



# Environmental Restoration Overview

## Mission:

Identify, characterize, and remediate sites where hazardous or radioactive materials may have been released to the environment.

## Regulation:

The New Mexico Environment Department (NMED) regulates the activities through the 2004 Compliance Order on Consent.

## Current Activities:

Three groundwater Areas of Concern (AOCs) are in the corrective action process. Monitoring at these AOCs follows the *Comprehensive Site-Wide Groundwater Monitoring Plan (Revised)*.

- **Burn Site Groundwater AOC**
  - The NMED approved the *Burn Site Groundwater Area of Concern Current Conceptual Model and Corrective Measures Evaluation Report* in February 2024 and has issued its notice for public comment on the proposed remedy.
- **Technical Area-V Groundwater AOC**
  - Will submit the *Technical Area-V Groundwater Area of Concern Current Conceptual Model and Corrective Measures Evaluation Report* to the NMED by May 20, 2024.
- **Tijeras Arroyo Groundwater AOC**
  - The NMED approved the *Tijeras Arroyo Groundwater Corrective Measures Implementation Plan (Revised)* in March 2024. The NMED-approved final remedy for the Tijeras Arroyo Groundwater AOC is monitored natural attenuation.

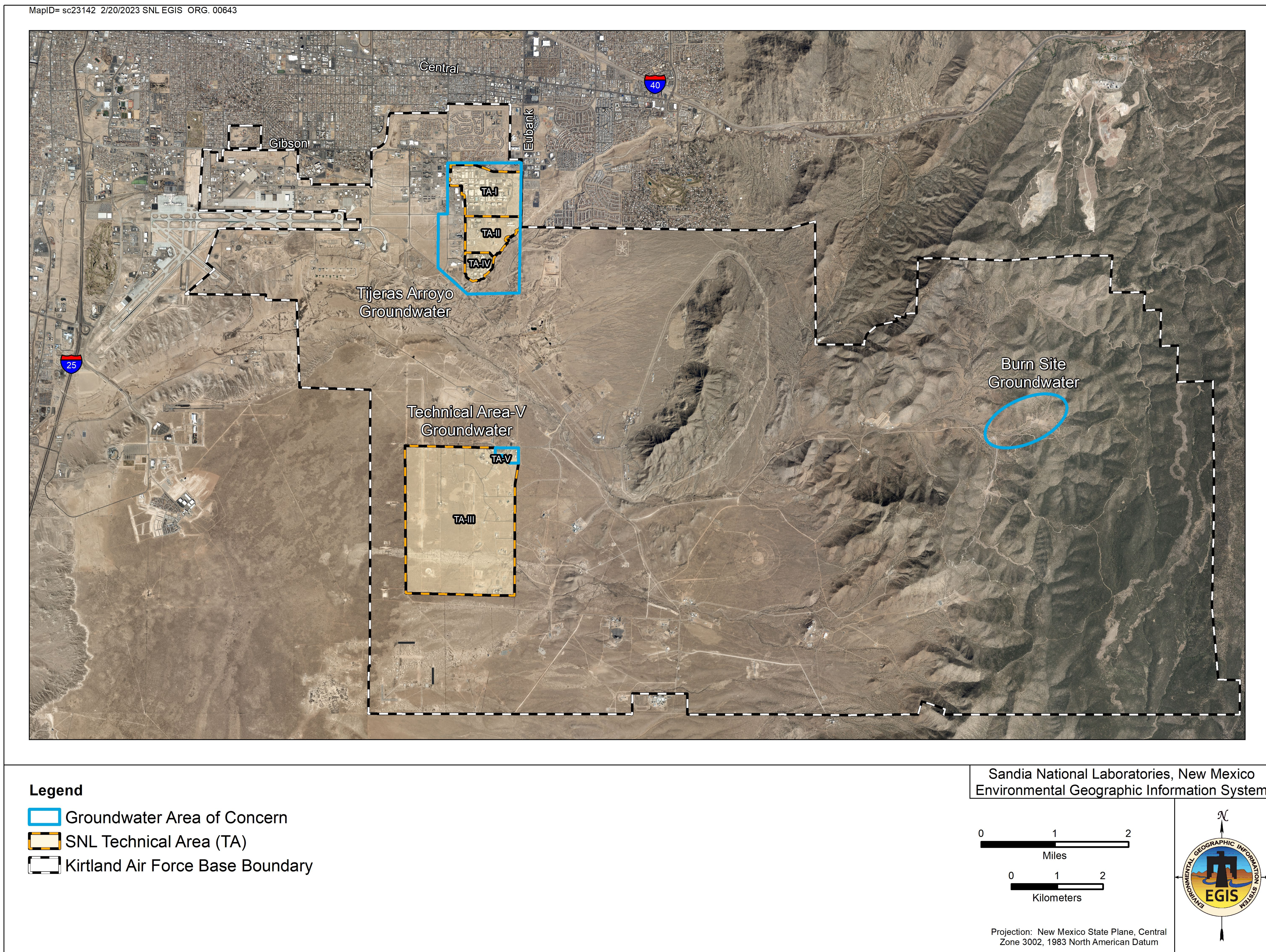
## Reporting:

- Quarterly activities are documented in *Environmental Restoration Operations Consolidated Quarterly Reports* submitted to the NMED.
- Annual groundwater monitoring activities and analytical data are documented in *Annual Groundwater Monitoring Reports* submitted to the NMED.

## There is no known harm to human health because:

- No one is drinking contaminated groundwater.
- There are no drinking water supply wells in or near contaminated groundwater.
- The contamination boundaries are defined.
- Ongoing monitoring of contaminated groundwater continues.





Map of Kirtland Air Force Base Showing Locations of 3 Sandia National Laboratories Groundwater Areas of Concern

For more detail, see the *Annual Groundwater Monitoring Report, Calendar Year 2022* available at: [https://www.sandia.gov/news/publications/environmental\\_reports/index.html](https://www.sandia.gov/news/publications/environmental_reports/index.html)

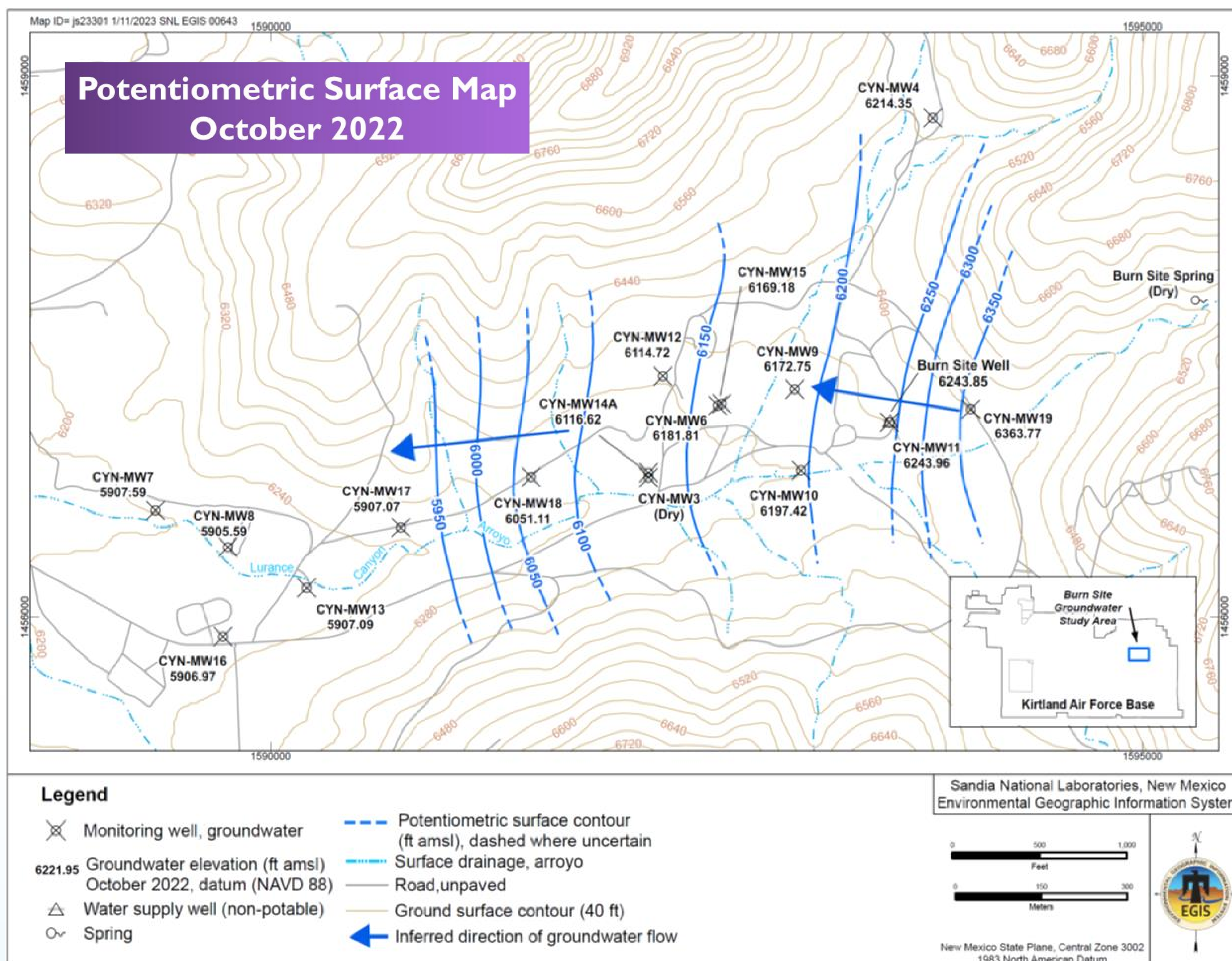
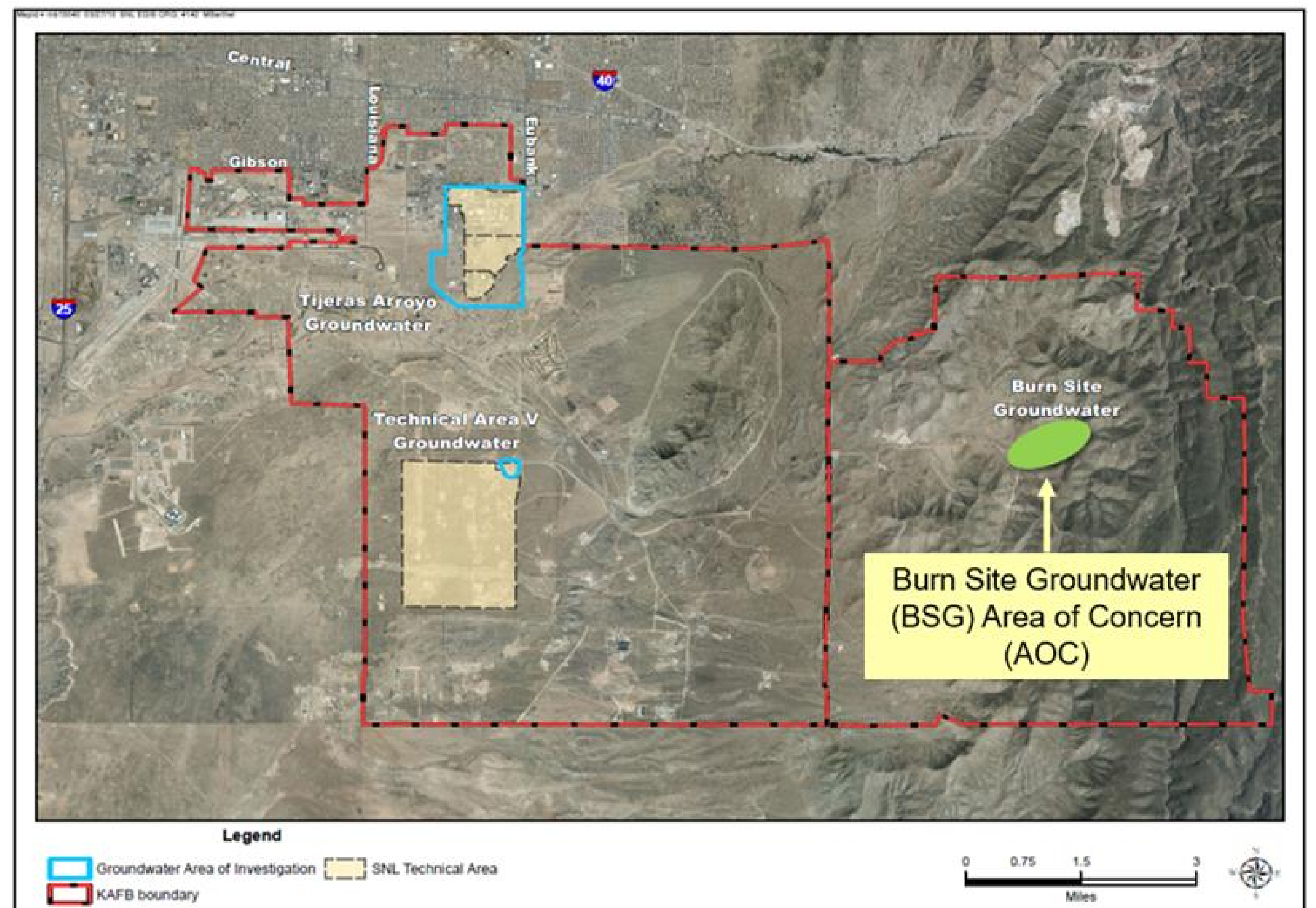




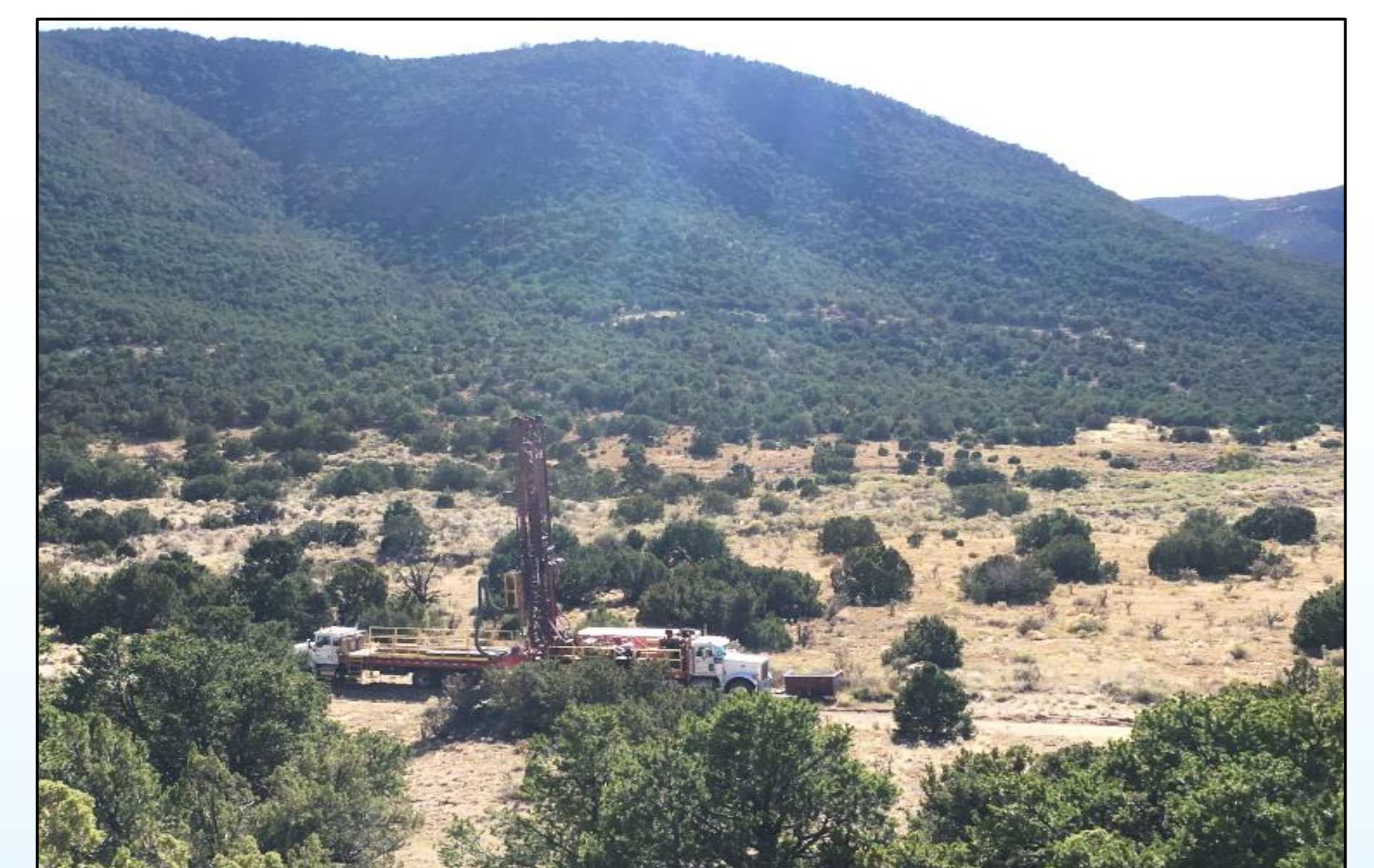
# Burn Site Groundwater Investigation

## Site Description

- The Burn Site Groundwater (BSG) Area of Concern (AOC) is located in Lurance Canyon in a remote area of the Manzanita Mountains.
- Lurance Canyon is a west-flowing drainage deeply incised into Paleozoic and Precambrian bedrock in moderately to heavily wooded pinon-juniper forest.
- Sandia National Laboratories activities at the Burn Site began in 1967. Early activities included explosives testing; current activity is fire survivability studies (i.e., burn testing).
- Only the groundwater at the Burn Site requires corrective action.
- The groundwater occurs in fractured Precambrian bedrock that is recharged by infiltrating precipitation; flow is controlled by changes in rock type and faults/fractures.



- Groundwater monitoring began in 1996.
- Depth to groundwater ranges from 46 to 361 feet below ground surface, and the groundwater flows to the west.
- The monitoring well network consists of 16 active wells, with the 4 newest wells installed in October/November 2019.



Installation of Monitoring Well CYN-MW19

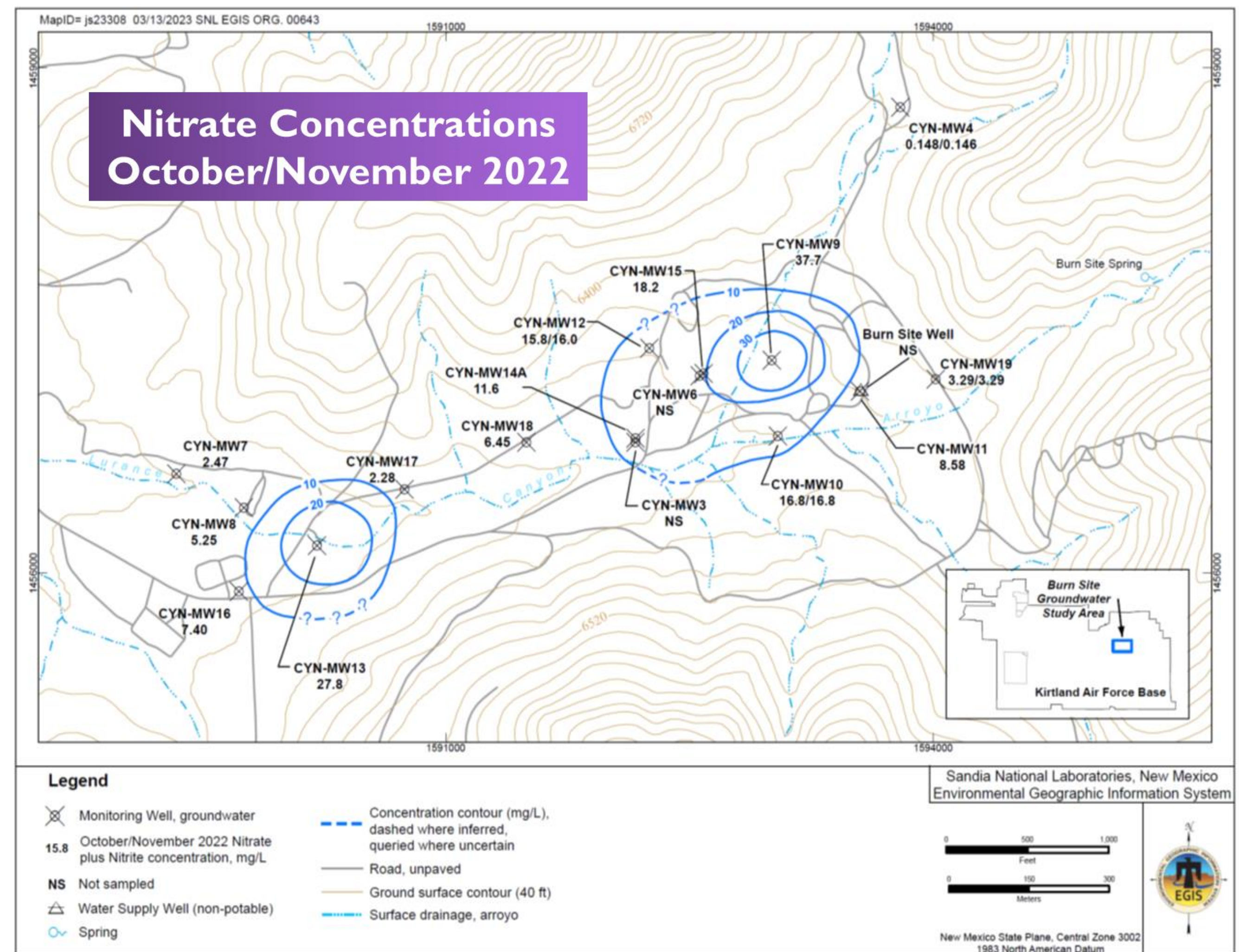




# Burn Site Groundwater Investigation

- The groundwater is contaminated with nitrate (the constituent of concern) at concentrations above the U.S. Environmental Protection Agency maximum contaminant level (MCL) for drinking water.
- Nitrate above the MCL has been detected in approximately half the monitoring wells, and the two nitrate plumes combined cover 41 acres.

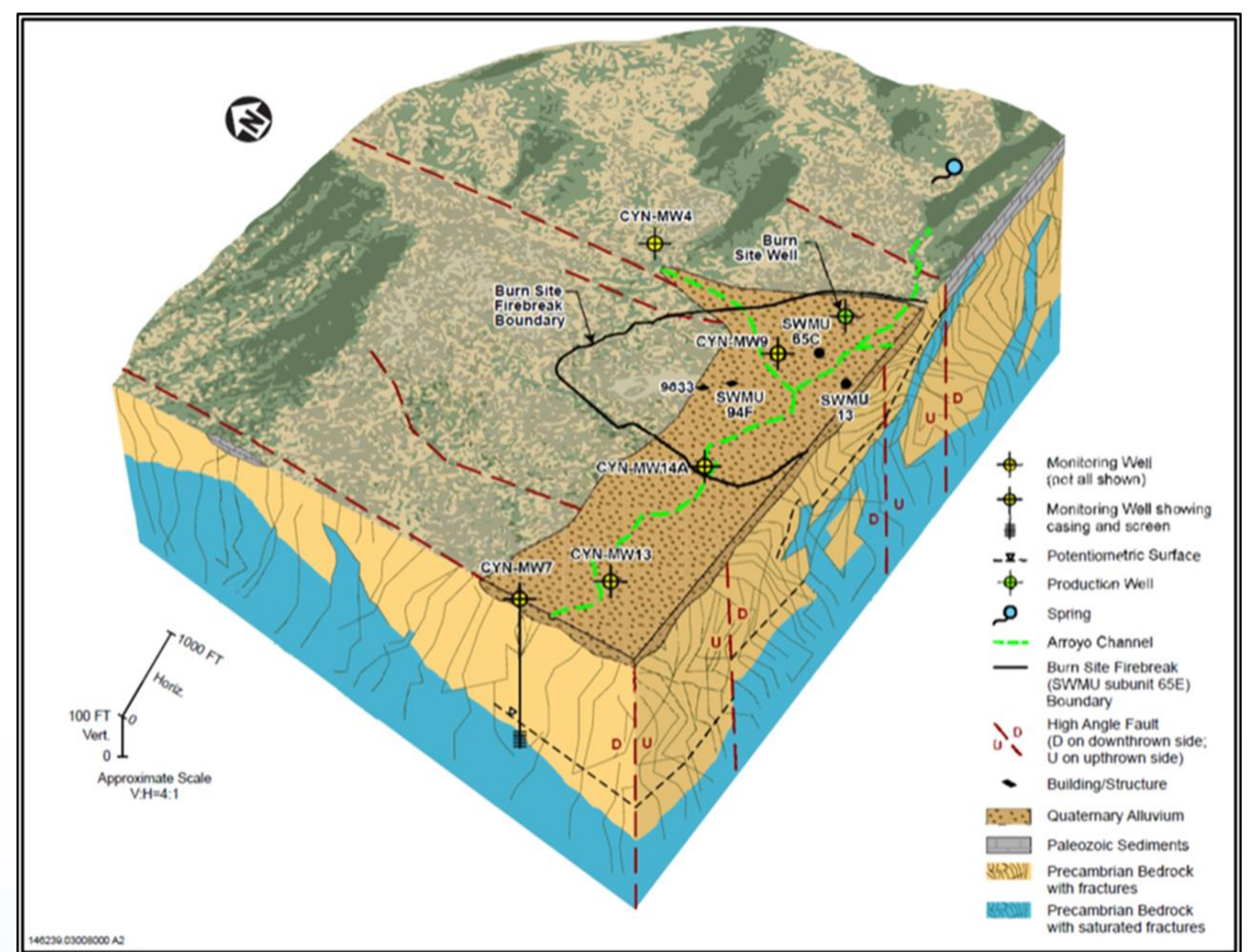
Constituent of Concern	Maximum Concentration in 2022	MCL
Nitrate	38.1 milligrams per liter (well CYN-MW9: April)	10 milligrams per liter



- The nitrate is derived from both manmade and natural sources, including ammonium nitrate slurry, wastewater discharges, and degraded explosive compounds.
- The groundwater is not used for any beneficial purpose; no one is drinking contaminated groundwater. The nearest downgradient drinking water supply well (KAFB-4) is 8.4 miles to the west.

## Current Status and Recent Activities

- The BSG AOC is in the corrective action process.
- Performed quarterly water level measurements and semiannual groundwater sampling. The data are available in the *Annual Groundwater Monitoring Report, Calendar Year 2022*.
- Submitted the *Burn Site Groundwater Area of Concern Current Conceptual Model and Corrective Measures Evaluation Report* to the New Mexico Environment Department (NMED) in January 2023.
- The NMED approved the *Burn Site Groundwater Area of Concern Current Conceptual Model and Corrective Measures Evaluation Report* in February 2024 and has issued its notice for public comment on the proposed remedy for the BSG AOC.



Conceptual Site Model for the BSG Vicinity

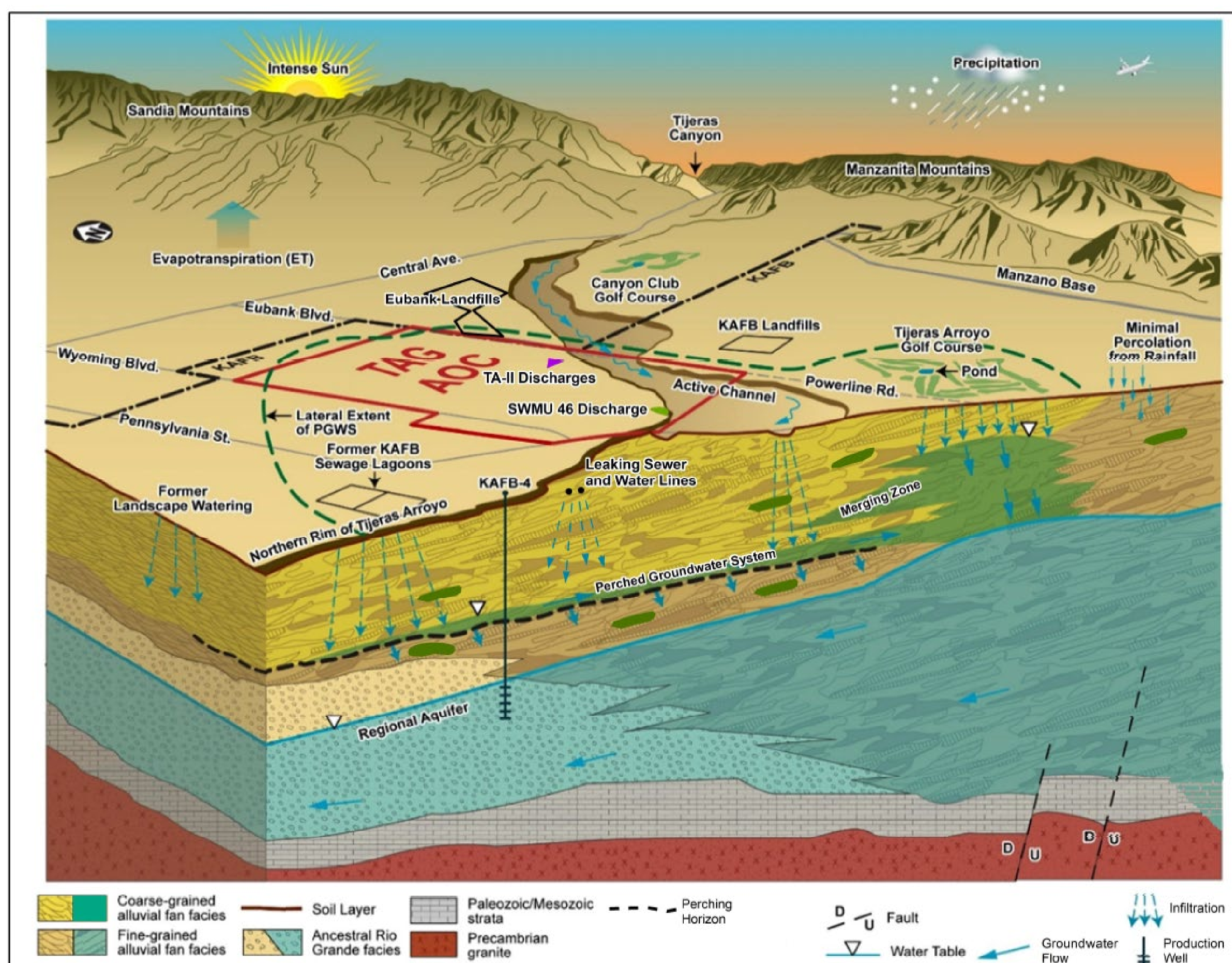




# Tijeras Arroyo Groundwater Investigation

## Site Description

- The Tijeras Arroyo Groundwater (TAG) Area of Concern (AOC) covers 1.82 square miles (1,165 acres) in the north-central part of Kirtland Air Force Base (KAFB) and spans Sandia National Laboratories Technical Areas I, II, and IV. Research activities in these areas began in 1948.
- The unconsolidated alluvial-fan sediments that underlie the TAG AOC contain two water-bearing zones: the Perched Groundwater System (PGWS) and the Regional Aquifer.
  - The PGWS water table is approximately 330 feet below ground surface. The PGWS was created by manmade recharge sources, including sewage lagoons, septic leach fields, and wastewater outfalls. These sources have been eliminated, and the saturated thickness of the PGWS is naturally decreasing at approximately 0.5 feet per year.
  - A 7- to 20-foot-thick layer of saturation remains in the central TAG AOC. The saturated thickness of the PGWS is consistently decreasing, and one monitoring well in the PGWS is now dry.
  - The Regional Aquifer water table is approximately 520 feet below ground surface.
  - The PGWS and the Regional Aquifer are vertically separated by a Perching Horizon and approximately 200 feet of unsaturated sediments everywhere except the TAG AOC's southeast corner, where a Merging Zone connects the two water-bearing zones.



Conceptual Site Model for the TAG Vicinity

- The groundwater in the PGWS flows southeast at approximately 24 feet per year and merges with the groundwater in the Regional Aquifer, which flows west and northwest at approximately 55 feet per year.

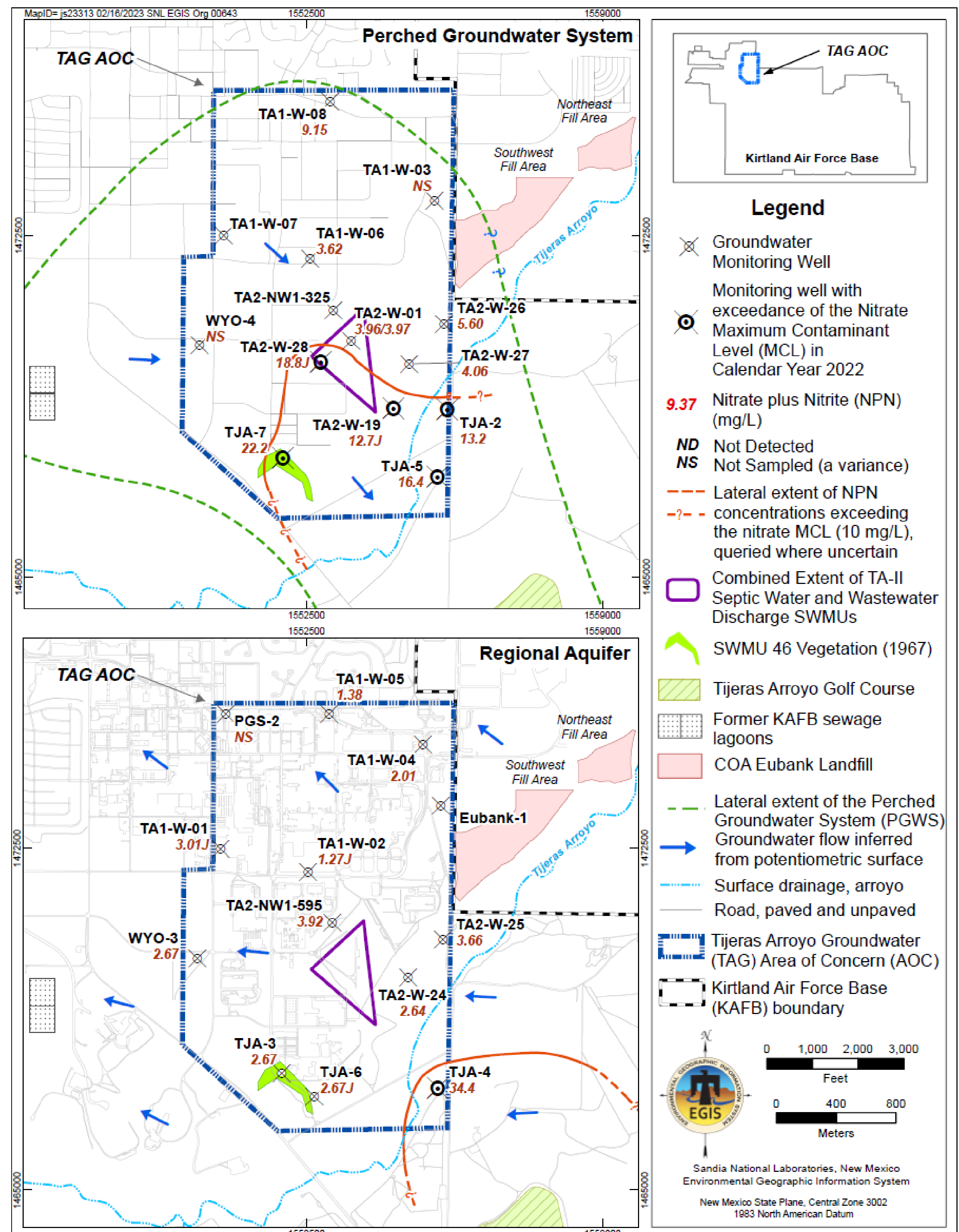




# Tijeras Arroyo Groundwater Investigation

## Site Description (continued)

- Groundwater monitoring began in 1992, with 31 monitoring wells installed in the TAG AOC to date.
- Monitoring wells in the surrounding area include 84 KAFB wells and 4 City of Albuquerque wells.
- The groundwater in the PGWS is contaminated with nitrate (the constituent of concern) at concentrations above the U.S. Environmental Protection Agency maximum contaminant level (MCL) for drinking water.
- The nitrate plume covers approximately 280 acres and does not pose a threat to the Regional Aquifer.
- The nitrate is derived from both manmade and natural sources, including septic leach fields, wastewater discharges, some fertilizers, degraded minerals, and the flushing of naturally occurring nitrate from decayed vegetation that has accumulated in vadose-zone sediments beneath arroyos.



Maximum 2022 Nitrate Concentrations in the PGWS and the Regional Aquifer

Constituent of Concern	MCL	Maximum Concentration in PGWS, 2022	Maximum Concentration in Merging Zone, 2022	Maximum Concentration in Regional Aquifer, 2022
Nitrate	10 milligrams per liter (mg/L)	22.2 mg/L at well TJA-7	34.4 mg/L at well TJA-4	3.92 mg/L at well TA2-NW1-595

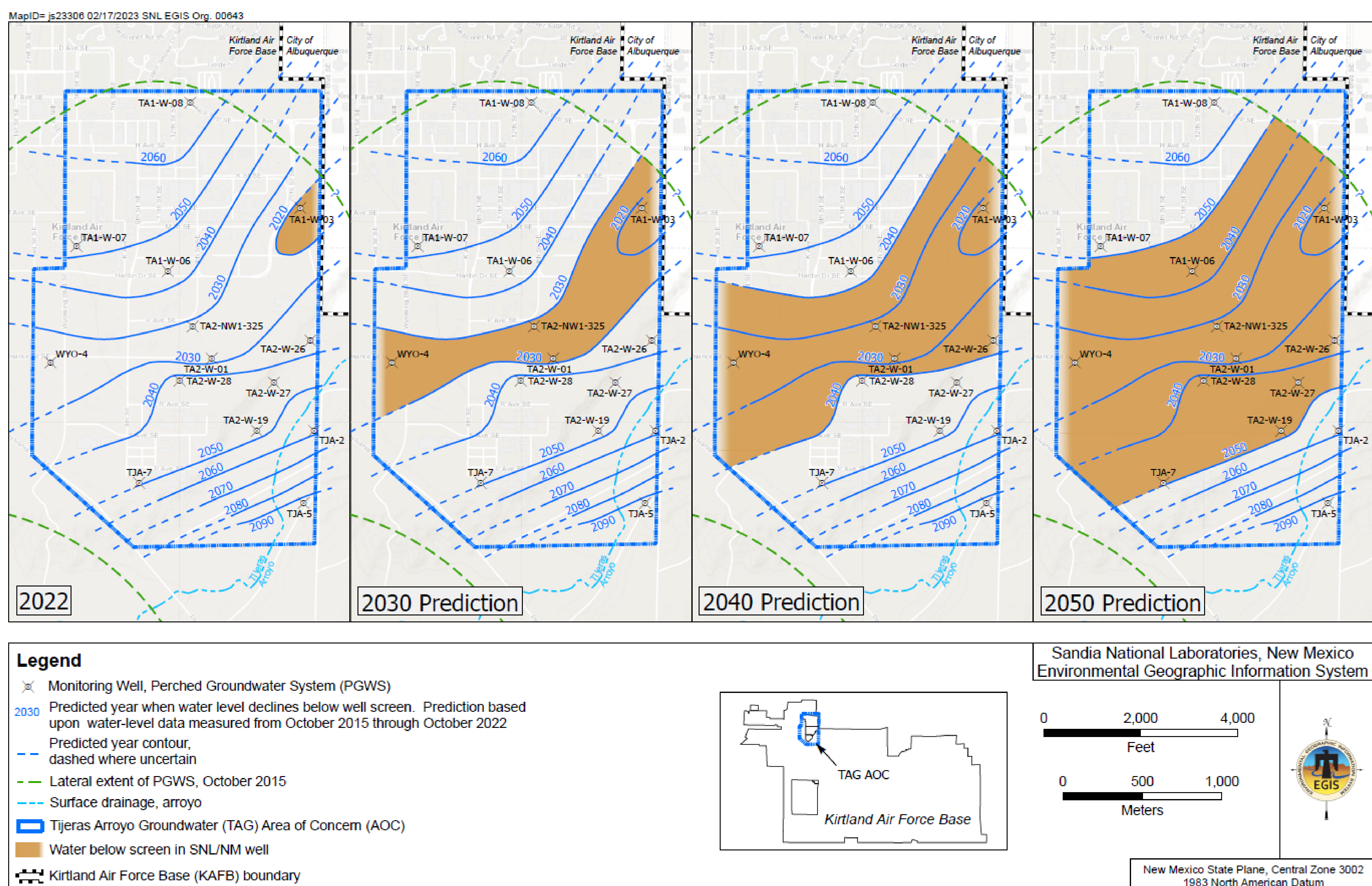




# Tijeras Arroyo Groundwater Investigation

## Site Description (concluded)

- Based on the water level trends, most of the monitoring wells in the PGWS will be dry by 2059, with 4 wells dry by 2030, 5 wells dry by 2040, and 10 wells dry by 2050.
- The groundwater in the PGWS is not used for any beneficial purpose; no one is drinking contaminated groundwater. Potentiometric surface maps and computer modeling show that the groundwater will not reach any drinking water supply wells.



## Current Status and Recent Activities

- Submitted the *Revised Tijeras Arroyo Groundwater Current Conceptual Model and Corrective Measures Evaluation Report* to the New Mexico Environment Department (NMED) in February 2018. The NMED approved this report in January 2023.
- The NMED-approved final remedy for the TAG AOC is monitored natural attenuation. The NMED approved the remedy implementation plan (*Tijeras Arroyo Groundwater Corrective Measures Implementation Plan [Revised]*) in March 2024. This plan requires semiannual groundwater sampling at 11 monitoring wells in the PGWS, annual groundwater sampling at 8 monitoring wells in the Regional Aquifer, sample analysis for nitrate, and quarterly water level measurements at 27 monitoring wells throughout the TAG AOC.
- The projected remedy duration is 30 years. Started implementing best management practices in January 2024 and will start implementing the final remedy in 2025.

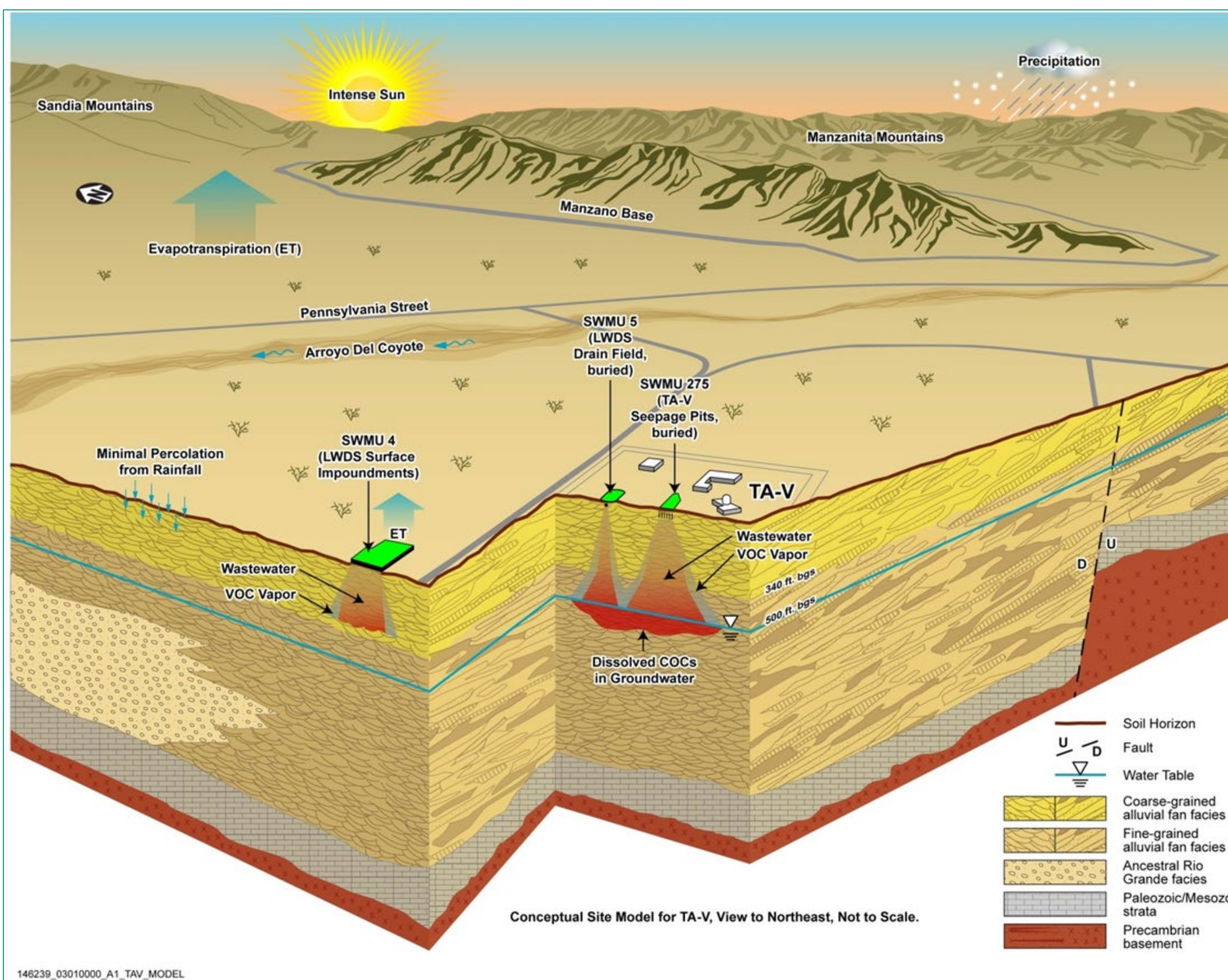
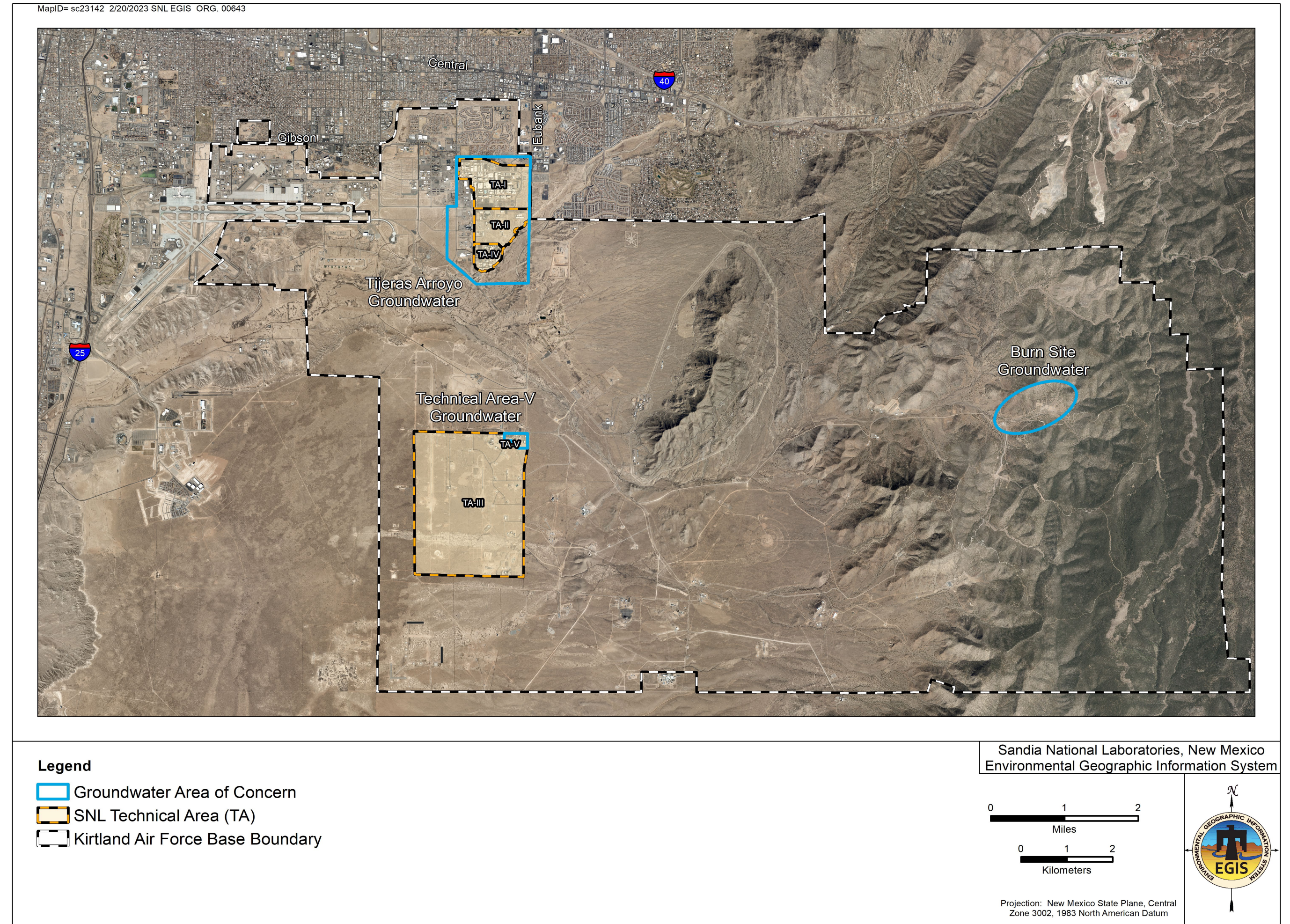




# Technical Area-V Groundwater Investigation

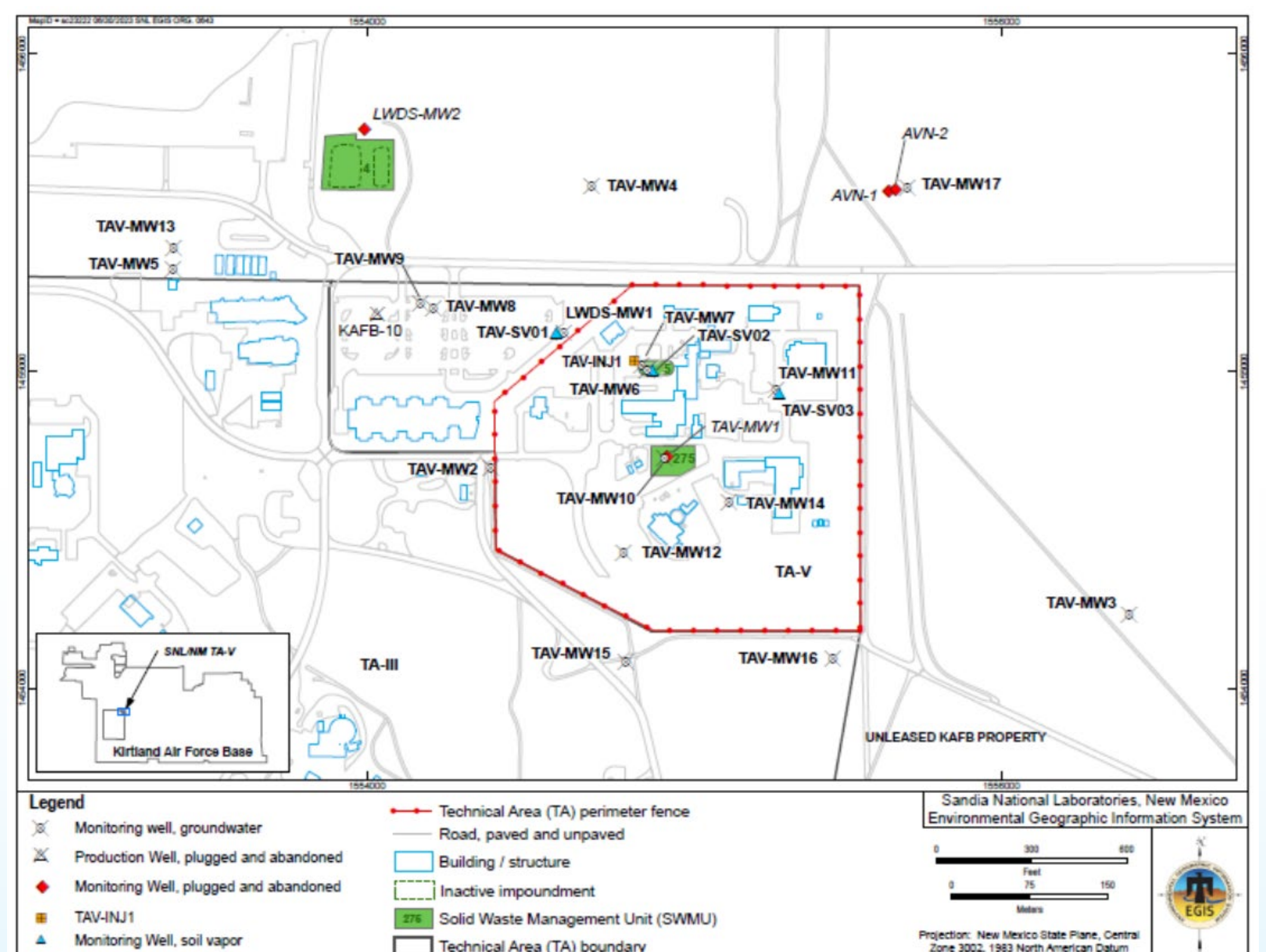
## Site Description

- Technical Area-V (TA-V) covers approximately 35 acres in the west-central portion of Kirtland Air Force Base (KAFB).
- Sandia National Laboratories activities at TA-V began in 1961.
- Corrective action for all the surface and shallow subsurface contamination at TA-V is complete.
- Only the groundwater at TA-V, designated as the TA-V Groundwater (TAVG) Area of Concern (AOC), requires corrective action.



Conceptual Site Model for the TAVG AOC Vicinity

- The groundwater at TA-V occurs in the Regional Aquifer in fine-grained, clay-rich alluvial-fan sediments.
- The groundwater in the Regional Aquifer flows to the west, then turns northeast toward the production wells near KAFB's northern boundary.
- The water table at TA-V is approximately 500 – 550 feet below ground surface.



- Groundwater monitoring at TA-V began in 1992, with 21 monitoring wells installed to date.
- The current monitoring well network consists of 17 active wells.
- The newest groundwater monitoring well is TAV-MW17.
- Groundwater levels are measured quarterly.



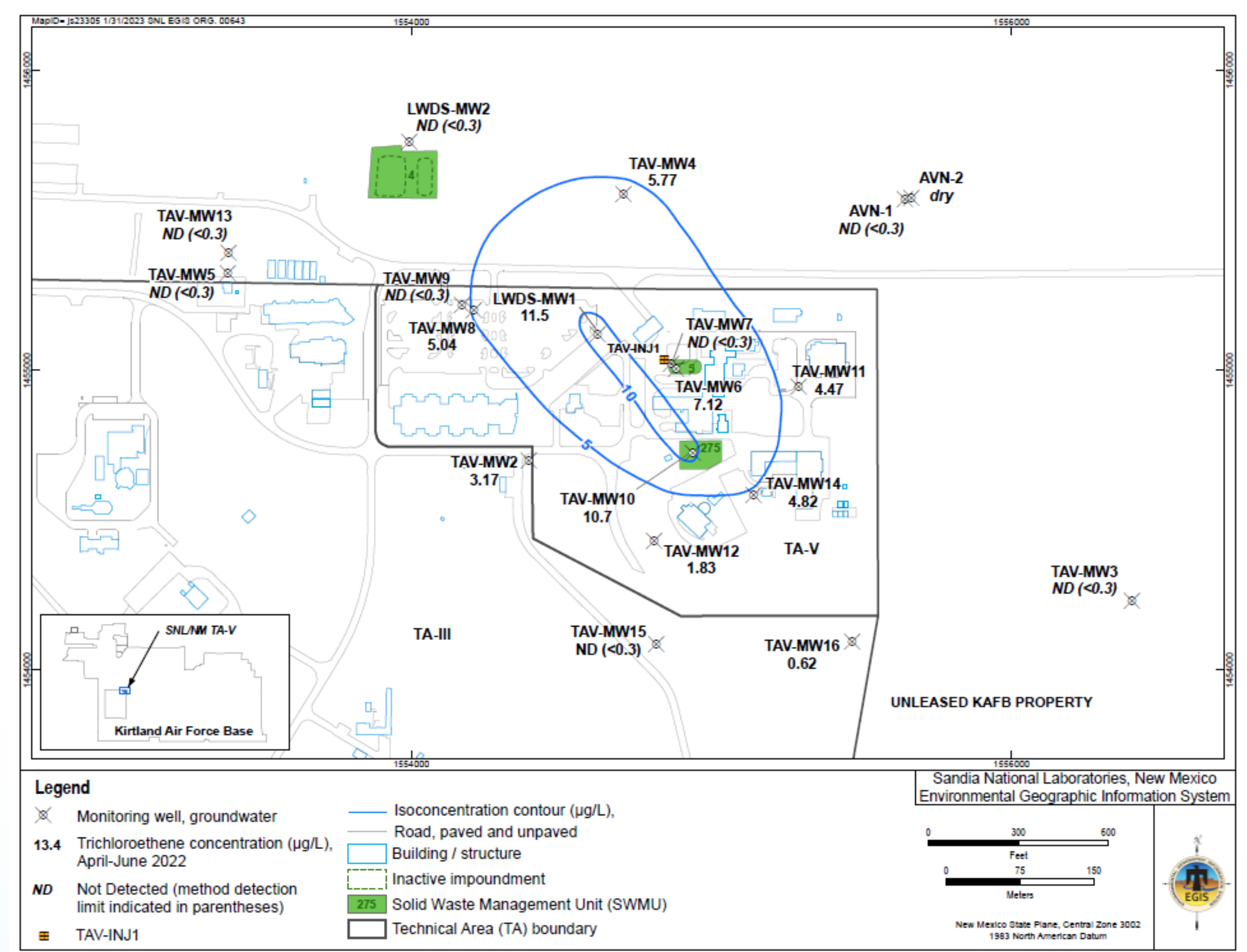
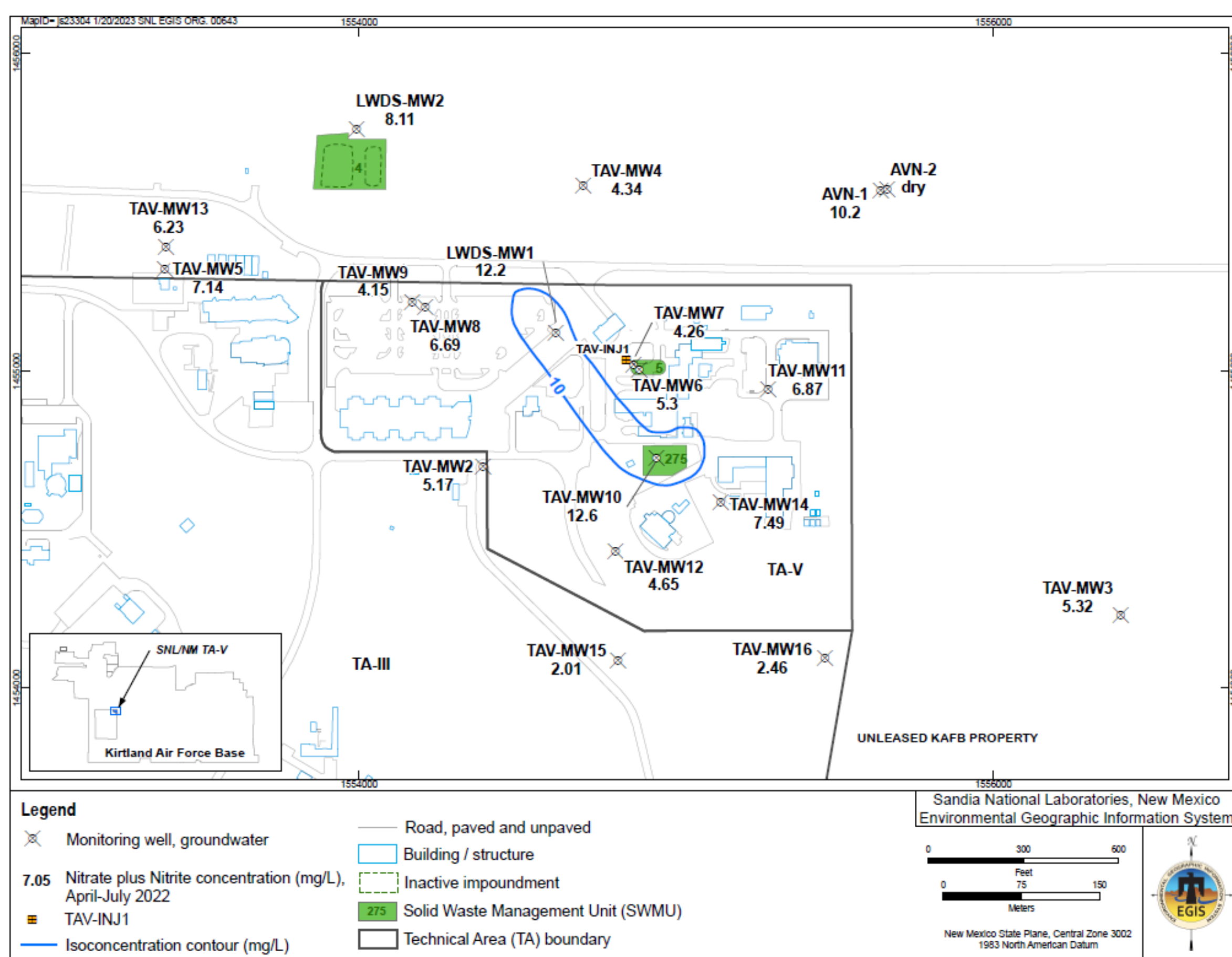


# Technical Area-V Groundwater Investigation

## Site Description (concluded)

- The groundwater at TA-V is contaminated with nitrate and trichloroethene (TCE) at concentrations above the U.S. Environmental Protection Agency maximum contaminant levels (MCLs) for drinking water.
- Nitrate and TCE are derived from industrial and septic wastewater discharged at TA-V from the 1960s through 1992. Nitrate could also be naturally occurring.
- Except for TAV-MW17, the monitoring wells are sampled either semiannually or annually for nitrate and TCE (the constituents of concern) and annually for waste characterization parameters.
  - The nitrate plume covers approximately 1.4 acres.
  - The TCE plume covers approximately 13 acres.
  - Both plumes are stable. They are not adversely impacting human health or the environment.
  - No other constituents in the groundwater exceed the MCLs.
- The groundwater is not used for any beneficial purpose; no one is drinking contaminated groundwater. The nearest drinking water supply well (KAFB-4) is 2.8 miles northwest of TA-V.

Constituent of Concern	Maximum Concentration in 2022	MCL
Nitrate	13.5 milligrams per liter (well TAV-MW10)	10 milligrams per liter
TCE	12.4 micrograms per liter (well LWDS-MW1)	5 micrograms per liter



Nitrate Plume (left) and TCE Plume (right)

Source: Annual Groundwater Monitoring Report, Calendar Year 2022

[www.sandia.gov](http://www.sandia.gov) | Environmental Responsibility | Environmental Reports |





# Technical Area-V Groundwater Investigation

## Current Status and Recent Activities

### New Monitoring Well TAV-MW17 — Sampling

- Installed and sampled for the first time in April 2023, then sampled quarterly in August 2023, October 2023, and January 2024.
  - Sampled for perchlorate to meet the 2004 Compliance Order on Consent requirement of having four consecutive perchlorate results below the screening level of 4 micrograms per liter. Met this requirement in January 2024.
  - Sampled for nitrate, TCE, and waste characterization parameters.
- Will be sampled semiannually for nitrate and TCE and annually for waste characterization parameters starting in the second quarter of calendar year 2024.

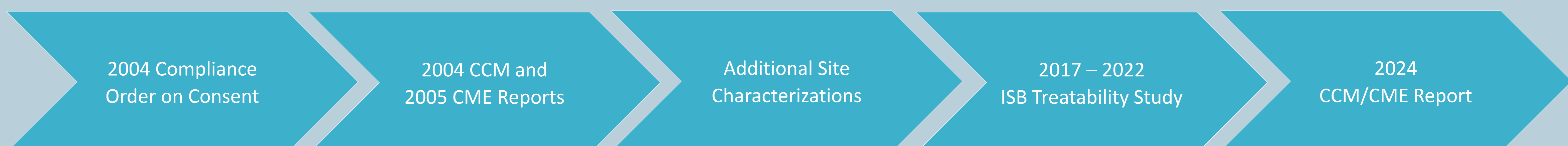
### New Monitoring Well TAV-MW17 — Reporting

- Submitted the *Monitoring Well TAV-MW17 Installation and Monitoring Well AVN-1, AVN-2, and LWDS-MW2 Decommissioning Report (Revised)* to the NMED in January 2024. The NMED approved this report in March 2024.



### Corrective Action at the TAVG AOC

- The TAVG AOC is in the corrective measures evaluation (CME) process.



- CCM = current conceptual model
- ISB = in-situ bioremediation
- Will submit the *Technical Area-V Groundwater Area of Concern Current Conceptual Model and Corrective Measures Evaluation Report* to the NMED by May 20, 2024.