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. Corrective action for all the surface and shallow subsurface contamination at TA-V is complete.

Drilling at Burn Site

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 Calendar Year 2025

- **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.
  - Implementation of the MNA final remedy began in January 2025. The remedy duration is estimated to be 30 years.
- **Burn Site Groundwater AOC**
  - The NMED-approved final remedy for the Burn Site Groundwater AOC is Long-Term Monitoring.
  - The Corrective Measures Implementation Plan was submitted to the NMED in December 2024.
- **Technical Area-V Groundwater AOC**
  - The *Technical Area-V Groundwater Area of Concern Current Conceptual Model and Corrective Measures Evaluation Report* was submitted to the NMED in May 2024.

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.

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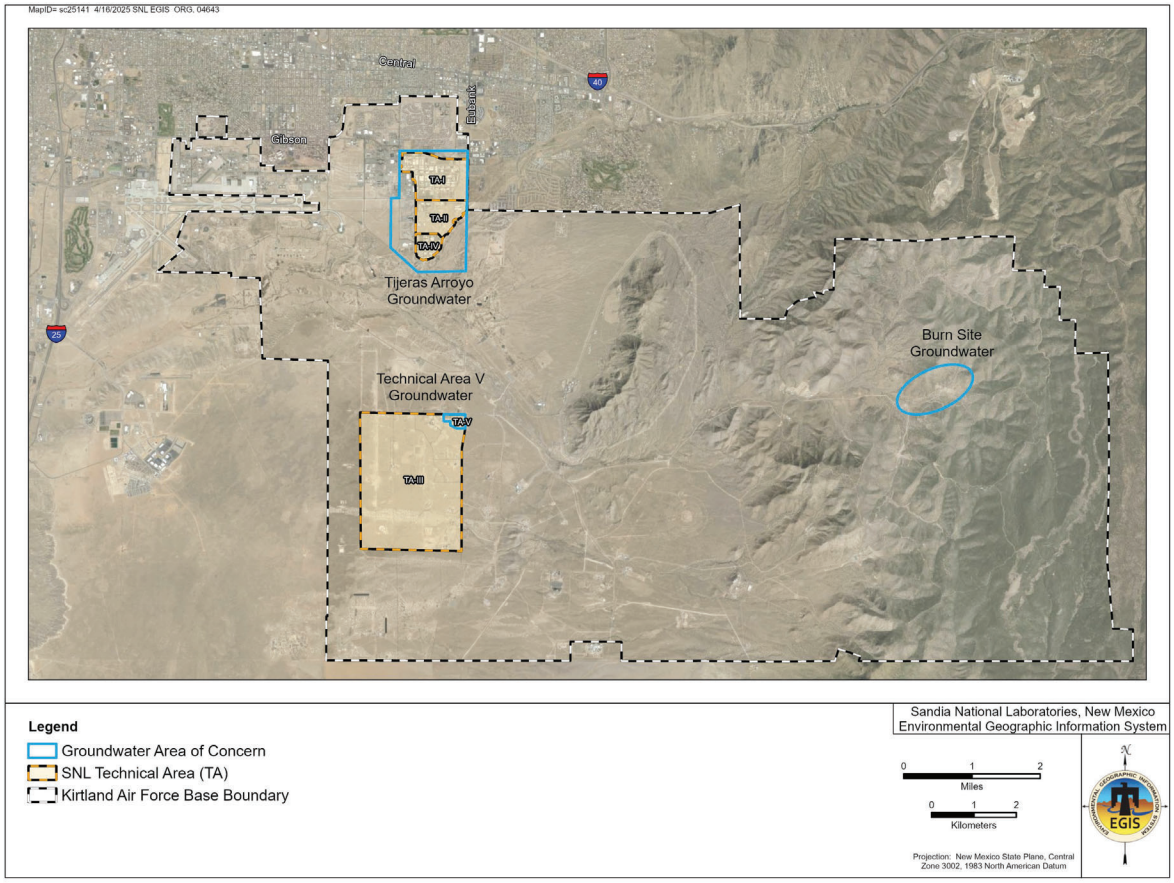

Map of Kirtland Air Force Base Showing Locations of 3 Sandia National Laboratories Groundwater Areas of Concern

For more detail, see the *Annual Groundwater Monitoring Report, Calendar Year 2023* available at: https://www.sandia.gov/news/publications/environmental_reports/index.html

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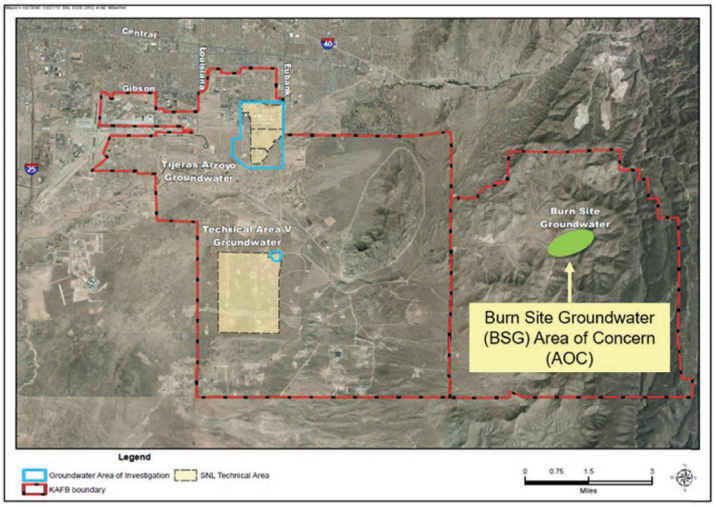
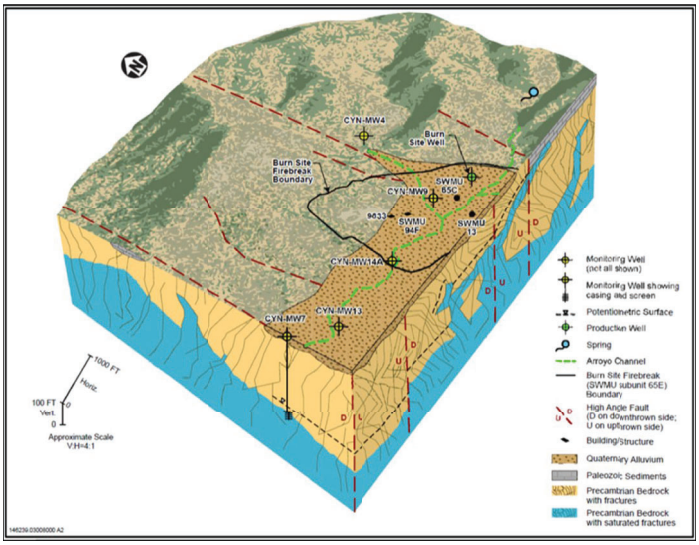
Burn Site Groundwater Investigation

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.

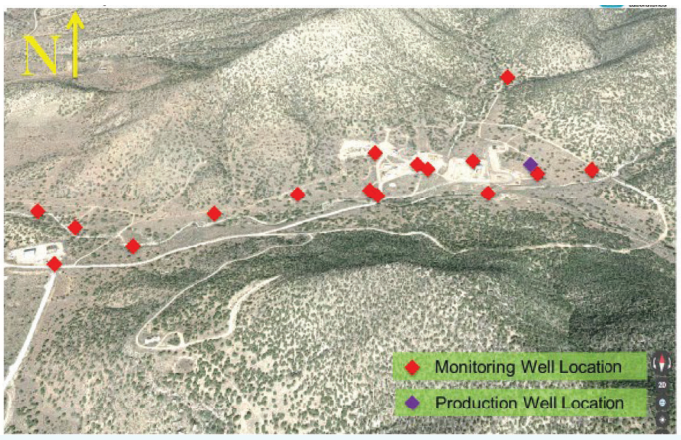




Conceptual Site Model for the BSG AOC Vicinity

- The groundwater occurs in fractured Precambrian bedrock that is recharged by infiltrating precipitation.
- Groundwater flow is controlled by changes in rock type and faults/fractures.
- Depth to groundwater ranges from 46 to 363 feet below ground surface.
- The groundwater flows to the west.
- The nearest downgradient drinking water supply well (KAFB-4) is 8.4 miles to the west.

- Groundwater monitoring at the Burn Site began in 1996.
- The current monitoring well network consists of 16 active wells and 1 inactive production well (Burn Site Well).
- Groundwater levels are measured quarterly.
- 13 monitoring wells are sampled semiannually.
- 3 monitoring wells are measured for water levels only.



Oblique Aerial View of the BSG AOC

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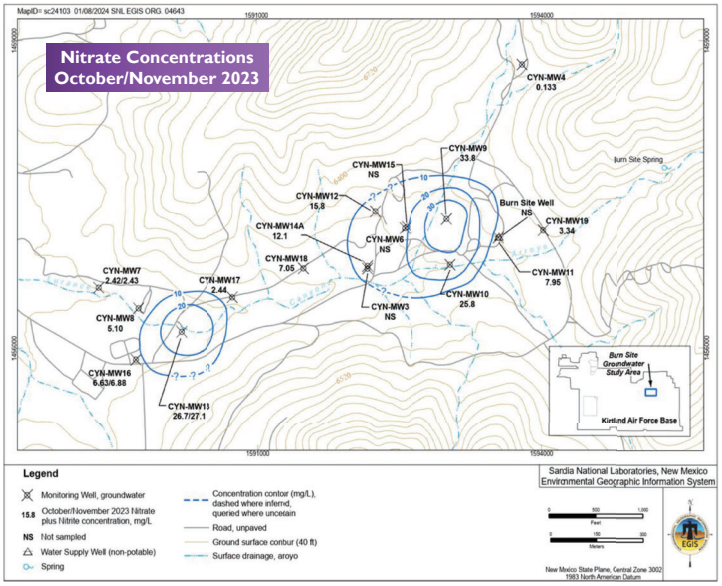
Burn Site Groundwater Investigation

Site Description (concluded)

- The groundwater at the Burn Site 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 is derived from both manmade and natural sources, including ammonium nitrate slurry, wastewater discharges, and degraded explosive compounds.
- In 2023,
  - Nitrate above the MCL was detected in five monitoring wells.
  - The two nitrate plumes combined cover approximately 41 acres.
- The groundwater is not used for any beneficial purpose; no one is drinking contaminated groundwater.



Constituent of Concern	Maximum Concentration in 2023	MCL
Nitrate	33.8 milligrams per liter (well CYN-MW9)	10 milligrams per liter

Current Status and Recent Activities

- The BSG AOC is in the corrective action process.

  - CCM = current conceptual model
  - CME = corrective measures evaluation
  - CMIP = corrective measures implementation plan
- The New Mexico Environment Department (NMED) selected Long-Term Monitoring as the final remedy for the BSG AOC in May 2024.
- Submitted the 2024 CMIP in December 2024.
  - The NMED is reviewing the CMIP.

- Measured groundwater levels quarterly.
- Will sample monitoring wells for nitrate and total petroleum hydrocarbons (diesel range organics and gasoline range organics) in May/June 2025.
- For more information, please see the *Annual Groundwater Monitoring Report, Calendar Year 2023,* available at www.sandia.gov | Environmental Responsibility | Environmental Reports |

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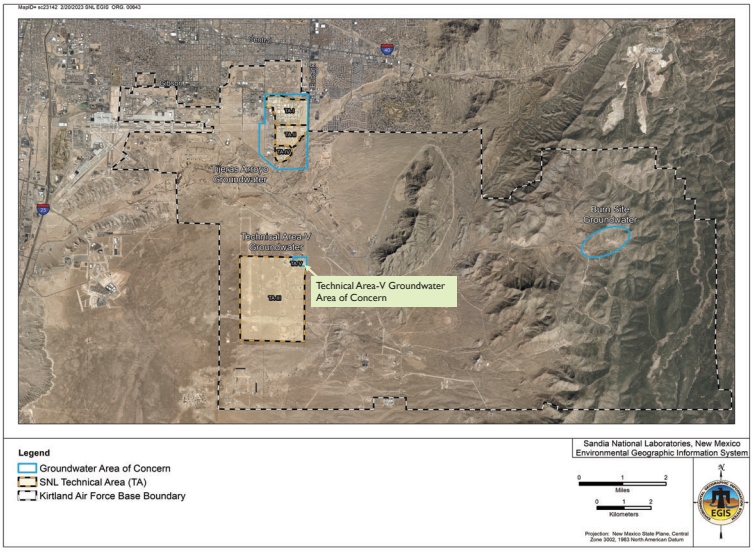
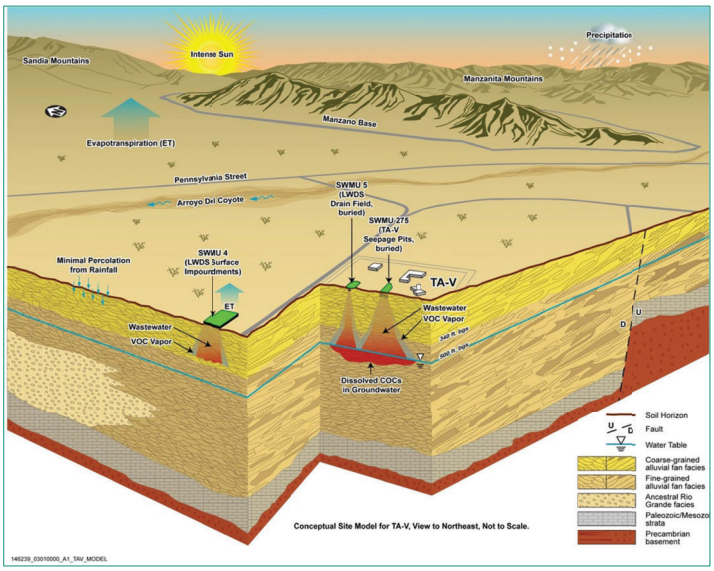
Technical Area-V Groundwater Investigation

Site Description

- Technical Area-V (TA-V) covers approximately 35 acres in the west-central part 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.

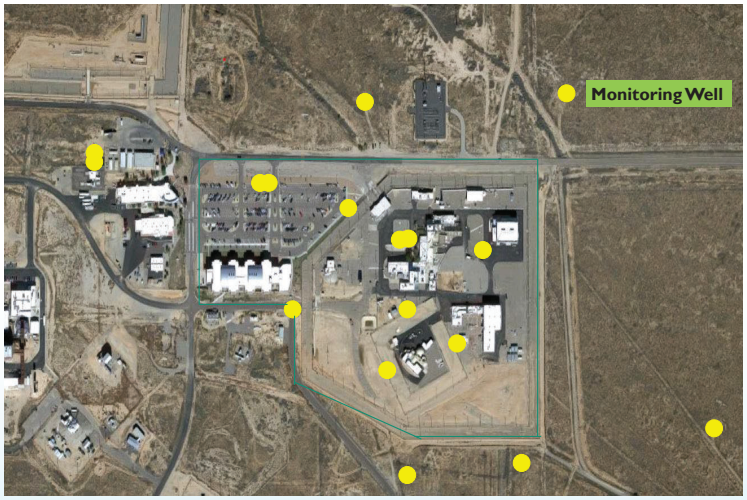




Conceptual Site Model for the TAVG AOC Vicinity

- The groundwater at TA-V occurs in the Regional Aquifer in fine-grained, clay-rich alluvial-fan sediments.
- The water table at TA-V is approximately 500 – 550 feet below ground surface.
- The groundwater in the Regional Aquifer flows to the west, then turns northeast toward the production wells near KAFB's northern boundary.
- The nearest drinking water supply well (KAFB-4) is 2.8 miles northwest of TA-V.

- 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.
- Groundwater levels are measured quarterly.
- 11 monitoring wells are sampled semiannually and 6 monitoring wells are sampled annually.



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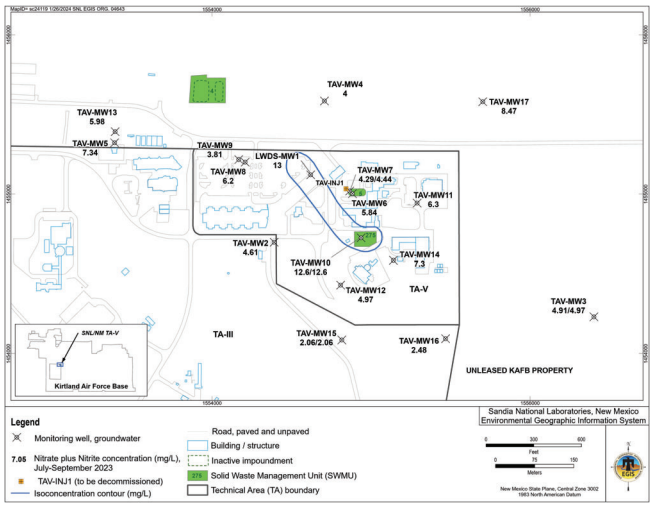
Technical Area-V Groundwater Investigation

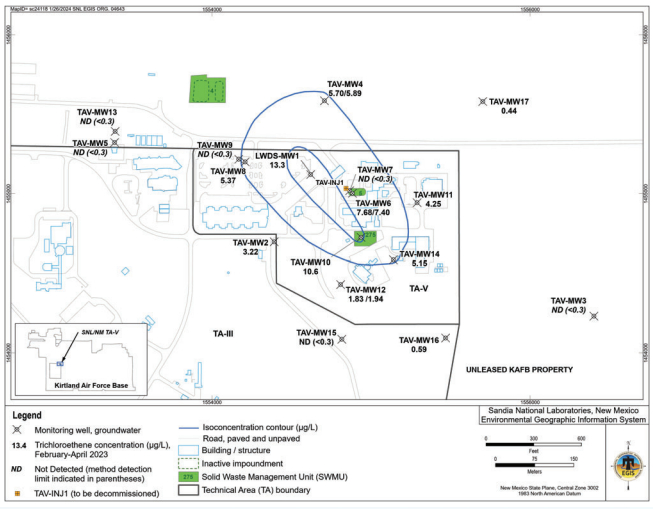
Site Description (concluded)

- The groundwater at TA-V is contaminated with nitrate and trichloroethene (TCE) (the constituents of concern) 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.
- In 2023,
  - Nitrate above the MCL was detected in two monitoring wells; TCE above the MCL was detected in six monitoring wells.
  - The nitrate plume covered approximately 2.7 acres; the TCE plume covered approximately 17 acres.
- Both plumes are stable. They are not adversely impacting human health or the environment.
- The groundwater is not used for any beneficial purpose; no one is drinking contaminated groundwater.

Constituent of Concern	Maximum Concentration in 2023	MCL
Nitrate	13.0 milligrams per liter (well LWDS-MW1)	10 milligrams per liter
TCE	13.3 micrograms per liter (well LWDS-MW1)	5 micrograms per liter



Nitrate Plume



TCE Plume

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Technical Area-V Groundwater Investigation

Current Status and Recent Activities

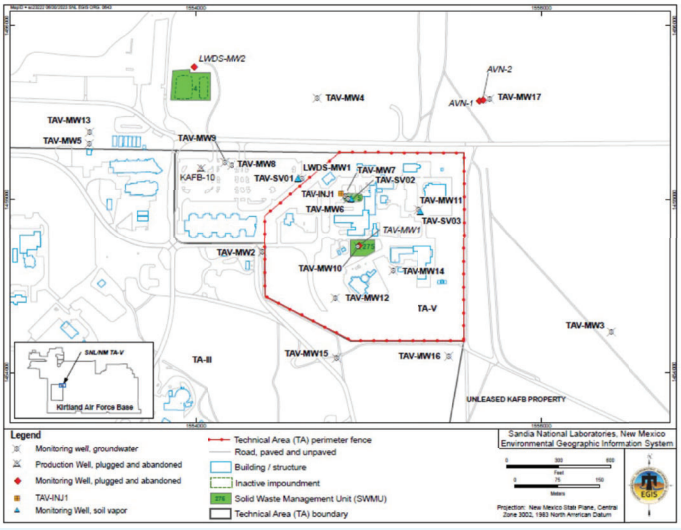
- The TAVG AOC is in the corrective action process.

2004 Compliance Order on Consent → Additional Site Investigation → 2017 – 2022 ISB Treatability Study → 2024 CCM/CME Report

  - CCM = current conceptual model
  - CME = corrective measures evaluation
  - ISB = in-situ bioremediation

- Submitted the 2024 CCM/CME Report to the New Mexico Environment Department (NMED) in April 2024. The NMED is reviewing the report and will:
  - Select a final remedy for the TAVG AOC.
  - Issue a Statement of Basis for the selection of the final remedy and accept public comment.

- Measured groundwater levels quarterly.
- Sampled 11 monitoring wells for nitrate and TCE in January and February 2025.
- Received approval from the New Mexico Office of the State Engineer for the Well Plugging Plan of Operations for TAV-INJ1 in November 2024.
- Completed decommissioning TAV-INJ1 in February 2025.
- For more information, please see the *Annual Groundwater Monitoring Report, Calendar Year 2023*, available at www.sandia.gov | Environmental Responsibility | Environmental Reports |



TAV-INJ1 Decommissioned

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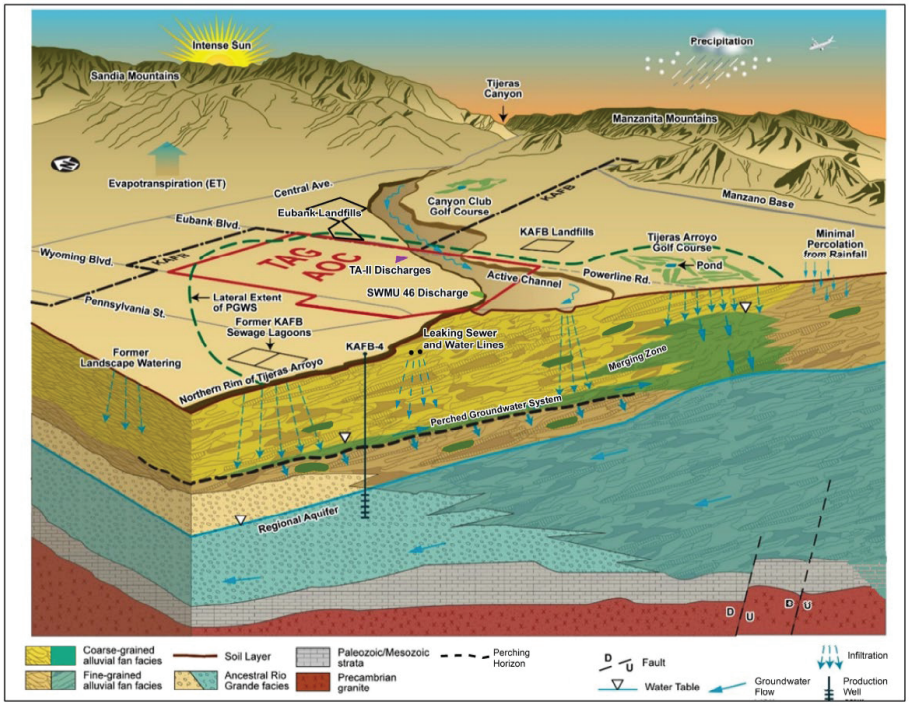
Tijeras Arroyo Groundwater Investigation

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.



Conceptual Site Model for the TAG Vicinity

- 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 two monitoring wells in the PGWS are 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.
- 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.

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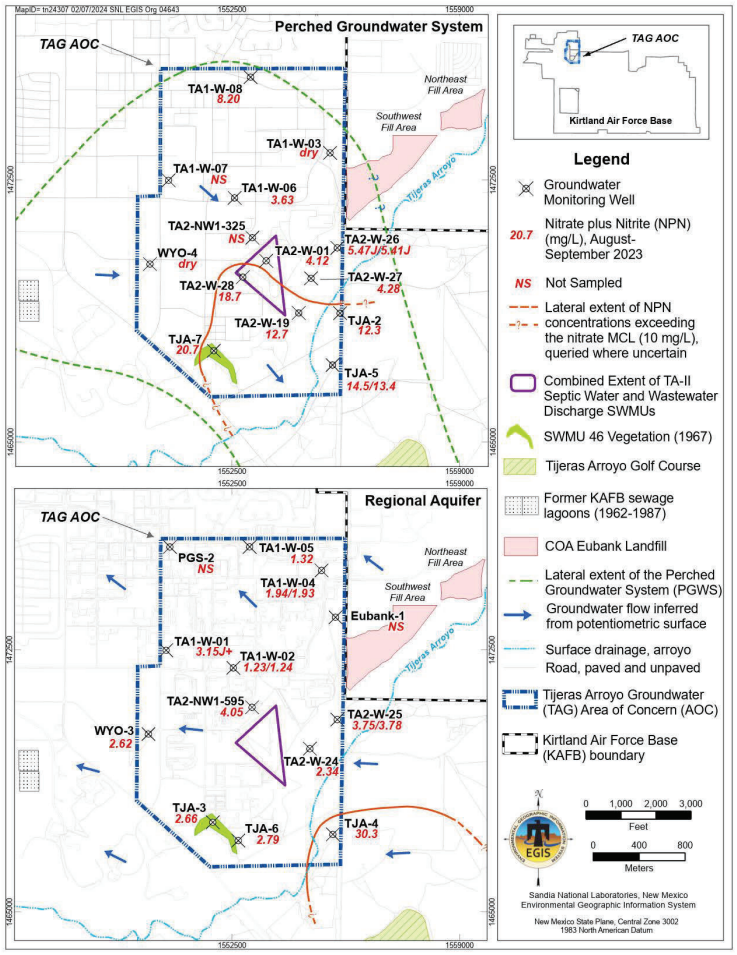
Tijeras Arroyo Groundwater Investigation

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 2023 Nitrate Concentrations in the PGWS and the Regional Aquifer

Constituent of Concern	MCL	Maximum Concentration in PGWS, 2023	Maximum Concentration in Merging Zone, 2023	Maximum Concentration in Regional Aquifer, 2023
Nitrate	10 milligrams per liter (mg/L)	20.7 mg/L at well TJA-7	30.3 mg/L at well TJA-4	4.05 mg/L at well TA2-NW1-595

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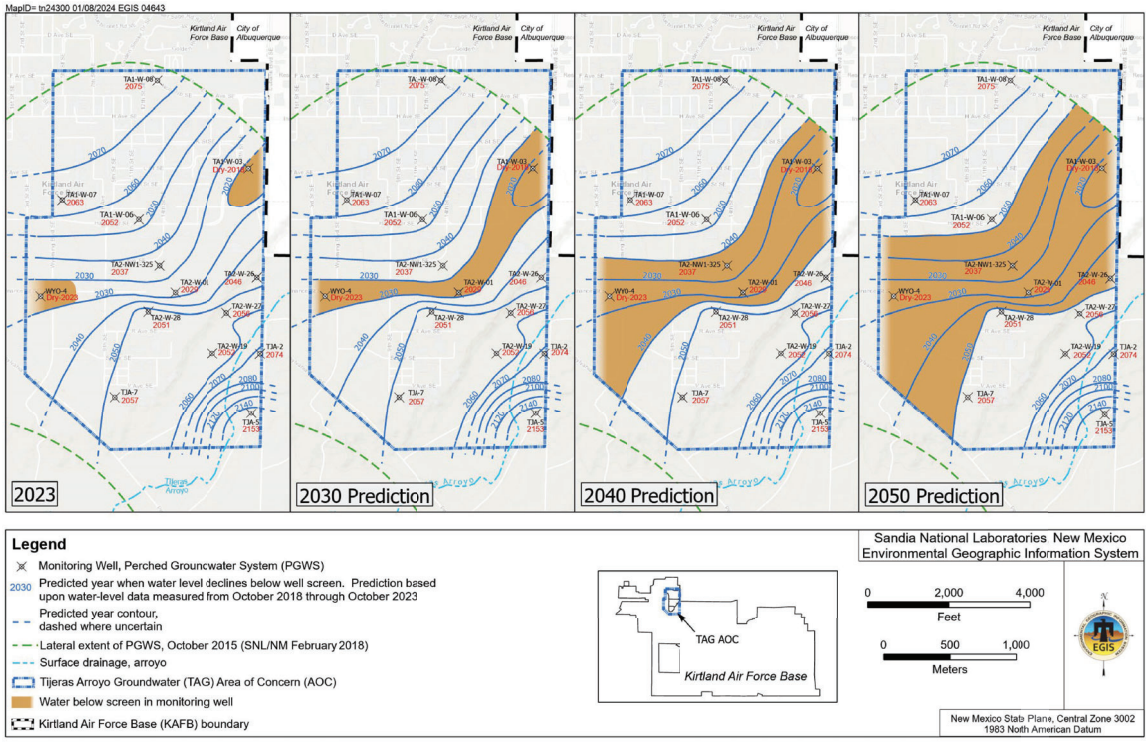
Tijeras Arroyo Groundwater Investigation

Site Description (concluded)

- Based on the water level trends, approximately 40 percent of the PGWS will be dry by 2050. Two wells are currently dry (the water levels have fallen below the screens). Three wells are predicted to be dry by 2030. Four wells will be dry by 2040. Five wells will be 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 the report in January 2023, selecting Monitored Natural Attenuation (MNA) as the final remedy for the TAG AOC.
- The NMED approved the *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 25 monitoring wells throughout the TAG AOC.
- Implementation of the final remedy began in January 2025. The remedy duration is estimated to be 30 years.
- For more information, please see the *Annual Groundwater Monitoring Report, Calendar Year 2023,* available at www.sandia.gov | Environmental Responsibility | Environmental Reports |

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