

FACT SHEET/STATEMENT OF BASIS

**Remedy Selection
For the
Technical Area V Groundwater Area of Concern**

**Sandia National Laboratories
New Mexico**

RCRA Permit No. NM5890110518

April 30, 2026

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Proposed Corrective Action Remedy for the
Technical Area V Groundwater Area of Concern
Sandia National Laboratories
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INTRODUCTION

The New Mexico Environment Department (Department/NMED) proposes to select a remedy for corrective action for the Technical Area-V (TAVG) Area of Concern (AOC) at Sandia National Laboratories (SNL). The United States Department of Energy/National Nuclear Security Administration (DOE/NNSA) and National Technology and Engineering Solutions of Sandia, LLC (NTESS) conducted a Corrective Measures Evaluation (CME) to evaluate different alternatives for remediation of the TAVG AOC and submitted a CME Report to NMED on May 8, 2024 (SNL 2024). NMED is proposing this action under the New Mexico Hazardous Waste Act, NMSA 1978 §§ 74-4-1 to 74-4-17, and under the terms of the Compliance Order on Consent (Consent Order), dated April 29, 2004, executed by NMED and by the DOE and Sandia Corporation. The TAVG AOC has been under investigation since the 1990s. Based on the information collected, NMED intends, pending public input, to select a remedy for the TAVG AOC.

A. FACILITY DESCRIPTION

SNL is located within the boundaries of Kirtland Air Force Base (KAFB) adjacent and southeast of Albuquerque in Bernalillo County, New Mexico. KAFB covers 52,223 acres on a high arid mesa approximately five miles east of the Rio Grande. SNL occupies 2,829 acres of land owned by the DOE and an additional 14,920 acres of land provided through land-use permits with KAFB, the U.S. Forest Service (USFS), the State of New Mexico, and the Isleta Pueblo Indian Reservation. Sandia Corporation, a former subsidiary of American Telephone and Telegraph (AT&T) Corporation, operated the properties for the DOE from the time of its opening in 1945 until September 1993, when Martin Marietta Corporation (now Lockheed Martin) took over operations from AT&T. The management and operating name changed on May 1, 2017, from Sandia Corporation to National Technology and Engineering Solutions of Sandia, LLC (NTESS). NTESS is owned by Honeywell International. The Facility is owned by the DOE and jointly operated by the DOE and NTESS.

SNL is engaged in research and development of conventional and nuclear weapons, alternative energy sources and a wide variety of national security-related research and development. SNL consists of five technical areas (TAs) and several test areas. The primary mission of SNL is to provide engineering and testing support for nuclear weapons components and related systems. During the late 1940s, the final assembly of weapons was conducted at SNL. Since 1949, SNL has been dedicated to research, development, and testing. SNL currently employs approximately 9,300 people. Because of its testing and research activities, SNL generates hazardous, radioactive, mixed (wastes containing both hazardous and radioactive components), and solid wastes. From 1945 to

1988 most of these wastes were disposed of at SNL at numerous locations which have been classified by NMED as Solid Waste Management Units (SWMUs). The SWMUs include unpermitted landfills, septic system drain-fields and seepage pits, outfalls, waste piles, test areas, and surface discharge sites. Past waste management activities at SNL have caused the release of hazardous, mixed, and radioactive contaminants into the environment.

SNL is located at 1515 Eubank SE, Albuquerque, New Mexico, 87123. The National Nuclear Security Administration (NNSA)/DOE Site Field Office is located at KAFB East of Pennsylvania & H Street, Albuquerque, NM 87116. The Permittee's primary contact for this action is Mr. Daryl Hauck, DOE/NNSA/SFO, PO Box 5400, MS-0184, Albuquerque, NM 87185.

B. STATUTORY AND REGULATORY FRAMEWORK

The Statement of Basis is a decision document that discusses the proposed remedy selection and the key information supporting the proposed selection, primarily contained in the Current Conceptual Model/Corrective Measures Evaluation (CCM/CME) Report and other reports that the Permittees have submitted to NMED. In accordance with regulatory guidance (USEPA 1991) and the Consent Order (Section VII.C.5), the purpose of the Statement of Basis is to:

- Describe the remedies that were considered;
- Identify the remedies that are proposed;
- Explain the rationale for selecting the proposed remedies;
- Solicit public review and comment on the proposed remedies; and
- Provide information on how the public can be involved in the remedy selection process.

In 1976, Congress passed, and the President signed, the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 to 6992k, as an amendment to the Solid Waste Disposal Act of 1965. RCRA provides for the "cradle to grave" regulation of hazardous wastes and requires the Environmental Protection Agency (EPA) to develop regulations governing the generation, transportation, treatment, storage, and disposal of hazardous wastes, including corrective action for releases into the environment of hazardous wastes or hazardous waste constituents.

On November 19, 1980, the first RCRA regulations became effective, and it became unlawful to treat, store, or dispose of hazardous waste without having, or having applied for, a permit. For existing treatment, storage, or disposal facilities, the requirement to submit an application is satisfied by submitting the "Part A" portion of the application; the "Part B" portion was allowed to be submitted at a later time. The content and function of these permit parts are explained in 40 Code of Federal Regulations (CFR) § 270.10.

EPA authorized the State of New Mexico, through the Environment Department, to implement and enforce its own hazardous waste management program, including corrective action requirements, in lieu of the federal program, under the New Mexico Hazardous Waste Act (HWA), New Mexico Statutes Annotated (NMSA) 1978, §§ 74-4-1 through 74-4-14. The HWA authorizes the New Mexico Environmental Improvement Board (EIB) to adopt hazardous waste management regulations for the management of hazardous waste. Pursuant to this authority, the EIB has adopted the Hazardous

Waste Management Regulations (HWMR), which govern the generation, transportation, treatment, storage, and disposal of hazardous waste, including permit requirements for facilities that treat, store, or dispose of hazardous waste, and including corrective action for releases of hazardous waste or hazardous waste constituents into the environment. These regulations incorporate by reference pertinent provisions of the RCRA Title 40 Code of Federal Regulations (CFR) – 40 CFR Parts 260 through 270, 273, and 280 – and are codified in the HWMR, 20.4.1 New Mexico Administrative Code (NMAC).

The HWA and HWMR require each person owning or operating an existing facility or planning to construct a new facility for the treatment, storage, or disposal of hazardous waste to have an HWA permit (see 42 U.S.C. 6925 and 20.4.1.900 NMAC incorporating 40 CFR § 270.1)). The HWA and HWMR also require corrective action for all releases of hazardous waste or hazardous constituents, regardless of when waste was placed in such a unit, from any SWMU at a permitted facility, or a facility seeking a permit (NMSA 1978, § 74-4-4.2(B); 20.4.1.500 NMAC, incorporating 40 CFR § 264.101(a)). Corrective action is also required for releases of contaminants beyond the facility boundary (20.4.1.500 NMAC, incorporating 40 CFR § 264.101(c)).

On January 26, 1983, RCRA subjected “units” managing and disposing of hazardous waste to the closure and post-closure standards of 40 CFR Part 264, Subpart G and 40 CFR Part 265, Subpart G and required a post-closure care permit in some circumstances.

On January 25, 1985, the Environment Department received from EPA authorization to implement its hazardous waste program under the HWA. 50 Fed. Reg. 1515 (Jan. 11, 1985). Subsequent program revisions were approved effective on April 10, 1990, July 25, 1990, December 4, 1992, August 23, 1994, December 21, 1994, July 10, 1995, January 2, 1996, March 10, 1997, July 13, 1998, October 9, 2001, and October 16, 2007.

On July 25, 1990, the Environment Department received from EPA authorization that clarified its authority to regulate the hazardous component of mixed waste. 55 Fed. Reg. 28397 (July 11, 1990). Mixed waste is waste that contains both hazardous waste under RCRA and source material, special nuclear material, or byproduct material under the Atomic Energy Act of 1954. Due to its hazardous component, mixed waste is regulated under RCRA.

On January 2, 1996, the State received from EPA authorization to implement the corrective action program under the HWA. See 60 Fed. Reg. 53708 (Oct. 17, 1995); 61 Fed. Reg. 2450 (Jan. 26, 1996).

On August 6, 1992, NMED issued a Hazardous Waste Facility Permit (Permit) to DOE and SNL (Permittees) to operate treatment and storage facilities at SNL. NMED renewed the Permit on January 27, 2015 (NMED, 2015b). The corrective action requirements in the 1992 permit were vague and largely ineffective. Consequently, on September 3, 2002, NMED issued a draft Order requiring investigation and cleanup of environmental contamination at SNL. DOE and its contractor challenged the Order in state and federal court, and the parties entered into lengthy settlement negotiations. On April 29, 2004, the parties executed the Consent Order, which requires DOE and its contractor to conduct comprehensive investigation and cleanup of environmental contamination at

SNL (NMED, 2004a). Therefore, corrective action at SNL is addressed primarily under the Consent Order, rather than the Permit.

Section IV.C of the Consent Order required the Permittees to conduct a thorough investigation of soil, sediment, groundwater, and surface water contamination at the TAVG AOC. Section VII.C of the Consent Order required the Permittees to conduct a CME for the TAVG AOC to evaluate a range of potential remedial alternatives and to recommend a preferred remedy. The Permittees were required to submit a CME Report to NMED following activities completed under the Corrective Measures Evaluation Work Plan (NMED, 2004b).

After conducting a review of the CME Report, NMED selects a remedy and provides for public comment as discussed in the Statement of Basis below. The public may also request a public hearing concerning the selected remedy. NMED will select the final remedy that will be protective of human health and the environment and attain the appropriate cleanup goals. All applicable closure and post-closure requirements in 40 CFR § 264.110(c), incorporated by 20.4.1.500 NMAC, must also be satisfied by the selected remedy. The alternative requirements for groundwater monitoring, as described in 40 CFR § 264.90(f), incorporated by 20.4.1.500 NMAC, also apply to the remedy for the TAVG AOC. Section VII.D of the Consent Order requires that the Permittees implement the selected remedy.

Section VII.C.3.a of the Consent Order states, “[t]he Respondents shall evaluate each of the remedy alternatives for the following threshold criteria. To be selected, the remedial alternative must:

1. Be protective of human health and the environment.
2. Attain media cleanup standards.
3. Control the source or sources of releases so as to reduce or eliminate, to the extent practicable, further releases of contaminants that may pose a threat to human health and the environment; and
4. Comply with applicable standards for management of wastes.” (NMED, 2004a).

Section VII.C.3.b of the Consent Order outlines the evaluation criteria for each potential remedy under consideration. These five criteria include:

1. Long-term reliability and effectiveness,
2. Reduction of toxicity, mobility, or volume,
3. Short-term effectiveness,
4. Implementability, and
5. Cost (NMED, 2004a).

Pursuant to Section VII.D.2 of the Consent Order, after the selection of the remedy, the Respondents shall submit a Corrective Measures Implementation (CMI) Plan for NMED approval that must meet the general requirements for closure of the TAVG AOC. The CMI Plan must include the specific design of the selected remedy including construction specifications, operation and

maintenance plans, performance monitoring for the selected remedy, and an implementation schedule.

Following completion of corrective measures, the Respondents are required to submit a CMI Report to NMED in accordance with Section VII.D.5.a of the Consent Order. Following NMED approval of the CMI Report, the Respondents must submit a request for a Class 3 modification to the Permit to add the TAVG AOC to either Table K-3 (Corrective Action Complete with Controls) or Table K-4 (Corrective Action Complete without Controls) (NMED, 2004a).

C. PUBLIC PARTICIPATION

The Administrative Record for this proposed remedy selection consists of this Fact Sheet/ Statement of Basis (FS/SOB), a Public Notice, the April 29, 2004 Compliance Order on Consent (Consent Order), the Current Conceptual Model and Corrective Measures Evaluation (CCM/CME) Report, and associated investigation reports, monitoring reports, work plans, correspondence, and other referenced supporting documents. The Administrative Record may be reviewed, with prior appointment, at the following location during the public comment period:

NMED - Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
Phone: (505) 476-6000
Monday – Friday: 8:00 a.m. to 5:00 p.m.
Contact: Naomi Gonzalez

The Administrative Record Index, Public Notice, FS/SOB, CCM/CME Report and Consent Order are also available on the NMED website at <https://www.env.nm.gov/hazardous-waste/sandia-national-laboratories/#SNLTAV>. To obtain a copy of the Administrative Record or a portion thereof, please contact Ms. Naomi Gonzalez at (505) 476-6000, or at the address given above. NMED will provide copies, or portions thereof, of the Administrative Record at a cost to the requestor.

NMED issued this public notice on **April 30, 2026**, to announce the beginning of a 60-day comment period that will end at **5:00 p.m. MDT, June 30, 2026**. Any person who wishes to comment on this action or request a public hearing should submit written or electronic mail (email) comments with the commenter's name and address to the address below. Only comments received **on or before 5:00 p.m. MDT, June 30, 2026**, will be considered.

Neelam Dhawan, Program Manager
NMED - Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6313
Or via e-mail: neelam.dhawan@env.nm.gov
Ref: SNL TAVG Remedy Selection.

A link to submit comments online may be found when you visit the facility website:

<https://www.env.nm.gov/hazardous-waste/sandia-national-laboratories/#SNLTAV>

Written comments must be based on reasonably available information and include, to the extent practicable, all referenced factual materials. Documents in the administrative record need not be re-submitted if expressly referenced by the commenter. Requests for a public hearing shall provide: (1) a clear and concise factual statement of the nature and scope of the interest of the person requesting the hearing; (2) the name and address of all persons whom the requestor represents; (3) a statement of any objections to this action, including specific references to any conditions being addressed; and (4) a statement of the issues that the commenter proposes to raise for consideration at the hearing. Written comments and requests for a Public Hearing must be filed with Ms. Neelam Dhawan **on or before 5:00 p.m. MDT, June 30, 2026**. NMED will provide a minimum thirty (30) day notice of a public hearing, if scheduled.

D. NEXT STEPS

NMED must ensure that the selected remedies are consistent with the Hazardous Waste Act (HWA), the Hazardous Waste Management Regulations (HWMR), and the Consent Order. All written comments submitted on this matter will become part of the administrative record. NMED will consider all written comments in formulating a final decision, and it may select a different remedy based on public comments. NMED will respond in writing to all written public comments received during the public comment period. This response will specify which provisions, if any, have been changed in the final decision and the reasons for the changes; and briefly describe and respond to all public comments received during the public comment period. All persons presenting written comments or who request notification in writing will be notified of the decision by mail. These responses will also be posted on the NMED website.

After consideration of all the written public comments received, NMED will select the appropriate remedy for the site based on information in the administrative record. In all cases, the Respondents will be provided by certified mail a written notice in accordance with the Consent Order. NMED will make the notice available to the public.

Arrangements for Persons with Disabilities

Any person with a disability requiring assistance or auxiliary aid to participate in this process should contact Kate Cardenas, Non-Discrimination Coordinator, by phone at (505) 469-0732, or via email at: nd.coordinator@env.nm.gov. Toll-free numbers are available for TDD or TDY users to access the New Mexico Relay Network at 1-800-659-1779 (voice); TTY users: 1-800-659-8331.

Non-Discrimination Statement

NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of

NMED's nondiscrimination programs, policies or procedures, or if you believe that you have been discriminated against with respect to a NMED program or activity, you may contact:

Kate Cardenas, Non-Discrimination Coordinator,
NMED, 1190 St. Francis Dr., Suite N4050,
P.O. Box 5469, Santa Fe, NM 87502,
(505) 827-2855
nd.coordinator@env.nm.gov.

You may also visit our website at <https://www.env.nm.gov/non-employee-discrimination-complaint-page/> to learn how and where to file a complaint of discrimination.

E. TECHNICAL AREA V GROUNDWATER (TAVG) AREA OF CONCERN (AOC)

E.1 BACKGROUND AND HISTORY OF THE TAVG AOC

E.1.1 Location/Unit Description

The Technical Area V Groundwater (TAVG) Area of Concern (AOC) Technical Area (TA)-V is located in the west-central portion within KAFB on DOE-owned land and KAFB-permitted land (Figure E-1). It occupies approximately 35 acres in the northeast corner of TA-III at SNL/NM. TA-V was established in 1961 to test radiation effects on weapon components and has hosted multiple generations of research reactors, including the Sandia Engineering Reactor Facility (SERF), the Sandia Pulsed Reactor, the High Energy Radiation Megavolt Electron Source, and the PROTO I Facility. Currently, active nuclear facilities include the Annular Core Research Reactor, the Sandia Pulsed Reactor, and the Auxiliary Hot Cell Facility, as well as radiological facilities such as the Gamma Irradiation Facility and the Low Dose Rate Irradiation Facility. Historically, wastewater derived from TA-V facilities was disposed of at the Liquid Waste Disposal System (LWDS) drain field, the two unlined LWDS surface impoundments, and the TA-V seepage pits.

E.1.2 Geologic and Hydrologic Framework

TA-V is underlain by a thick section of alluvial fan deposits. These deposits are part of the alluvial fan lithofacies of the Santa Fe Group and have a predominantly east-to-west depositional fabric reflecting an anastomosing sequence of braided channels (Van Hart, 2003). The alluvial fan lithofacies are subdivided into upper and lower sections. The upper section consists of relatively coarse-grained sediments that were most likely deposited in a relatively high-energy environment. The lower section consists of a fine-grained, clay-rich unit. This section has been identified as low-energy piedmont deposits derived from upland soil that developed during a pre-glacial humid climate (Van Hart, 2003). The groundwater at TA-V resides in the Regional Aquifer in the fine-grained lower section of the alluvial fan lithofacies.

ARG deposits interfinger with the alluvial fan deposits at depth west of TA-V. The ARG deposits consist predominantly of well-sorted sands and gravels that were deposited during the integration of the Rio Grande drainage system (SNL/NM, April 2004a). The ARG deposits have a predominantly north-to-south depositional fabric. The nearest known occurrence of the ARG lithofacies is at groundwater monitoring well PL-4, located approximately 1.7 miles northwest of TA-V. PL-4 is in the SNL/NM Long-Term Stewardship Groundwater Monitoring Program (SNL/NM, April 2023). The ARG lithofacies, with its distinctive pebbles of tuffaceous material, was encountered in PL-4 at a depth of 270 ft bgs. Prior to the installation of groundwater monitoring well TAV-MW13 in November 2010, Van Hart (June 2003) postulated that the ARG lithofacies might be located near the western boundary of TA-V. However, TAV-MW13 was drilled to a depth of 598 ft bgs approximately 500 ft west of the TA-V boundary and no ARG deposits were encountered.

E.1.3 Previous Investigations at TAVG AOC

SNL/NM ER Operations personnel have conducted numerous surface and subsurface investigations and remediation activities at TA-V since 1986. Past investigations were mainly site-specific and conducted at various SWMUs and AOCs.

A total of 21 SWMUs and AOCs were previously identified at TA-V (Figure E-2). They include the Liquid Waste Disposal System (LWDS), transformer oil spills, underground storage tanks, a cistern, seepage pits, septic systems, and dry wells. Table E-1 provides their descriptions, periods of use, types of wastewater discharged, and current status. Site characterizations and corrective actions have been completed for all 21 SMWUs and AOCs. The activities included oil spill excavation and confirmatory sampling, shallow-subsurface soil-vapor and soil sampling, and vadose zone soil-vapor and soil sampling. The site characterizations and confirmatory soil sampling have demonstrated that the SWMUs and AOCs do not pose a threat to human health or the environment. Consequently, all 21 SMWUs and AOCs have been approved for Corrective Action Complete (CAC) status by the NMED and are listed in Tables K-3 (Solid Waste Management Units, Areas of Concern, and Hazardous Waste Management Units for which Corrective Action is Complete with Controls) and K-4 (Solid Waste Management Units, Areas of Concern, and Hazardous Waste Management Units for which Corrective Action is Complete without Controls) of the Permit.

Wastewater discharges to the subsurface at TA-V occurred before such liquid discharges were diverted in 1992 to the base-wide sanitary sewer system connected to the City of Albuquerque publicly owned treatment works (now the ABCWUA) (Table E-1). Based on site investigations, most of the SWMUs and AOCs had only minor releases that did not contribute to groundwater contamination at TA-V (SNL/NM, March 1999). Three SWMUs had large releases, described below.

Table E-1: SWMUs and AOCs at Technical Area-V

SWMU/AOC	Description	Period of Use	Type of Wastewater Discharged	Current Status
SWMU 4	LWDS surface impoundments	1967–1972	Reactor-cooling water and industrial water	CAC with Controls
SWMU 5	LWDS drain field	1962–1967	Reactor-cooling water and industrial water	CAC without controls
SWMU 36	HERMES oil spill	1968–1989	No wastewater discharge	CAC without controls
SWMU 37	PROTO oil spill	1978–1989	No wastewater discharge	CAC without controls
SWMU 52	LWDS holding tanks	1962–1972	Reactor-cooling water and industrial water	CAC without controls
SWMU 155	Bldg. 6597 UST	1978–1989	No wastewater discharge	Site Closed

SWMU 174	Bldg. 6581 UST	1961–1990	No wastewater discharge	Site Closed
SWMU 175	Bldg. 6588 UST	1978–1990	No wastewater discharge	Site Closed
SWMU 181	Former Bldg. 6500 UST	1976–1991	No wastewater discharge	Site Closed
SWMU 196	Bldg. 6597 cistern	1978–1989	Waste oil and Storm water	CAC with Controls
SWMU 216	Bldg. 6596 UST	1968–1989	No wastewater discharge	Site Closed
SWMU 275	TA-V seepage pits	1960s–1992	Septic water and industrial wastewater	CAC without controls
AOC 1014	Former T-12, T-42, and T-43 septic system	1980s–1992	Septic water	CAC without controls
AOC 1015	Former MO 231-234 septic system	1980s–1992	Septic water	CAC without controls
AOC 1072	Bldg. T-52 and former Bldg. 6500 septic system	1960s–1992	Septic water	CAC without controls
AOC 1073	Bldg. 6580 seepage pit	1962–1992	Process water	CAC without controls
AOC 1098	TA-V plenum rooms drywell	1960s–1992	Storm water	CAC without controls
AOC 1104	Bldg. 6595 seepage pit	1966–1992	Process water	CAC without controls
AOC 1105	Bldg. 6596 drywell	1966–1992	Process water	CAC without controls
AOC 1112	Bldg. 6590 reactor sump drywell	1961–1992	Storm water	CAC without controls
AOC 1113	Bldg. 6597 drywell	1971–1992	Process water	CAC without controls

Three SWMUs (4, 5, and 275) released large quantities of wastewater. Figure E-4 depicts these SWMUs as part of the Conceptual Site Model for TA-V. Table E-2 presents the disposal periods, estimated disposal volumes, types of wastewater, and design characteristics for these high-discharge SWMUs. The total discharge volume is estimated to have ranged from 48.5 to 68.5 million gallons. SWMU 275 had the greatest discharge volume, accounting for up to 73 percent of the total discharge. The average disposal rate is estimated to have ranged from approximately 1 to 2.4 million gallons per year. The wastewater consisted of reactor cooling water, industrial water (from sinks and drains in radiochemistry laboratories and assembly shops), and septic (sanitary sewer) water. (SNL/NM, 2024).

Historical documentation of organic chemical use and disposal at TA-V is limited. Organic solvents were used in conjunction with the activities at TA-V machine shops and chemistry laboratories. According to interviews with site workers, organic solvents were disposed of through sinks and floor drains that drained to the LWDS and the TA-V seepage pits (SNL/NM, March 1999). Undocumented use makes it impossible to identify specific buildings as sources of groundwater contamination. Solvent disposals at TA-V were discontinued in the early 1980s in response to an emerging nationwide awareness of personnel exposure hazards. Solvent-free wastewater disposals to the TA-V seepage pits continued until 1992 (SNL/NM, 2024).

Table E-2. Wastewater and Septic Water Disposal History at Technical Area-V

Disposal Site	Date in Use	Estimated Volume (gallons)	Percentage of Total Volume	Average Disposal rate (Gal/yr)	Primary types of Wastewater	Design Characteristics
SWMU 4 – LWDS surface impoundments Reactor cooling water and industrial water	1967–1972	12 million	18–25	2.4 million	Reactor cooling water and industrial water	Two unlined impoundments total 0.4 acres
SWMU 5 – LWDS drain field Two unlined impoundments, total 0.4 acres	1962–1967	6.5 million	9–13	1.3 million	Reactor cooling water and industrial water	One buried, perforated horizontal pipe, 60-ft long, 36-ft deep, 3-ft diameter
SWMU 275 – TA-V seepage pits	1960s–1992	30 to 50 million	62–73	1 to 1.6 million	Septic water and industrial water	Six buried, open-bottomed cylinders, 20-ft deep, 6.5-ft diameter

As Table E-1 shows, septic water was discharged to seepage pits and drain fields at AOCs 1014, 1015, and 1072. These drain and septic systems served temporary/mobile and small buildings, and discharge volumes would have been small. Small amounts of process water were discharged to seepage pits and drywells at AOCs 1073, 1104, 1105, and 1113. Stormwater was discharged to AOCs 1098 and 1112. Small amounts of waste oil and stormwater were discharged to SWMU 196 until the cistern was backfilled with clean soil in 2005. The other SWMUs had no wastewater releases during their periods of use. After 1992, all liquid discharges at TA-V were diverted to the base-wide sanitary sewer system (SNL/NM, 2024).

The groundwater beneath TA-V is addressed separately as the TAVG AOC by the Consent Order, requiring characterization and corrective action (NMED, April 2004). Groundwater monitoring at TA-V has been conducted on a regular basis since 1992 (over 30 years). TCE and nitrate are the only COCs identified at the TAVG AOC (NMED, April 2004). Figures E-5 and E-6 depict the current extent of the nitrate and TCE plumes, respectively, at TA-V.

A Treatability Study of In-Situ Bioremediation (ISB) was conducted at TA-V to remediate the two constituents of concern, trichloroethene (TCE) and nitrate. The Treatability Study consisted of a Phase I Pilot Test in 2017-2018 and the Phase I Full-Scale Test in 2018-2021 (SNL/NM, March 2022). Overall, Phase I Full-Scale Test results showed limited success of ISB. The injected treatment solution only affected a small, localized area near the injection well. Phase I Full-Scale Test results have proven that ISB is not a feasible technology for low concentrations of chlorinated compounds contamination (e.g., TCE concentration below 10-20 µg/L) with the existing aquifer characteristics (SNL/NM, March 2022).

E.1.4 Groundwater Monitoring Wells and Potentiometric Surface at TA-V AOC

There are currently 17 active groundwater monitoring wells (LWDS-MW1 and TAV-MW2 through TAV-MW17) in the TAVG AOC monitoring well network; 14 are screened across the water table and three (TAV-MW7, TAV-MW9, and TAV-MW13) are screened in deeper aquifer. All the groundwater monitoring wells are screened in the Santa Fe Group of the regional aquifer. No perched groundwater is present at TA-V. The southern edge of the perched groundwater system is located approximately one mile north of TA-V. The perched groundwater system has been thoroughly evaluated by the Tijeras Arroyo Groundwater AOC investigation (SNL/NM, February 2018; SNL/NM, June 2023).

Figure E-7 depicts a potentiometric surface map of the water table at TA-V using groundwater levels measured in July and August 2024. The average depth to the water table in 2024 was 509 ft bgs. Groundwater flow direction is generally to the south and southwest (SNL/NM, 2024).

Since the early 1960s, the groundwater flow direction in the Regional Aquifer in the vicinity of TA-V has shifted in response to pumping by various production wells located on and off KAFB. Concurrent with most wastewater disposals at TA-V in the 1960s through 1980s, the groundwater flow direction was southwestward (SNL/NM, 2024) before large-scale pumping by municipal production wells located north of KAFB began. This pumping caused the regional groundwater flow to gradually shift to a more westerly direction. This shift likely influenced the lateral distribution of the contaminants in the groundwater.

Farther west of TA-V, the groundwater flows generally westward until it intercepts the highly permeable ARG lithofacies, where the flow shifts to a more northerly direction in response to pumping by the municipal production wells located near the northern boundary of KAFB (SNL/NM, 2024).

The groundwater levels have declined steadily since the wells were installed. The water level declines are due to the combined pumping of the Regional Aquifer by the KAFB, VA, and ABCWUA production wells. The decline rates range from 0.44 to 0.80 ft/yr, with an average of 0.66 ft/yr. In general, the decline rates have been higher east of TA-V. The water level declines are expected to continue as long as the production wells in the region continue to operate. The groundwater levels at TA-V have not shown the recovery seen in the northern part of KAFB (SNL/NM, 2025).

Historically, contaminant migration in the subsurface at TA-V was driven and controlled by infiltration to the regional aquifer. Wastewater disposed of at TA-V was a local recharge source from the 1960s to 1992 (SNL/NM, 2025). Precipitation and arroyo flow are two other potential, though negligible, naturally occurring recharge sources. Arroyo del Coyote is located approximately one mile east of TA-V and flows northwestward to Tijeras Arroyo. Overall, under natural conditions, groundwater recharge at TA-V is negligible (SNL/NM, 2025).

The first detection of TCE at TA-V was in groundwater monitoring well LWDS-MW1 in November 1993 at a concentration of 6 µg/L, exceeding the EPA MCL of 5 µg/L (SNL/NM, 2025). Historically, the highest TCE concentrations at TA-V have been consistently detected in groundwater monitoring wells LWDS-MW1 and TAV-MW10, with concentrations above the EPA MCL. The maximum TCE concentrations in the groundwater samples collected from LWDS-MW1 and TAV-MW10 were 22.4 µg/L (March 2014) and 18.2 µg/L (June 2012), respectively (SNL/NM, 2025).

Nitrate above the EPA MCL of 10 mg/L was first detected in groundwater monitoring well LWDS-MW1 in December 1995 at a concentration of 10.1 mg/L (SNL/NM, 2025). Historically, the highest nitrate plus nitrite (NPN) concentrations at TA-V have been consistently detected in groundwater monitoring wells LWDS-MW1 and TAV-MW10, with most concentrations above the EPA MCL. The maximum NPN concentrations in the groundwater samples collected from LWDS-MW1 and TAV-MW10 were 15 mg/L (April 2004) and 15.3 mg/L (June 2019), respectively (SNL/NM, 2025). The NMED suggested 4 mg/L as the maximum background concentration for nitrate at KAFB, including at SNL/NM (Dinwiddie, September 1997).

Tetrachloroethene (PCE) was detected in groundwater monitoring well TAV-MW7 from November 2001 to August 2003, with a maximum concentration of 5.2 µg/L (SNL/NM, 2025). The PCE concentrations decreased over time, and PCE has not been detected in any of the groundwater monitoring wells since August 2003. Cis-1,2-Dichloroethene (DCE) has been detected along with TCE in some of the groundwater monitoring wells, but its concentrations have never exceeded the EPA MCL of 70 µg/L (SNL/NM, 2025). Radionuclides, although discharged through the LWDS between 1962 and 1972, have either not been detected or have been reported at background activities. TCE and nitrate are the only COCs identified at the TAVG AOC (NMED, April 2004).

E.2 TAVG AOC CORRECTIVE MEASURES EVALUATION SUMMARY

The Permittees evaluated several corrective measure alternatives for the TAVG AOC. The following remedial technologies were initially considered to address elevated nitrate at the TAVG AOC in the first CME Work Plan (SNL/NM, 2004):

- Air sparging
- Long Term Groundwater monitoring
- In-situ bioremediation (ISB)
- In-situ chemical oxidation
- In-situ flushing
- Monitored Natural Attenuation (MNA)
- Monolithic confinement
- Nanoscale iron injection
- Permeable reactive barriers
- Phytoremediation
- Pump and treat
- Soil-vapor extraction
- Thermal technologies

Based on each technology's applicability at the TAVG AOC, the initial screening eliminated the following source control technologies: in-situ chemical oxidation, in-situ flushing, nanoscale iron injection, and thermal technologies. These are aggressive technologies that are not applicable to the low-concentration plumes at the site. Monolithic confinement and permeable reactive barriers were eliminated because both involve construction of barriers to more than 500 ft bgs and therefore are not technically feasible at the site. Air sparging was eliminated because of the low-concentration TCE plume and the fact that this technology does not address nitrate contamination. Phytoremediation was eliminated because of the depth to the groundwater (approximately 500 ft bgs). Lastly, soil-vapor extraction was eliminated because most of the site contamination is present in the groundwater rather than the vadose zone.

The remedial technologies that were retained in the initial CME Work Plan SNL/NM, December 2004) technology screening were:

- In-situ bioremediation (ISB)
- Pump and treat
- Groundwater monitoring
- MNA

E.2.1 In-Situ Bioremediation

A Treatability Study of In-Situ Bioremediation (ISB) was conducted at TA-V to determine whether it was suitable to remediate the two constituents of concern, trichloroethene (TCE) and nitrate. The ISB treatability study would deliver a treatment solution to the groundwater using injection

well(s). The treatment solution included dechlorinating bacteria (known to degrade TCE) and amendments to stimulate growth of the introduced dechlorinating bacteria. Nitrate would also be degraded in the anaerobic conditions created during the ISB. Phase I of the ISB treatability study included the installation of one injection well (TAV-INJ1) 50 feet from existing groundwater monitoring well TAV-MW6, followed by a pilot test from November 2017 to June 2018 and a full-scale test from November 2018 to May 2021 (SNL/NM, March 2022).

For the Phase I Pilot Test, approximately 9,000 gallons of treatment solution including 6 liters of dechlorinating bacteria were injected through well TAV-INJ1 in November 2017, followed by monitoring of the injection well, well TAV-MW6, and well TAV-MW7 through June 2018. For the Phase I Full-Scale Test, approximately 531,000 gallons of treatment solution including 123 liters of dechlorinating bacteria were injected through well TAV-INJ1. The Phase I Full-Scale Test injection period lasted six months from November 2018 to April 2019 (SNL/NM, March 2022). Well TAV-MW6, well TAV-MW7, and eight surrounding wells were monitored during the six-month injection period. After the completion of Phase I Full-Scale Test injections, the injection well, TAV-MW6, TAV-MW7, and eight surrounding wells were monitored from May 2019 to April 2022. Phase I of the ISB Treatability Study was concluded in May 2021 (SNL/NM, March 2022).

Monitoring results of the Phase I Full-Scale Test indicated that groundwater at the injection well TAV-INJ1 maintained anaerobic and reducing conditions that were optimal for biodegradation. TCE and nitrate were mostly not detected during the two-year monitoring, and no concentration rebound of TCE and nitrate was observed at the injection well. At monitoring well TAV-MW6, located approximately 50 feet to the southeast of well TAV-INJ1, the inert tracer bromide injected with the treatment solution reached a peak concentration of 24 percent of the bromide concentration at the injection well (SNL/NM, March 2022). The injected treatment solution did not reach well TAV-MW6 to an extent that could induce anaerobic and reducing conditions necessary for biodegradation of TCE and nitrate (SNL/NM, March 2022). Meanwhile, there was no change in groundwater quality at the deeper well (TAV-MW7) and the eight surrounding wells. Overall, Phase I Full-Scale Test results showed limited success of ISB. The injected treatment solution only affected a small, localized area near the injection well.

Several key factors contributed to the limited success of ISB at the site; these factors included aquifer characteristics and infrastructure restrictions on installing multiple injection wells. More importantly, even though microbial metagenome data showed that bioaugmentation and biostimulation implemented at the site were capable of establishing a bioremediation treatment zone for reductive dechlorination of TCE, the TCE concentration at the site was too low to sustain the dechlorinating microbial community.

The overall objective of the ISB treatability study was to evaluate the effectiveness of ISB as a potential technology for remediating the TCE and nitrate contamination at the TAVG AOC (SNL/NM, March 2016). The Phase I Treatability Study results showed that ISB is not an effective remedial technology for treating low concentrations of TCE in a low-permeability aquifer. Therefore, it is not viable to scale up ISB to treat the TCE and NPN plumes at the TAVG AOC. ISB is not retained as a remedial alternative for the TCE and nitrate contamination at the TAVG AOC.

E.2.2 Pump and Treat

Contaminated groundwater can be pumped to the ground surface and treated to remove contaminants. This remedial technology consists of well(s) to extract the contaminated groundwater, ex-situ treatment system(s), and re-injection of the treated groundwater. Multiple pore volumes of groundwater would need to be extracted.

Even though it is one of the most widely used groundwater remediation technologies, pump and treat has shown significant disadvantages for sites with slow contaminant transport and interphase contaminant transfer (e.g., sorption). At the TAVG AOC, TCE sorbs to aquifer sediments, and the low hydraulic conductivity of the Regional Aquifer was demonstrated by the ISB treatability study.

To implement pump and treat, multiple extraction wells would need to be installed. However, the number of extraction wells and where they could be installed would face the same infrastructure limitations as those encountered during the ISB treatability study.

The contaminated groundwater would be brought to the surface, and an ex-situ treatment system would treat the TCE and nitrate using granular activated carbon and ion exchange, respectively. The treated groundwater would be re-injected into the Regional Aquifer. A discharge permit would need to be obtained from the NMED Ground Water Quality Bureau before discharge could occur. New injection well(s) would need to be installed to re-inject the treated groundwater. ABCWUA does not allow disposal of treated groundwater to the sanitary sewer system (ABCWUA, January 2018).

The 2005 CME Report included a comparative analysis of the following four remedial technologies: groundwater monitoring, ISB, MNA, and pump and treat (Attachment B of SNL/NM, July 2005). The comparative analysis demonstrated that pump and treat is considerably less effective than the other three remedial technologies, including ISB. Pump and treat has significant challenges due to sorption of the VOCs and the low permeability of the Regional Aquifer. To accomplish aquifer restoration, multiple pore volumes of groundwater would need to be extracted and treated above ground, making pump and treat significantly more difficult to implement than ISB. As ISB has been demonstrated to be ineffective at the site, conducting pump and treat at the site similarly would not be viable.

Pump and treat is not retained as a remedial alternative for the TCE and nitrate contamination at the TAVG AOC.

E.2.3 Corrective Measures Alternatives Evaluated by SNL for TAVG AOC

Alternative 1: Long-Term Monitoring

Long-term monitoring consists of the continued evaluation of the concentrations and extent of nitrate throughout the duration of the remedy. Natural processes, that may include sorption,

dispersion, dilution, evaporation, and chemical reactions, will decrease the concentration of the contaminants in soil and groundwater.

The Permittees propose to monitor the concentrations and extent of nitrate and TCE and prevent exposure throughout the duration of the remedy until remedial objectives are met. This technology requires no removal, treatment, or storage of groundwater other than the minor volumes of purge water generated during monitoring well sampling.

Implementation

The Permittees propose to measure water levels quarterly at 17 monitoring wells and sample 17 wells annually for nitrate and TCE in the TAVG AOC during remedy implementation. Figure E.3 depicts the monitoring well network for the TAVG AOC during remedy implementation for Alternative 1. The Permittees propose to analyze additional analytes required for the disposal of purge water and equipment decontamination water to the sanitary sewer system. The additional analytes would also function for surveillance monitoring purposes of the aquifer system and would ensure that no new releases are overlooked.

Remedy Performance Monitoring, Maintenance, and Closure

The Permittees propose to redevelop and repair groundwater monitoring wells, as needed. The need for replacing a monitoring well where the water level has dropped below the bottom of the screen would be determined on a case-by-case basis, depending on the progress of the remedy, and would also take into account the local nitrate and TCE concentrations and the need for water level data. The Permittees propose to submit Well Installation Work Plans to the NMED HWB within one year of a well having a water level becoming unsuitable for sampling purposes. Work Plans would be used for obtaining NMED HWB approval of proposed field tasks.

The Permittees propose to prepare Performance Monitoring Reports (identified in the Consent Order as “Progress Reports”) every five years. The reports would summarize the monitoring results for the five-year period and would identify any required modifications or optimization measures for the remedy. A review of land use controls would also be incorporated into this process.

The Permittees propose to keep the public informed of the progress of the remedy by: (1) semiannual public meetings, (2) discussions in the annual groundwater monitoring reports (AGMRs), (3) Five-year Performance Monitoring Reports, and (4) postings on internet websites (i.e., www.sandia.gov/about/environment/, <https://digitalrepository.unm.edu/snl/>, and <https://www.env.nm.gov/hazardous-waste/sandia-national-laboratories/>).

After this alternative is complete and verified, the 17 monitoring wells would be plugged and abandoned. A small number of wells (1-3) may be retained as sentry wells and transferred to the SNL/NM Long-Term Stewardship program.

Land Use Controls

The Permittees propose to use land use controls to mitigate potential exposure to contaminated groundwater. The Permittees state that most of these controls are already in place and include maintaining existing SNL/NM site access controls. The Permittees propose to review land use controls annually and modify if necessary. The Corrective Measures Implementation Plan would include a Land Use Controls Implementation Plan that would be amended if site conditions change (SNL 2024).

Timeframe

The estimated timeframe to achieve remedial objectives for Alternative 1 is 36 years. This includes one year to prepare plans, 30 years of remedial sampling and water-level measurements, two years of post-remediation verification sampling and water-level measurements, and five years of final reporting efforts and plugging and abandonment (P&A) of monitoring wells (SNL 2024).

Cost

The estimated total Present Value cost of the Long-Term Monitoring Alternative (in 2023 dollars) is \$9,719,446.

Alternative 2: Monitored Natural Attenuation

Monitored natural attenuation relies on natural processes to decrease concentrations of contaminants in soil and groundwater. The dominant natural attenuation mechanisms for TCE at the TAGV AOC are dispersion, diffusion, and sorption and for nitrate at the TAGV AOC are dispersion and diffusion. The Permittees propose to monitor the concentrations and extent of contamination throughout the duration of the remedy until remedial objectives are met. This technology requires no removal, treatment, or storage of groundwater other than the minor volumes of purge water generated during monitoring well sampling (SNL/NM 2024).

Implementation

The Permittees propose to measure water levels quarterly at 17 monitoring wells and sample 17 monitoring wells annually for nitrate and TCE in the TAGV AOC during remedy implementation. The Permittees propose to analyze additional analytes required for the disposal of purge water and equipment decontamination water to the sanitary sewer system which would also function for surveillance monitoring purposes. Evaluation of the additional analytes would ensure that no new releases are overlooked. Figure E.3 depicts the monitoring well network for the TAGV AOC during remedy implementation.

Remedy Performance Monitoring, Maintenance, and Closure

The Permittees propose to redevelop and repair groundwater monitoring wells as needed. The need for replacing a monitoring well where the water level has dropped below the bottom of the screen would be determined on a case-by-case basis, depending on the progress of the remedy, and would consider the local nitrate concentrations and the need for water level data. The Permittees propose to submit Well Installation Work Plans to the NMED HWB within one year of

a well having a water level becoming unsuitable for sampling purposes. Work Plans would be used for obtaining NMED HWB approval of proposed field tasks.

The Permittees propose to prepare Performance Monitoring Reports (identified in the Consent Order as “Progress Reports”) every five years. The reports would summarize the monitoring results for the five-year period and would identify any required modifications or optimization measures for the remedy. A review of land use controls would also be incorporated into this process.

The Permittees propose to keep the public informed of the progress of the remedy by: (1) semiannual public meetings, (2) discussions in the AGMRs, (3) Five-year Performance Monitoring Reports, and (4) postings on internet websites (i.e., www.sandia.gov/about/environment/, <https://digitalrepository.unm.edu/snl/>, and <https://www.env.nm.gov/hazardous-waste/sandia-national-laboratories/>).

After this alternative is complete and verified, the 17 monitoring wells would be plugged and abandoned. A small number of wells (1-3) may be retained as sentry wells and transferred to the SNL/NM Long-Term Stewardship program.

Land Use Controls

The Permittees propose to use land use controls to mitigate potential exposure to contaminated groundwater. The Permittees state that most of these controls are already in place and include maintaining existing SNL/NM site access controls. The Permittees propose to review Land use controls annually and modify if necessary. The Corrective Measures Implementation Plan would include a Land Use Controls Implementation Plan that would be amended if site conditions change.

Timeframe

The estimated total timeframe for Alternative 2 is 36 years. This includes one year to prepare plans, 30 years of remedial sampling and water-level measurements, two years of post-remediation verification sampling and water-level measurements, and five years of final reporting efforts and P&A of monitoring wells.

Cost

The estimated total Present Value cost of the MNA Alternative (in 2023 dollars) is \$8,565,911.

E.2.4 Corrective Measures Recommended by Permittees for TAVG AOC

The Permittees recommended Alternative 2: MNA for the TAVG AOC. The Permittees assert that this alternative meets the threshold criteria and is readily implementable.

The Permittees assert that nitrate and TCE concentrations in groundwater are low at this site (slightly exceeding the EPA MCL), are inaccessible to onsite receptors, and do not pose a potentially unacceptable risk to offsite receptors.

The Permittees assert that there is no current or anticipated use of groundwater near the TAVG AOC. The nearest receptor is production well KAFB-4, which is approximately 2.8 miles north-northwest from the TAVG AOC. Thus, there is no foreseeable risk to human health or threat to beneficial use of groundwater. The TCE and nitrate plumes are located within TA-V where public access is restricted. Depth to the groundwater is approximately 500 feet below ground surface. There is no potential for direct human contact or exposure to groundwater contaminants near the TAVG AOC.

The Permittees assert that there are no remaining active sources of contaminant release at the TAVG AOC. Discharge of industrial water and septic water at TA-V began in the 1960s and ceased in 1992. The LWDS drain field and the TA-V seepage pits were the main sources of groundwater contamination. Wastewater disposed of at these sites contained TCE and nitrate, the only COCs in groundwater. The TCE concentrations in the vadose zone are stable, and there is no indication that the residual TCE will result in additional impacts to the groundwater. The general location and overall dimension of TCE and nitrate groundwater plumes are stable. There is no current or anticipated use of the groundwater in the immediate vicinity of TA-V.

The Permittees assert that attenuation is projected to occur within a reasonable timeframe. The Permittees assert that land use controls can be controlled, maintained, or implemented. DOE/NNSA and SNL/NM personnel are expected to retain stewardship of the site for the foreseeable future. If land use changes at the TAVG AOC, or transfer of the property from DOE/NNSA and SNL/NM personnel control were to occur in the future, the remedy would be reevaluated to ensure the protectiveness of the remedy. Existing or readily implementable land use controls would prevent any exposure to contaminants. These controls would include site access controls and production well drilling restrictions.

The Permittees assert that the remedy is readily implementable. The monitoring well network is already in place. The remedy would have few detrimental impacts on ongoing programmatic operations in the area. The remedy minimizes safety risks to field personnel otherwise present during drilling, construction, and operation of more active measures.

The Permittees assert that under the MNA remedial alternative, reduction in the toxicity, mobility, and mass (volume) of the contaminants will be achieved by the naturally occurring attenuation mechanisms that include dispersion and diffusion, as well as sorption for TCE.

The Permittees assert that Long-Term Monitoring Alternative would include groundwater monitoring until remedial objectives are achieved.

E.2.5 Corrective Measures Criteria Evaluation by NMED for TAVG AOC

Alternative 1 – Long Term Monitoring

1. Long-Term Reliability and Effectiveness

Alternative 1 would be fairly reliable and effective over the long-term as the contamination in the aquifer may degrade due to dispersion and dilution over time. Monitoring would continue until after the nitrate plume no longer exists. Therefore, Alternative 1 rates moderately for this criterion.

2. Reduction of Toxicity, Mobility, or Volume

Alternative 1 would reduce the volume of nitrate due to dispersion and dilution over time. There is no risk to human health or the environment, even if no degradation occurred. No hazardous byproducts would be produced during the remedy implementation. Therefore, Alternative 1 rates moderately for this criterion.

3. Short-Term Effectiveness

Alternative 1 would require many years' time to complete, however, there would be no short-term risks from construction or transportation of contaminants. Therefore, Alternative 1 rates moderately low for this criterion.

4. Implementability

Alternative 1 rates very high for this criterion because no additional infrastructure is required and land use controls are already in place.

5. Cost

Alternative 1 would cost \$9,719,446 in 2023 dollars. Therefore, Alternative 1 rates high for this criterion.

Alternative 2 – Monitored Natural Attenuation

1. Long-Term Reliability and Effectiveness

Alternative 2 would be fairly reliable and effective over the long-term as the contamination in the aquifer may degrade due to dispersion and dilution over time. Monitoring would continue until after the nitrate plume no longer exists. Therefore, Alternative 2 rates moderately for this criterion.

2. Reduction of Toxicity, Mobility, or Volume

Alternative 2 would reduce the volume of nitrate due to dispersion and dilution over time. There is no risk to human health or the environment, even if no degradation occurred. No hazardous byproducts would be produced during the remedy implementation. Therefore, Alternative 2 rates moderately for this criterion.

3. *Short-Term Effectiveness*

Alternative 2 would require many years' time to complete, however, there would be no short-term risks from construction or transportation of contaminants. Therefore, Alternative 2 rates moderately low for this criterion.

4. *Implementability*

Alternative 2 rates very high for this criterion because no additional infrastructure is required, and land use controls are already in place.

5. *Cost*

Alternative 2 would cost \$8,565,911 in 2023 dollars. Therefore, Alternative 2 rates very high for this criterion.

E.2.6 Corrective Measures Selected by NMED for TAVG AOC

NMED believes that Alternative 1 – Long Term Monitoring is the corrective measure for TAVG AOC that would best meet the evaluation criteria of the Consent Order, would be protective of public health and the environment, and would attain cleanup standards because of natural dispersion and dilution of nitrate contamination. The following is a summary of the rationale for this proposed remedy selection.

Alternative 1, Long-Term Monitoring, is rated low for short-term effectiveness, but it rates moderately for long-term reliability and effectiveness and reduction of toxicity, mobility, or volume, and rates highest on implementability and cost.

Alternative 2, Monitored Natural Attenuation, is rated low for short-term effectiveness, but it rates moderately for long-term reliability and effectiveness and reduction of toxicity, mobility, or volume, and rates highest on implementability and cost.

Although Alternative 1 and 2 are essentially the same, NMED did not select Alternative 2 because it is unknown if 30 years is enough time for attenuation of the nitrate plume. While the cost is greater, Alternative 1, Long-Term Monitoring is a more appropriate choice because the greater number of wells sampled will provide a more comprehensive picture of the changes in the contaminant plume over time.

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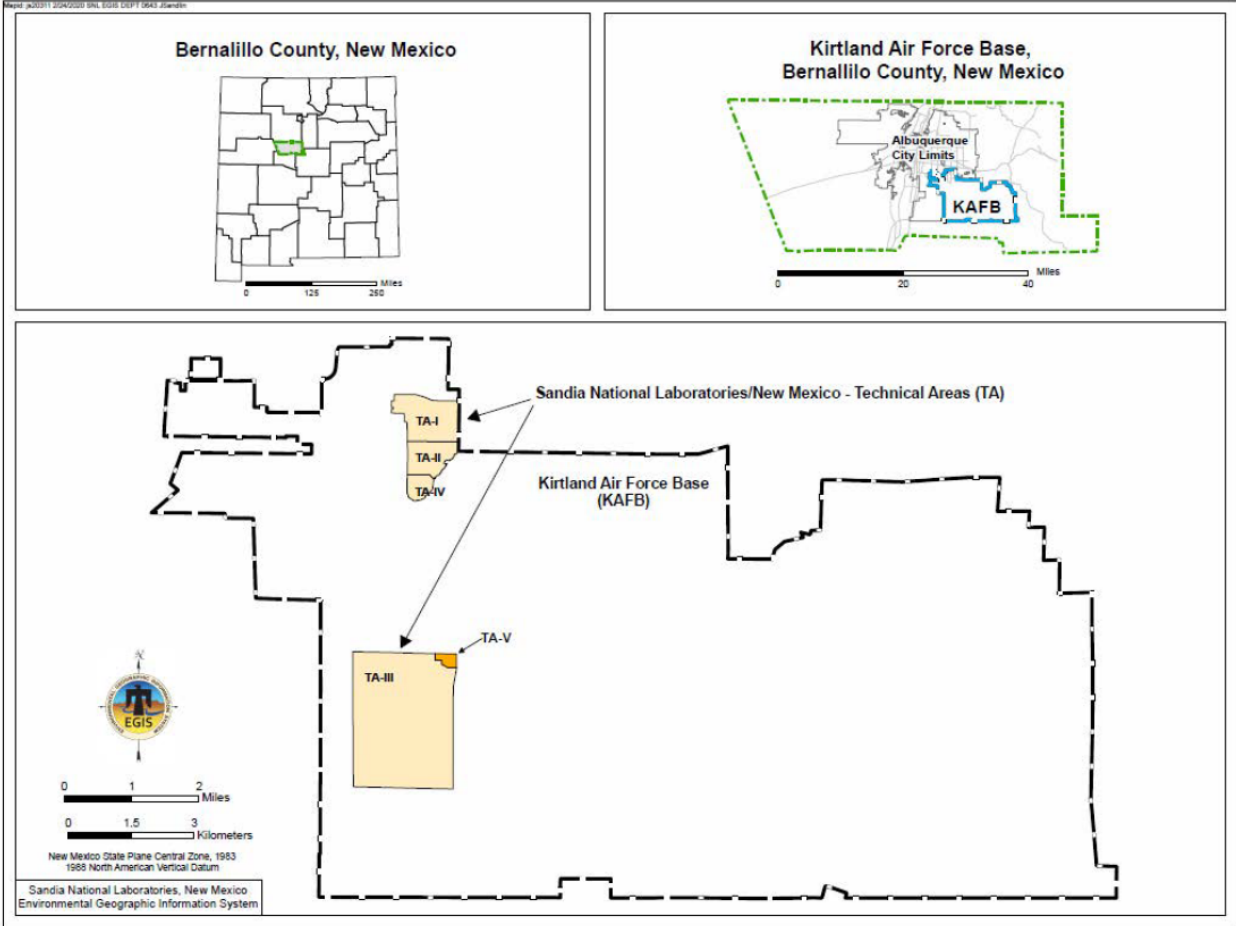


Figure E-1: Facility Location Map (SNL/NM, 2024).

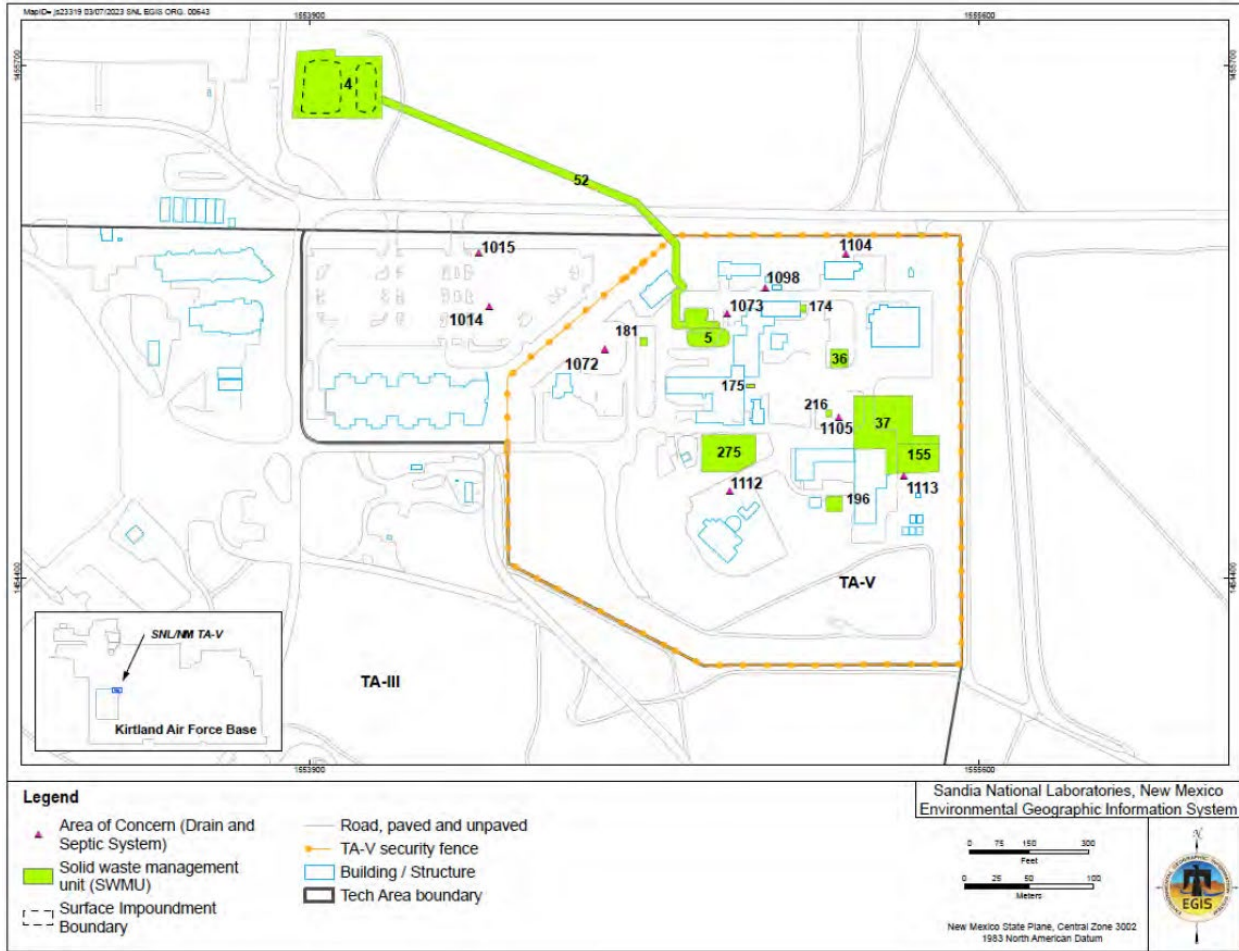


Figure E-2: Location of former SWMUs and AOCs at TA-V (SNL/NM, 2024).

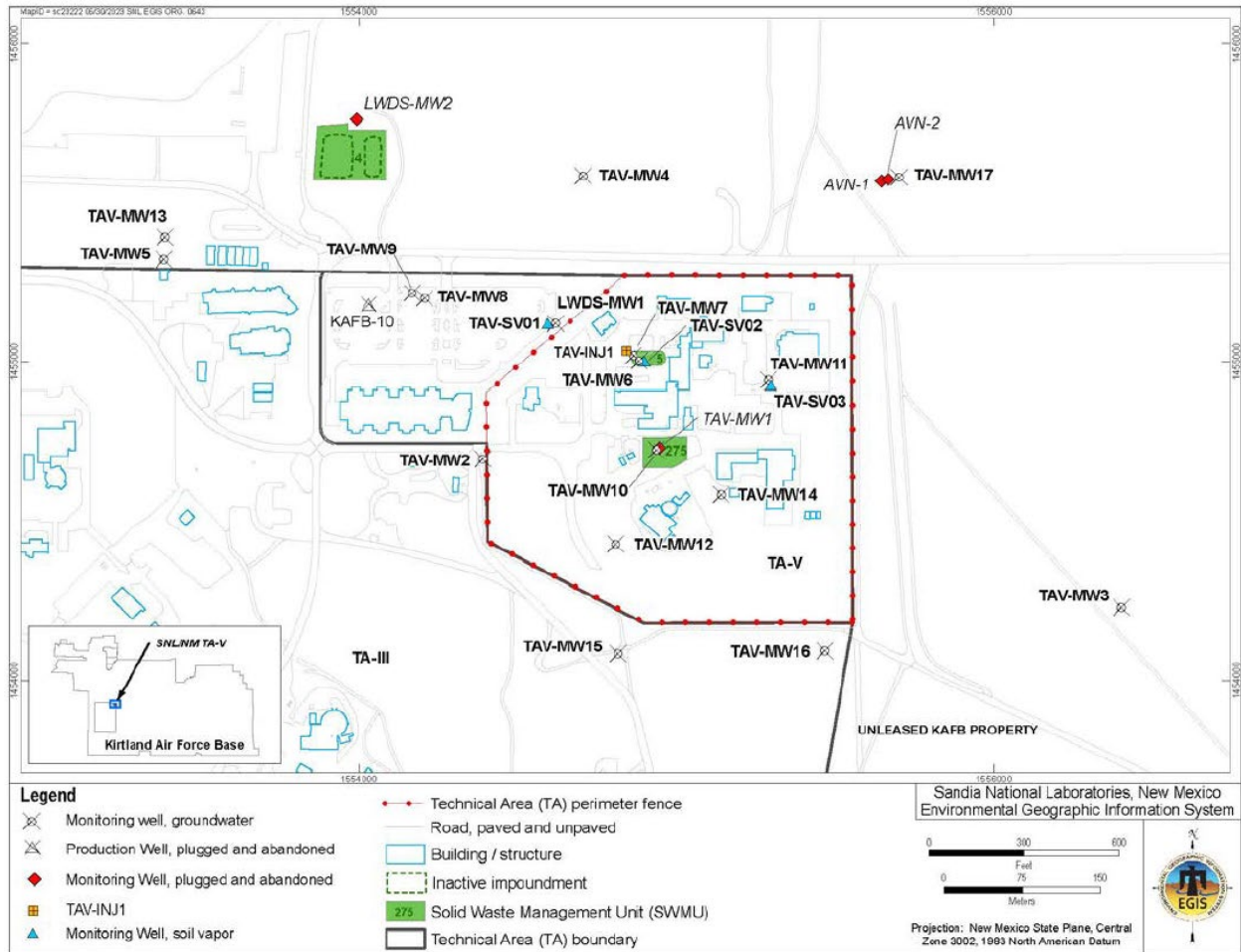
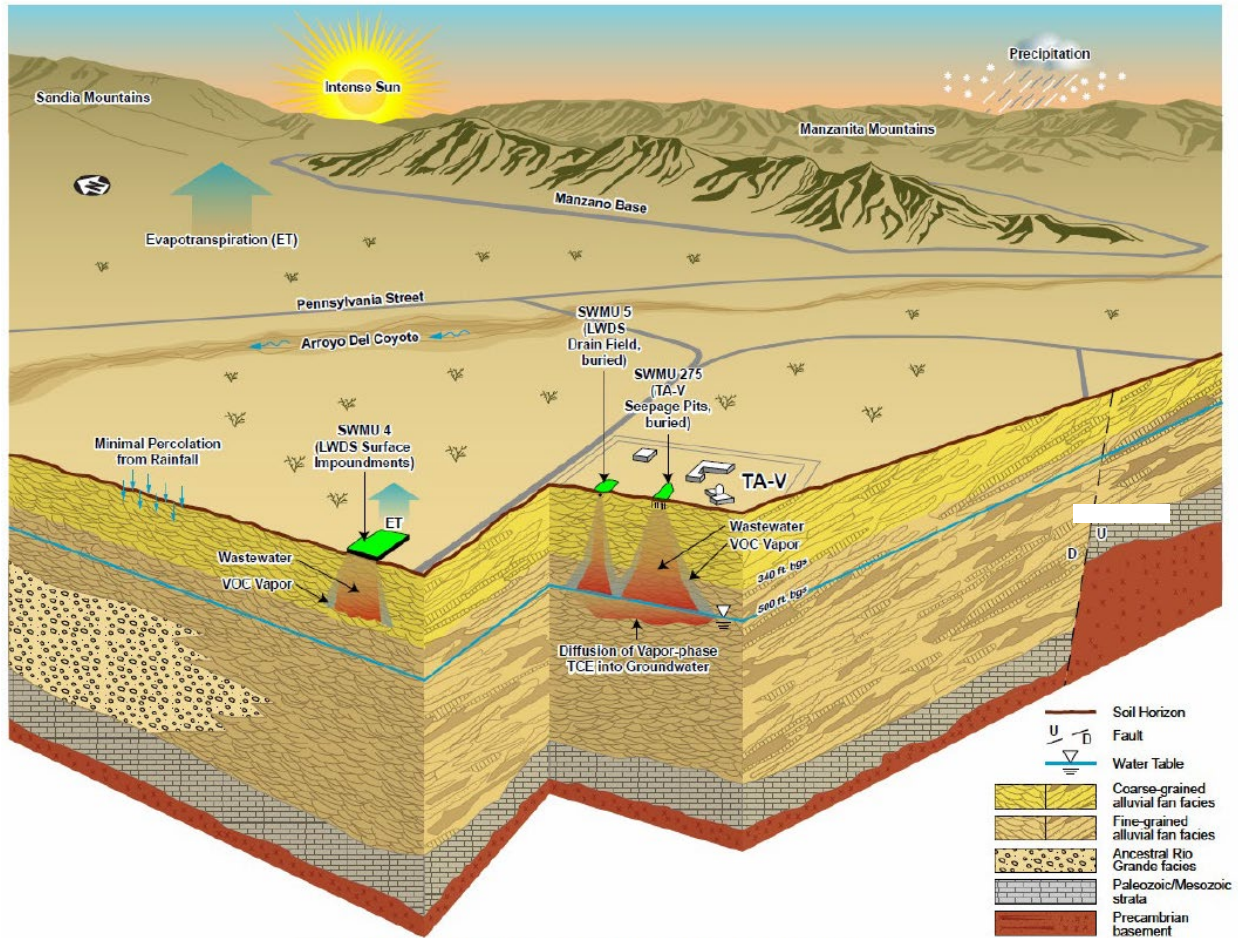


Figure E-3: TA-V Groundwater Monitoring Well Locations, Current and Former (SNL/NM 2024).



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Conceptual Site Model for TA-V, View to Northeast, Not to Scale.

Figure E.4: Conceptual Site Model for TA-V (SNL/NM, 2024).

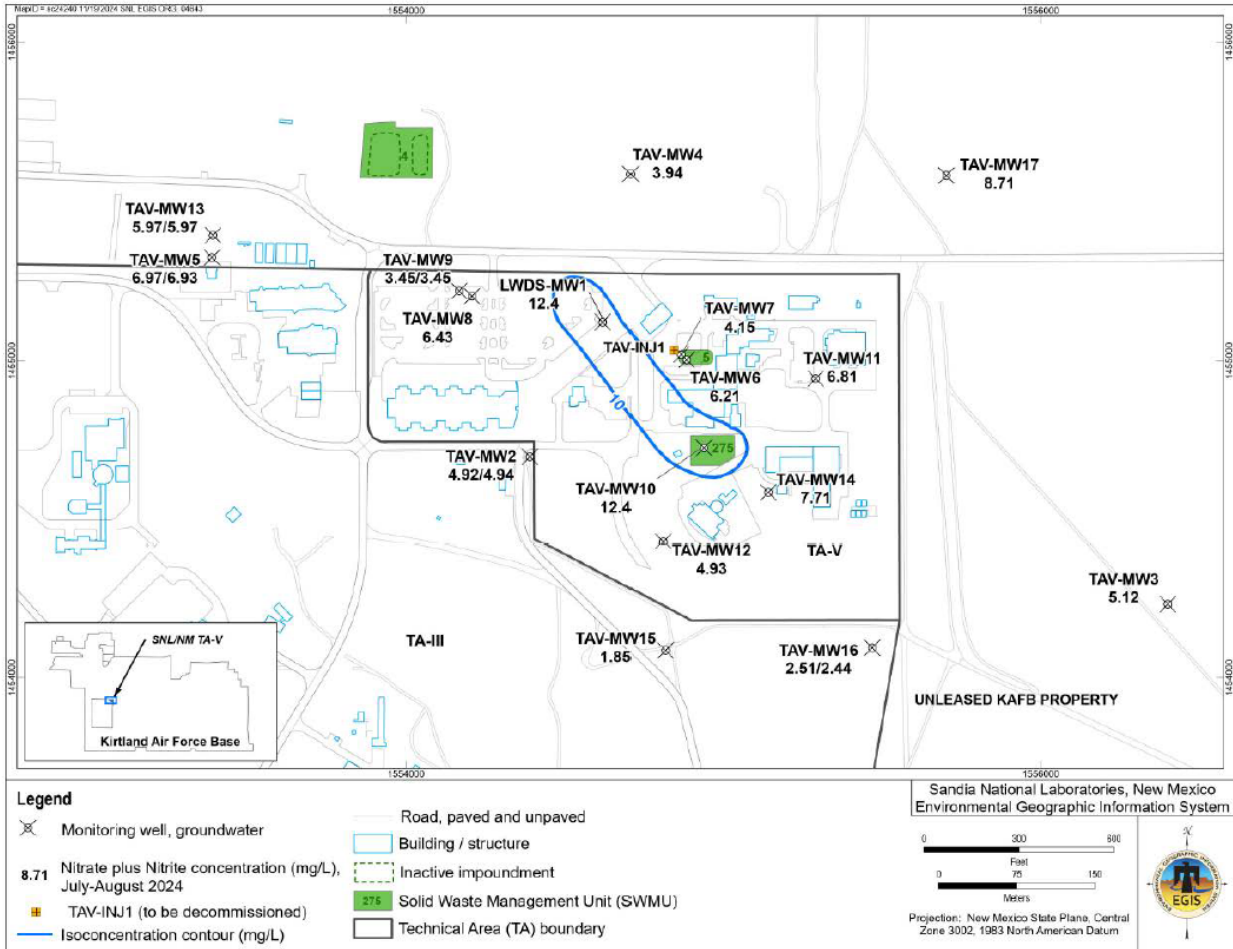


Figure E-5: Nitrate Concentrations in Groundwater at TAVG AOC as of Summer 2004(SNL/NM 2024).

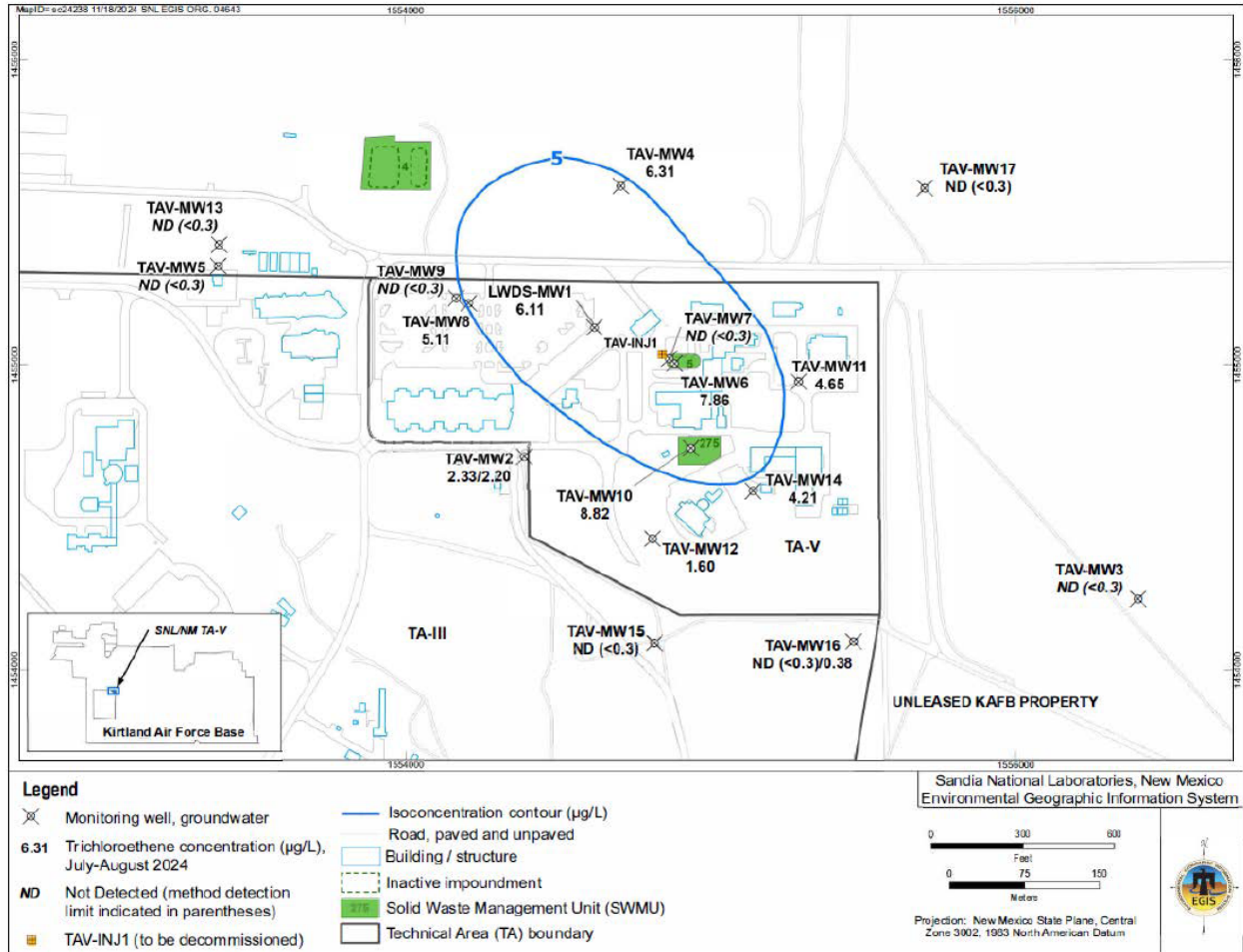


Figure E-6: Trichloroethylene Concentrations in Groundwater at TAVG AOC as of Summer 2024 (SNL/NM 2024).

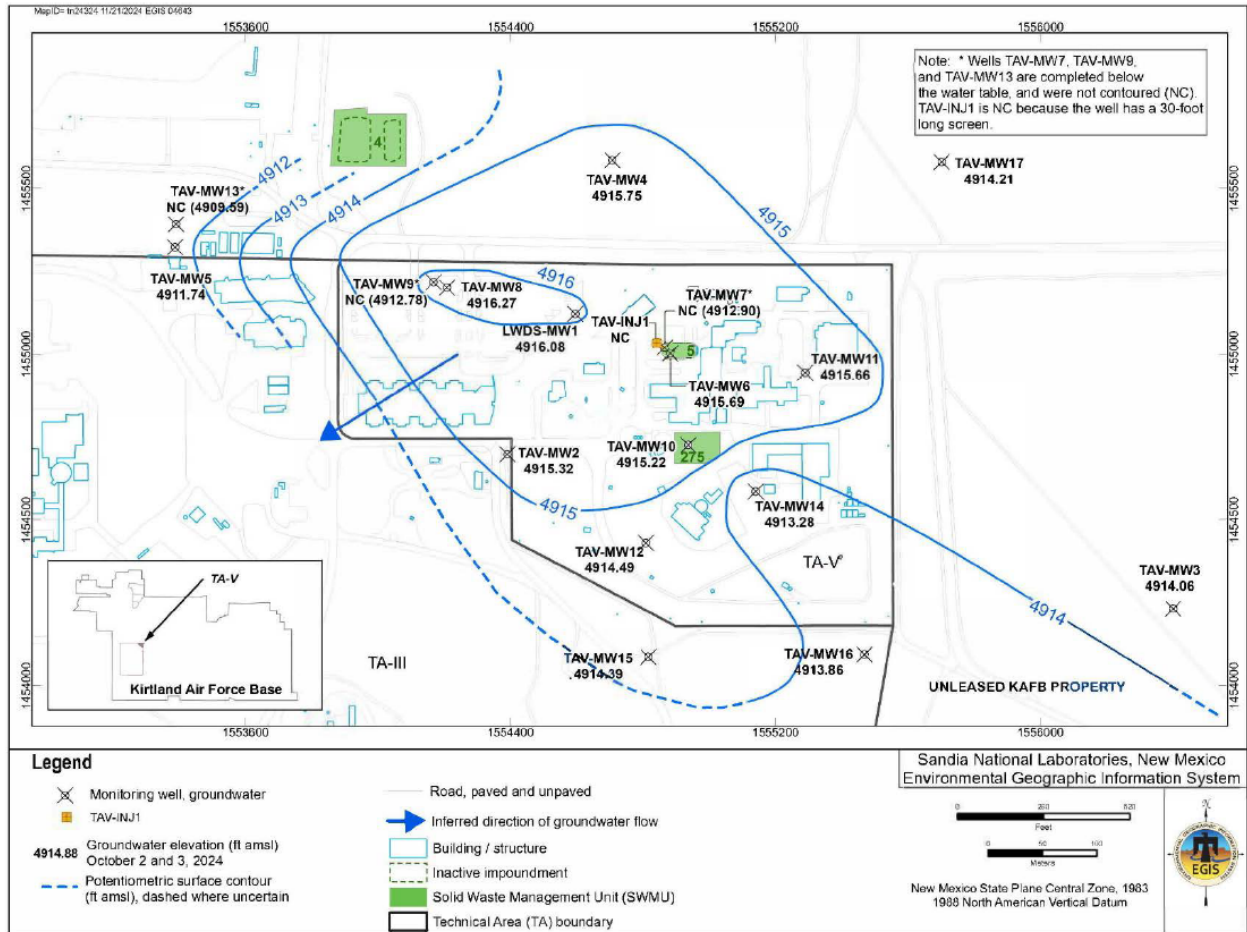


Figure E-7: Monitoring Network and Potentiometric Contours in the TAVG AOC (SNL/NM 2024).