mile = $3,000 per trip /25 tons per trip = $120 per ton x 1.5 tons/CY = $180/LCY
Hauling to Red Rocks Disposal Facility	312323204114	$12.90	LCY	43 loaded miles x $5/loaded mile = $215 per trip/25 tons per trip = $8.6 per ton x 1.5 tons/CY = $12.90/LCY
Disposal of Contaminated Soil at Licensed Facility				
Disposal Contaminated Soil - Clean Harbors Facility, Deer Trail, Colorado	Quote for disposal at Deer Trail, Colorado - September 2020 (includes tax and fees)	$105.00	LCY	Price does not include hauling. $70/Ton, assume 1.5 tons/CY.
Disposal Contaminated Soil - Red Rocks Disposal Facility	Quote for Disposal at Red Rocks Disposal Facility - January 2022	$82.50	LCY	Assumed price ($55/ton). Landfill quoted between $53 and $58/ton.
Transport to and Place Material at Off-Site Location				
Place/compact backfill/cover material	312323170020 + 312323235600	$3.15	LCY	Spread dumped material, no compaction by dozer + Compaction sheepsfoot or wobbly wheel roller, 6 inch lifts, 2 passes
Top Liner				
HDPE Liner	Southwest Linings in Bernalillo, New Mexico	$0.60	SF	Early 2020 estimate
Drainage Geonet	Southwest Linings in Bernalillo, New Mexico	$0.40	SF	Early 2020 estimate
Soil Cap				
Import Borrow Soil, includes delivery	312323150020 + 312323151800	$27.54	LCY	Material only, bank run gravel + Delivery charge, minimum 20 tons, 1 hour round trip, add. B34B Crew. Assume 1.5 tons/CY. 130 Ton/Day/Truck
Place/compact borrow	312323170020 + 312323235600	$3.15	LCY	Spread dumped material, no compaction by dozer + Compaction sheepsfoot or wobbly wheel roller, 6 inch lifts, 2 passes. 1,000 LCY/Day/Truck
Excavation of Off-Site Repository				
Excavate, place in stockpile (no utilities)	312316465400	$5.51	BCY	Excavating, bulk, dozer, open site, bank measure, sand and gravel, 300 HP dozer, 300 foot haul
Soil Cap at Off-Site Repository				
Place/compact borrow	312323170020 + 312323235600	$3.15	LCY	Spread dumped material, no compaction by dozer + Compaction sheepsfoot or wobbly wheel roller, 6 inch lifts, 2 passes. 1,000 LCY/Day/Truck

Table E-7. Unit Cost Breakdown

Cost Item	Cost Source	Unit Cost	Unit	Description
Rock Armoring on Benches				
Boulders drilled and blasted	312316302900	32.07	LCY	Drilling and blasting rock, boulders, drilled and blasted
Loading	312316302800	19.9	LCY	Boulders under 1/2 CY, loaded on truck, no hauling
Hauling	312316305460	5.02	LCY	Drilling and blasting rock, 25 ton off-highway dump, 4 mile round trip, haul boulders
Riprap/Placing	313712100200	$82.03	SY	Rip-rap and rock lining, random, broken stone, 18 inch minimum thickness, machine placed for slope protection, not grouted.
Fence Maintenance				
Fence Inspection	Engineers Estimate	$110.00	Hour	
Fence Repair	Engineers Estimate	$2.42	LF	
O&M				
Hydroseeding	329219145400	$56.01	MSF	Seeding athletic fields, seeding utility mix with mulch and fertilizer, 7 pounds per MSF, hydro or air seeding
Riprap	Actual 2023 Cost	$40.00	ton	Cost from 2023 Quivira construction
Small Equipment	015436501400	$717.03	Each	Mobilization or demobilization, delivery charge for equipment, hauled on 20-ton capacity towed trailer. 50 miles roundtrip.
Fine Grading	312213200280	$0.22	SY	
Lawn Mower	015433403407	$2,546.58	Week	146.58 per week 40 hours per week operator $60/hour
Straw waddles	312514160600	$3.94	LF	Straw in polymeric netting, biodegradable log
Topographical Survey, Average	22113090050	$697.34	Acre	Topographical surveying, conventional, average

Notes:

BCY = Bank cubic yard
CY = Cubic Yard
CCY = Compacted cubic yard
CONUS = Continental United States
GPM = Gallon per minute
HDPE = High-density polyethylene
HP = Horse power
HVAC = Heating, ventilation, and air conditioning
LCY = Loose cubic yard
LF = Linear foot
MPH = Mile per hour
MSF = Thousand square foot
psi = Pound per square inch
SF = Square foot
SY = Square yard

Table E-8. Derived Costs

Cost Item	Unit Cost	Unit	Qty	Derived Unit Cost	Unit
Support Structures					
Trailers	$264.86	Month	2	$529.72	Month
Storage Boxes	$95.73	Month	2	$191.46	Month
Field Office Lights/Heating/Air Conditioning	$177.57	Month	1	$177.57	Month
Telephone/internet	$95.23	Month	1	$95.23	Month
Portable Toilets	$220.92	Month	4	$883.68	Month
Field Office Equipment	$248.99	Month	1	$248.99	Month
Field Office Supplies	$98.70	Month	1	$98.70	Month
Trash	$435.00	Month	1	$435.00	Month
Air Monitoring Equipment Rental CR-1	$1,975.00	Month	1	$1,975.00	Month
Air Monitoring Equipment Rental CR-1E	$1,975.00	Month	1	$1,975.00	Month
Rental trucks 4-wheel drive	$1,578.00	Month	4	$6,312.00	Month
4-wheel drive truck fuel	$1,792.00	Month	4	$7,168.00	Month
Rental cars	$1,505.00	Month	3	$4,515.00	Month
Rental car fuel	$916.36	Month	3	$2,749.09	Month
Submersible Pump (Month)	$520.74	Month	1	$520.74	Month
Truck Scales (Month)	$200.00	Month	1	$200.00	Month
Security - Night Watchman	$20.00	Hour	432	$8,640.00	Month
			Subtotal	**$36,715.18**	Month
Voluntary Alternative Housing	$2,000,000.00	Lump Sum	1	$2,000,000.00	Lump Sum
Mobilization/Demobilization					
Mobilization/Demobilization of Trailers/Storage Boxes	$284.87	Each	4	$1,139.48	Each
Temporary Electric Connect/Disconnect	$3,379.81	Each	1	$3,379.81	Each
Large Equipment Mobilization/Demobilization	$2,598.31	Each	15	$38,974.65	Each
Small Equipment	$665.88	Each	16	$10,654.08	Each
			Subtotal	**$54,148.02**	Each
Travel, Lodging, and Per Diem					
Travel/Airfare	$350.00	Month	1.5	$525.00	Month
Lodging and Per Diem	$166.00	Day	30	$4,980.00	Month
			Subtotal	**$5,505.00**	Month
Fence Construction/Repair					
Fence Construction/Repair	$28.24	LF	1	$28.24	LF
			Subtotal	**$28.24**	LF
Clearing and Grubbing					
Clear and Grub	$1,331.54	Acre	1	$1,331.54	Acre
			Subtotal	**$1,331.54**	Acre
Land Surveying					
Land surveying, Mob/Demob	$697.34	Acre	1	$697.34	Lump Sum
			Subtotal	**$697.34**	Lump Sum
Excavation of Mine Waste					
Excavate, place in stockpile (no utilities)	$2.16	BCY	1	$2.16	BCY
Load stockpiles to trucks	$2.68	BCY	1	$2.68	BCY
			Subtotal	**$4.84**	BCY
General Backfill from Off-Site					
Import Borrow Soil, includes delivery	$27.54	LCY	1	$27.54	LCY
Place/compact backfill/cover material	$3.15	LCY	1	$3.15	LCY
			Subtotal	**$30.69**	LCY
General Backfill from On-Site					
Excavate, place in stockpile (no utilities)	$2.68	BCY	1	$2.68	BCY
Load stockpiles to trucks	$2.16	BCY	1	$2.16	BCY
Off-road truck, 22 CY, 10 MPH, 2 mile cycle	$4.12	LCY	1	$4.12	LCY
Place/compact backfill/cover material	$3.15	LCY	1	$3.15	LCY
			Subtotal	**$12.11**	LCY

Table E-8. Derived Costs

Cost Item	Unit Cost	Unit	Qty	Derived Unit Cost	Unit
On-Site Transportation					
Hauling to CR-2	$8.37	LCY	1	$8.37	LCY
Place/compact backfill/cover material	$3.15	LCY	1	$3.15	LCY
			Subtotal CR-2	**$11.52**	LCY
Site Restoration					
Import Borrow Soil, includes delivery	$20.49	LCY	806.67	$16,531.29	Acre
Place/compact vegetative layer	$3.15	LCY	806.67	$2,541.00	Acre
Hydroseeding	$56.01	MSF	43.56	$2,439.80	Acre
Rough Grading	$52.69	MSF	43.56	$2,295.18	Acre
			Subtotal	**$23,807.26**	Acre
Erosion and Sediment Control					
Silt Fence, Polypropylene, 3-foot High	$2.75	LF	210	$577.50	Acre
Straw Waddles	$3.94	LF	40	$157.60	Acre
			Subtotal	**$735.10**	Acre
Dust Control On-Site Alternative					
Dust Control, Heavy	$1,976.96	Truck/Day	4	$7,907.84	Day
			Subtotal	**$7,907.84**	Day
Dust Control Off-Site Alternatives					
Dust Control, Heavy	$1,976.96	BCY	2	$3,953.92	Day
			Subtotal	**$3,953.92**	Day
Unnamed Arroyo #2 Sloping and Armoring					
Excavate, place in stockpile (no utilities)	$5.51	BCY	3700	$20,387.00	
Boulders loaded on truck	$19.90	LCY	2500	$49,750.00	
Haul boulders	$7.63	LCY	2500	$19,075.00	
Place riprap	$41.02	LCY	2500	$102,537.50	
			Subtotal	**$191,749.50**	Lump Sum
Pipeline Arroyo Sloping, Armoring, and Road Rebuilding					
Excavate, place in stockpile (no utilities)	$5.51	BCY	3700	$20,387.00	
Boulders loaded on truck	$19.90	LCY	2500	$49,750.00	
Haul boulders	$7.63	LCY	2500	$19,075.00	
Place riprap	$41.02	LCY	2500	$102,537.50	
Road Base	$37.11	CCY	370	$13,744.44	
Gravel	$8.76	SY	10000	$87,600.00	
Road Grading	$565.90	Mile	0.09	$53.59	
				$293,147.53	Lump Sum
Shaft Closure					
Excavation	$8.57	BCY	20	$171.40	
Concrete Delivered	$131.10	CY	230	$30,153.00	
Forming	$134.85	Each	2	$269.70	
Placing Concrete	$25.71	CY	230	$5,913.30	
			Subtotal	**$36,507.40**	
Complexity and Remoteness Multiplier			**3**	**$109,522.20**	Each
Adit Closure					
Lump sum assumption	$50,000.00	Each	1	$50,000.00	
				$50,000.00	Each
Hauling to Off-Site Licensed Facility					
Hauling to Clean Harbors Facility, Deer Trail, Colorado	$180.00	LCY	1	$180.00	LCY
Hauling to Red Rocks Disposal Facility	$12.90	LCY	1	$12.90	LCY
Disposal of Contaminated Soil at Licensed Facility					
Disposal Contaminated Soil - Clean Harbors Facility, Deer Trail, Colorado	$105.00	LCY	1	$105.00	LCY
Disposal Contaminated Soil - Red Rocks Disposal Facility	$82.50	LCY	1	$82.50	LCY

Table E-8. Derived Costs

Cost Item	Unit Cost	Unit	Qty	Derived Unit Cost	Unit
Transport to and Place Material at Off-Site Location					
Hauling to CR-2	$8.37	LCY	1	$8.37	LCY
Place/compact backfill/cover material	$3.15	LCY	1	$3.15	LCY
			Subtotal	**$11.52**	LCY
Soil Cap					
Import Borrow Soil, includes delivery	$27.54	LCY	1.11	$30.60	CCY
Place/compact borrow	$3.15	LCY	1.11	$3.50	CCY
			Subtotal	**$34.10**	CCY
Rock Armoring on Benches					
Boulders drilled and blasted	$32.07	LCY	1	**$32.07**	LCY
Loading	$19.90	LCY	1	**$19.90**	LCY
Hauling	$5.02	LCY	1	**$5.02**	LCY
Riprap/Placing	$82.03	SY	1	**$82.03**	LCY
			Subtotal	**$139.02**	LCY
Fence Maintenance					
Fence Inspection	$110.00	Hour	10	$1,100.00	Event
Fence Repair	$2.42	LF	250	$605.00	Event
			Subtotal	**$1,705.00**	Event
Maintenance					
Revegetation (30 years)					
Hydroseeding	56.01	MSF	43.56	$2,439.80	Acre
Small Equipment	717.03	Each	1	$717.03	Year
Regrading/Erosion Control (10 years)					
Small Equipment	717.03	Each	1	$717.03	Year
Fine Grading	0.22	SY	1	$0.22	SY
Riprap	40	ton	500	$20,000.00	year
Silt Fence, Polypropylene, 3-foot High	$2.75	LF	210	$577.50	Acre
Straw Waddles	$3.94	LF	40	$157.60	Acre
Cap Weed Control (30 years)					
Lawn Mower	2546.58	Week	0.5	$1,273.29	Year
Inspection/Vegetation Survey (30 years)					
Topographical Survey, Average	697.34	Acre	62.86	$43,834.79	Year

Notes:

BCY = Bank cubic yard
CY = Cubic yard
CCY = Compacted cubic yard
LCY = Loose cubic yard
LF = Linear foot
MPH = Mile per hour
MSF = Thousand square foot
SY = Square yard
x1.25 Expansion Factor Used for LCY quantities
x0.9 Compaction Factor Used for CCY quantities

Table E-9. Derived Quantities

Region	Areas Outside Capped Waste Piles Requiring Restoration (AC)			General Backfill Volume (BCY)			Soil Cap Volume (BCY)	Off-Site Disposal Volumes (BCY)		On Site Transport Volumes (BCY)
	Onsite	Red Rocks	RCRA or LLRW	Onsite	Red Rocks	RCRA or LLRW	Onsite	Red Rocks	RCRA or LLRW	Onsite
Cover on Waste Pile (Footprint)	20.93	20.93	20.93	135,095	135,095	135,095		33,771.92	33,771.92	33,771.92
Outer Perimeter	7.31	7.31	7.31	11,798	11,798	11,798		11,797.64	11,797.64	11,797.64
East Side Toe	1.52	1.52	1.52	3,671	3,671	3,671		3,670.82	3,670.82	3,670.82
East Side	1.65	1.65	1.65	5,334	5,334	5,334		5,334.33	5,334.33	5,334.33
Western Toe	1.63	1.63	1.63	3,955	3,955	3,955		3,954.83	3,954.83	3,954.83
Southern Toe	1.88	1.88	1.88	12,150	12,150	12,150		12,150.04	12,150.04	12,150.04
Pond 1	0.62	0.62	0.62	13,950	13,950	13,950		13,950.07	13,950.07	13,950.07
Pond 1A	0.15	0.15	0.15	1,959	1,959	1,959		1,959.14	1,959.14	1,959.14
Unreclaimed Pond	1.95	1.95	1.95	21,978	21,978	21,978		21,978.13	21,978.13	21,978.13
Pond 3	0.23	0.23	0.23	3,671	3,671	3,671		3,671.59	3,671.59	3,671.59
Pond 2	0.21	0.21	0.21	6,587	6,587	6,587		6,587.37	6,587.37	6,587.37
Lower Pond 5 Hotspot	0.07	0.07	0.07	795	795	795		794.57	794.57	794.57
Lower Pond 5 Hotspot	0.06	0.06	0.06	3,934	3,934	3,934		393.39	393.39	393.39
Lower Pond 6c	0.30	0.30	0.30	3,361	3,361	3,361		3,360.84	3,360.84	3,360.84
Lower Pond 6b	0.22	0.22	0.22	2,438	2,438	2,438		2,438.37	2,438.37	2,438.37
CR-1 Existing Waste Pile								803,325.00	803,325.00	803,325.00
CR-1 Total	**38.73**	**38.73**	**38.73**	**230,676**	**230,676**	**230,676**		**929,200**	**929,200**	**929,200**
North Industrial	0.50	0.50	0.50	2,015	2,015	2,015		2,014.76	2,014.76	2,014.76
Hotspot	0.05	0.05	0.05	427	427	427		426.65	426.65	426.65
Surface 1	0.06	0.06	0.06	141	141	141		140.83	140.83	140.83
Surface 2	3.80	3.80	3.80	9,207	9,207	9,207		9,206.78	9,206.78	9,206.78
Surface 3	0.02	0.02	0.02	51	51	51		49.92	49.92	49.92
Surface 4	0.01	0.01	0.01	28	28	28		28.40	28.40	28.40
Outer Perimeter	4.46	4.46	4.46	7,202	7,202	7,202		7,201.56	7,201.56	7,201.56
CR-1E Existing Waste Piles	2.55	2.55	2.55	16,456	16,456	16,456		30,168	30,168	30,168
CR-1E Total	**11.5**	**11.5**	**11.5**	**35,526**	**35,526**	**35,526**		**49,300**	**49,300**	**49,300**
KMP UNC Hotspot	0.00	0.00	0.00	-	-	-		-	-	-
KMP UNC Hotspot 4ft	1.01	1.01	1.01	6,531.01	6,531.01	6,531.01		6,531.01	6,531.01	6,531.01
KMP UNC Hotspot 6 ft	0.07	0.07	0.07	642.49	642.49	642.49		642.49	642.49	642.49
KMP UNC Hotspot 6 ft	0.08	0.08	0.08	817.47	817.47	817.47		817.47	817.47	817.47
KMP UNC Perimeter	9.42	9.42	9.42	15,201.34	15,201.34	15,201.34		15,201.34	15,201.34	15,201.34
KMP NN Perimeter	1.84	1.84	1.84	2,973.26	2,973.26	2,973.26		2,973.24	2,973.24	2,973.24
KMP NN Hotspot	0.26	0.26	0.26	834.07	834.07	834.07		834.12	834.12	834.12
Kerr McGee Pond Total	**12.7**	**12.7**	**12.7**	**26,999.64**	**26,999.64**	**26,999.64**		**27,000**	**27,000**	**27,000**
Cap Area (acres)							10			
Total Quantities	**62.9**	**62.9**	**62.9**	**293,202**	**293,202**	**293,202**	**64,533**	**1,005,500**	**1,005,500**	**1,005,500**
Truckloads	**2120**	**2120**	**2120**	**18,330**	**18,330**	**18,330**	**4,040**	**76,180**	**76,180**	**57,140**

Table E-9. Derived Quantities

Riprap Volume							
	LF	11.3 FT Slope	LF	8.49 FT Slope	Total SF	SY	CY (Assuming 3ft Depth)
CR-1	8,245	93,169	0	0	93,169	10,352	10,352
CR-1E	3,516	39,731	2,146	18,220	57,950	6,439	6,439

Canyon Repository Area
10.00 ACRES

Riprap Volume (LCY)	
Alternative 2	10,352
Alternative 3	16,971
Alternative 4	16,971
Off Site Truckloads Site Restoration	
Alternative 2	24,490
Alternative 3	96,630
Alternative 4	96,630

Notes:

BCY	Bank cubic yard	RCRA	Resource Conservation and Recovery Act
CY	Cubic yard	SF	Square foot
LF	Linear foot	SY	Square yard
LLRW	Low-level radioactive waste		

Table E-10. Inspection and Maintenance Breakdown

Percent Revegetation (0-10 years):	25%
Percent Revegetation (10-30 years):	10%
Percent Regrading (0-10 years):	10%
Percent Regrading (10-30 years):	5%
Percent Erosion Control:	10%
Total Site Area Square Yards:	304,242
CR-2 Cap Area Square yards:	48,400

		Alternative 2	All Alternatives
Duration	**Activity**	**Cap Only**	**Entire Site**
10 years Maintenance	Revegetation (Square Yards)	12,100	76,061
	Regrading (Square Yards)	35,264	30,424
30 years Maintenance	Erosion Control (Acre)	1	6
100 years Maintenance	Inspection	12,100	76,061

Present Value Calculations		
Years (n)	5	4.100197436
Interest (i)	0.07	
Years (n)	10	7.023581541
Interest (i)	0.07	
Years (n)	30	12.40904118
Interest (i)	0.07	
Years (n)	100	14.26925071
Interest (i)	0.07	

Quivira Present Worth of Maintenance - 7%				
		Alternative 2 Cap Only	**Entire Site for All Alternatives**	**Alternative 2 Total**
0 to 10 years Maintenance	Revegetation	$46,335	$279,496	$325,831
	Regrading/Erosion Control	$27,192.52	$66,724.98	$93,917
10 to 30 years Maintenance	Revegetation	$31,165	$199,210	$230,375
	Regrading/Erosion Control	$24,021.44	$58,943.79	$82,965
0 to 30 years Maintenance	Site Inspection	$0.00	$543,947.74	$543,948
0 to 100 years Maintenance	Cap Inspection	$99,505.19	$0.00	$99,505
Total Maintenance		**$228,219**	**$1,148,322**	**$1,376,542**

Table E-10. Inspection and Maintenance Breakdown

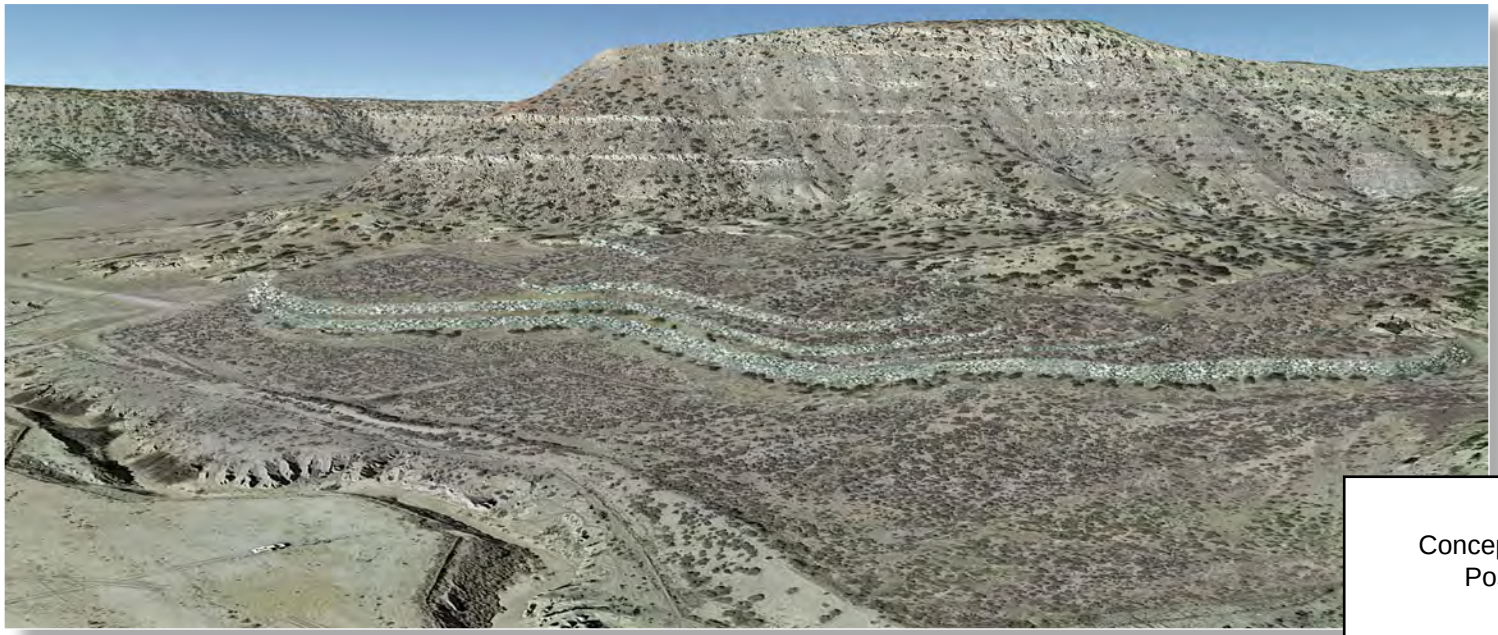
Assumptions
7% Interest Rate
Offsite Cap Area based on percentage of overall repository capacity needed for Quivira Assuming 10% of repository cap will require regrading/erosion control each year (0-10) Assuming 5% of repository cap will require regrading/erosion control each year (10-30) Assuming 25% of repository cap will require revegetation each year (0-10) Assuming 10% of repository cap will require revegetation each year (10-30) Assuming 10% of areas not capped will require regrading/erosion control each year (0-10) Assuming 5% of areas not capped will require regrading/erosion control each year (10-30) Assuming 25% of areas not capped will require revegetation each year (0-10) Assuming 10% of areas not capped will require revegetation each year (10-30)
$717.03 - Equipment mobilization cost for annual maintenance 500 tons riprap per year, $40/ton

APPENDIX F

POST-RESTORATION VISUALIZATIONS



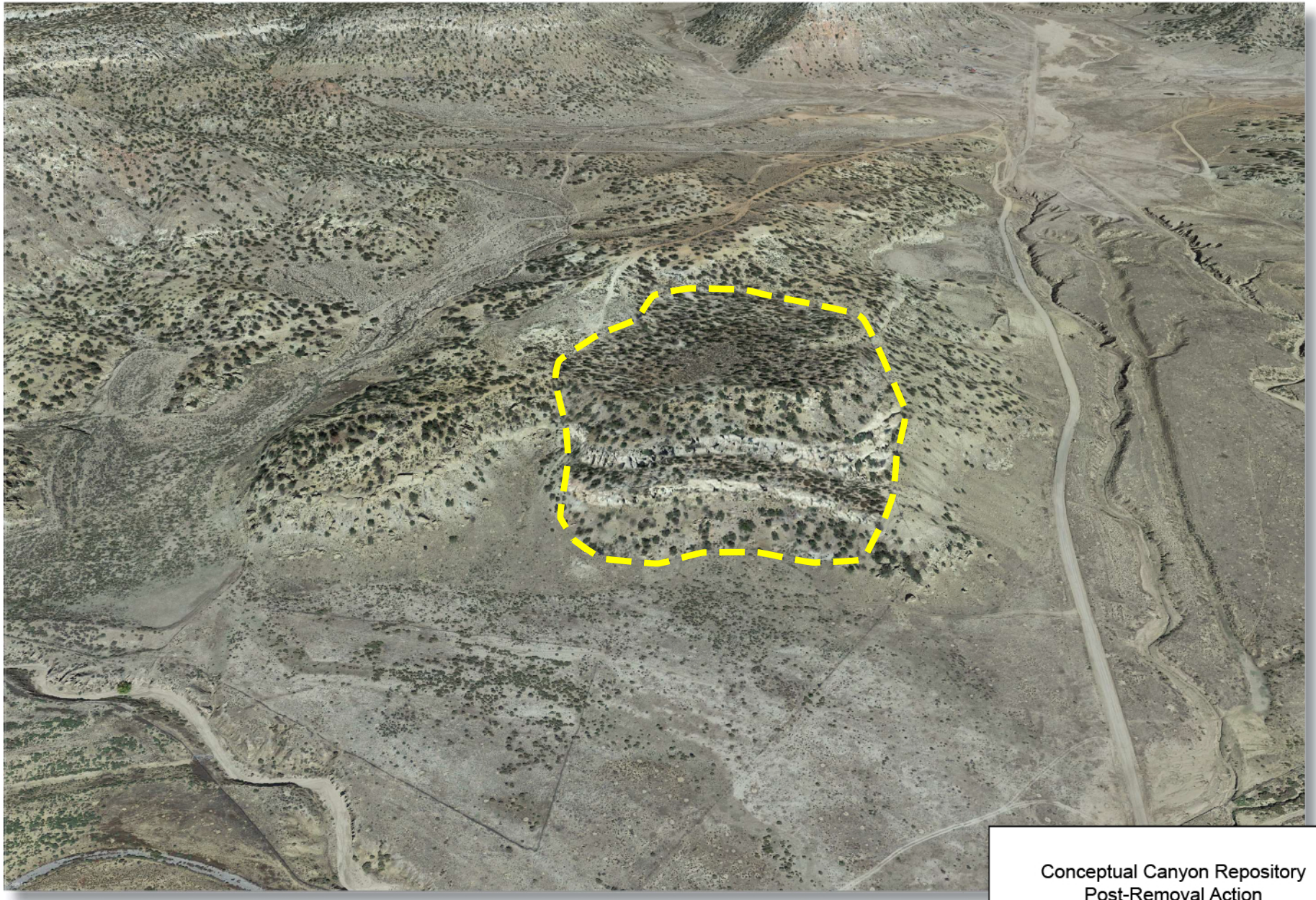
EXISTING CONDITIONS - CR-1



PROPOSED RECLAMATION - CR-1

Conceptual CR-1 Repository
Post-Removal Action

TETRA TECH



Conceptual Canyon Repository
Post-Removal Action

TETRA TECH