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Tijeras Arroyo Groundwater Discussion at the Water Protection Advisory Board, June 10, 2016

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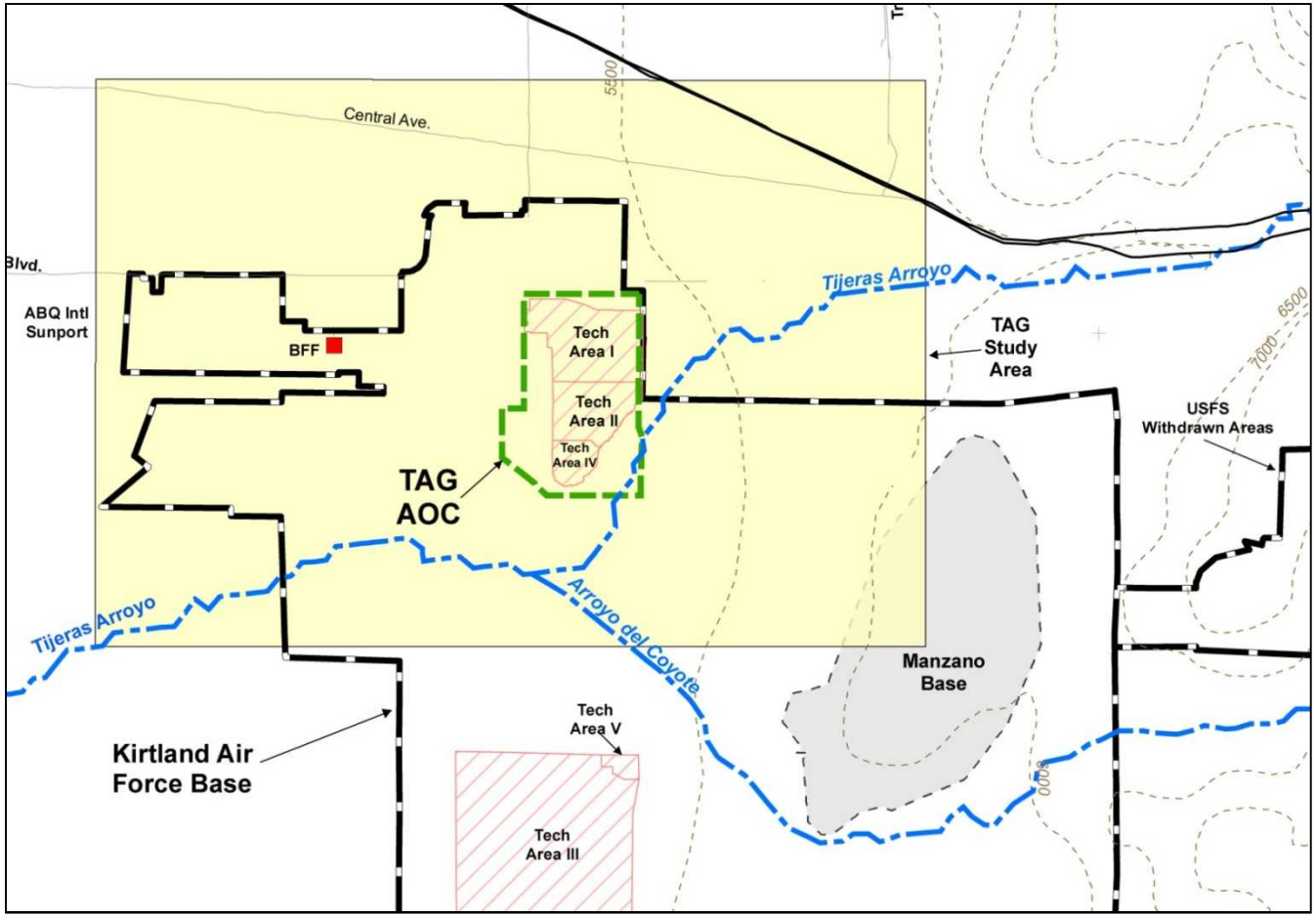
Overview of Sandia's Environmental Restoration Operations

- Sandia has completed Corrective Action at 303 of the 315 sites.
- 9 surface-soil sites remain in the corrective-action process
  - None have impacted groundwater.
- 3 groundwater Areas of Concern (AOCs) are:
  - Burn Site Groundwater AOC.
  - Technical Area V Groundwater AOC.
  - Tijeras Arroyo Groundwater (TAG) AOC

    This is the focus of today's discussion per WPAB's request.

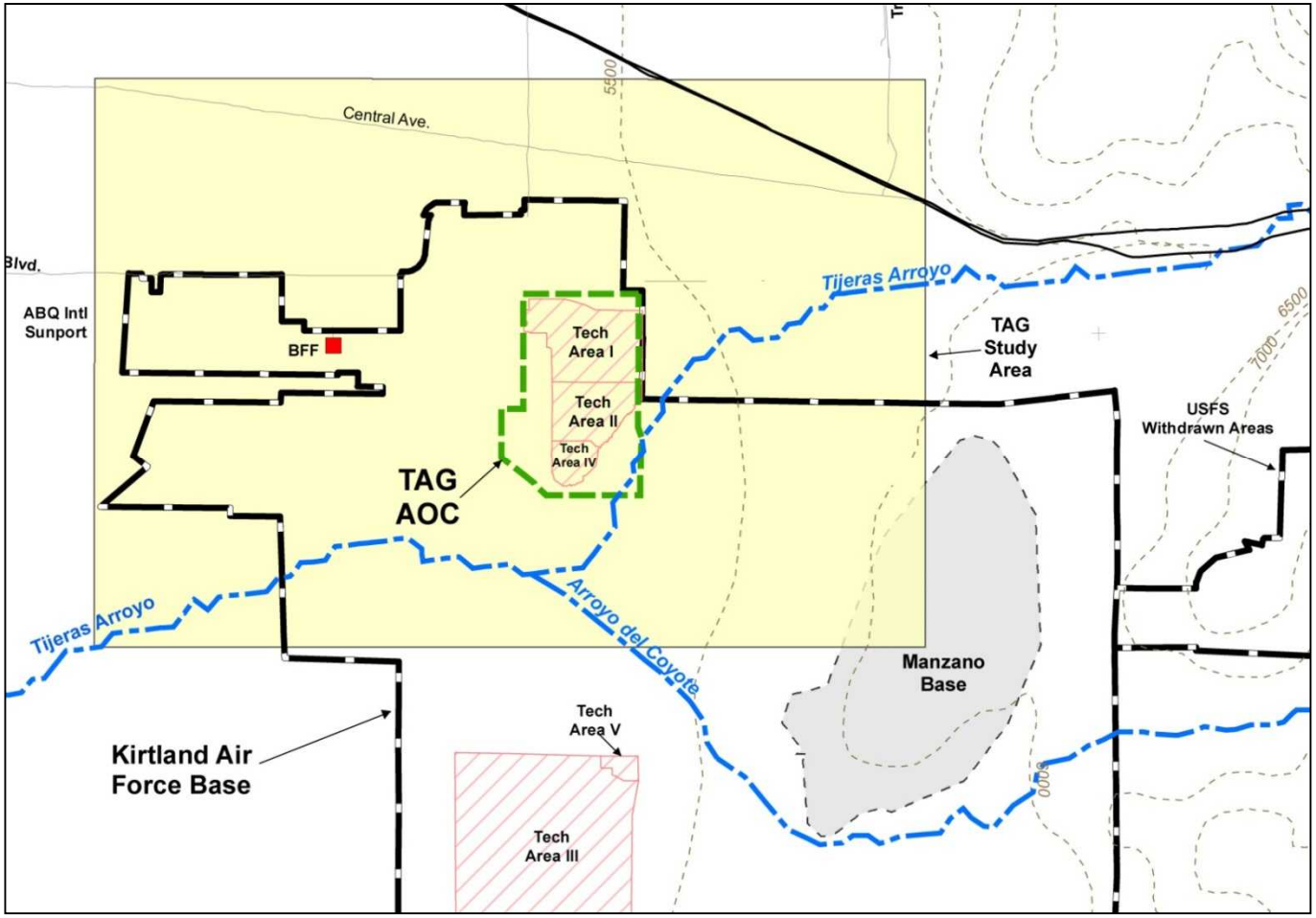
Location of Tijeras Arroyo Groundwater



Potential Release Sites in the Study Area

- KAFB disposed ~7.3 billion gallons of water
  - Most to former KAFB sewage impoundments (used 1966 - 1987)
  - Remainder to Tijeras Arroyo Golf Course
- KAFB Landfills (1 active and 3 closed)
- City Eubank landfill (operational between 1960–1973).
- City sewer-line interceptor along the Tijeras Arroyo
  - Drains approximately 20 percent of the Northeast Heights.
- City sewer lines had 3 catastrophic breaks (1994, 2003 & 2013)
  - West of TAG AOC in line with Louisiana Blvd.
  - Created significant ponding within arroyo.
- Sandia TAG sites (discussed below).

Sandia's
Tijeras Arroyo Groundwater AOC



TAG AOC Characteristics

- NMED identified the TAG AOC as covering 1.7 square miles (1,115 acres) in the northern part of KAFB.
  - The AOC is within the 40 square mile HPT Study Area.
- TAG AOC contains 3 technical areas (TA-I, TA-II, & TA-IV).
- Investigations were conducted at 46 surface-soil SWMUs.
- Two TAG sites are suspected of impacting groundwater:
  - Old acid waste line outfall discharged approximately 130,000 gpd from 1948 to 1974 with approx.1.3 billion gallons of dilute wastewater from photo-processing lab, foundry, machine shops, & light laboratories.
  - TA-II Septic System used from 1948 to 1992 to dispose small machine shop, laundry, shower, toilet wastewater.
- No ongoing releases to groundwater occur at Sandia.

Overview of Sandia's Environmental Restoration Operations

- Environmental Restoration (ER) Mission
  - Characterize and remediate sites where hazardous and/or radioactive materials were potentially released.
- Regulated by New Mexico Environment Department (NMED) – Hazardous Waste Bureau
  - April 2004 Compliance Order on Consent (the COoC).
- DOE/NNSA and Sandia Corporation maintain compliance with the COoC and other Federal & State requirements.
- NMED has 'corrective action' regulatory authority for TAG.

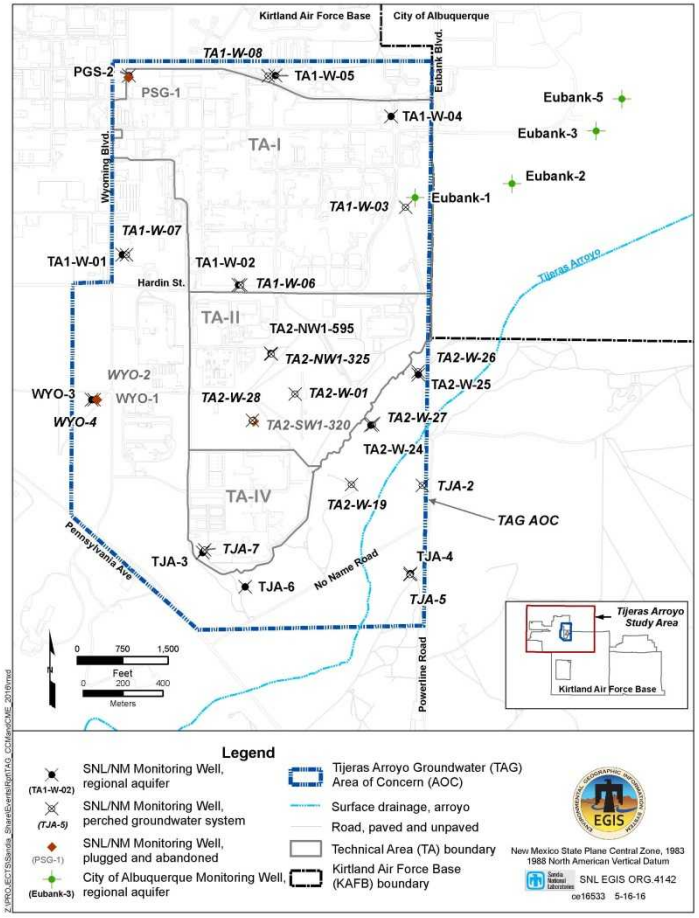
TAG AOC Timeline

- Since 1992, Sandia has installed 31 groundwater monitoring wells and 7 soil-vapor monitoring wells.
- NMED's High Performing Team meetings started in October 2000.
  - Contributors were Sandia, DOE-SFO, KAFB, and COA-EHD.
  - Developed a *Work Plan* for Sandia to implement.
- *Corrective Measures Evaluation* (CME) report submitted to NMED August 2005.
- *Investigation Report "CCM"* submitted to NMED November 2005.
  - NMED approved February 2010.
- A *Current Conceptual Model* report will be submitted to NMED December 2016.
- Updated *Corrective Measures Evaluation* (CME) Report will be submitted to NMED December 2016.

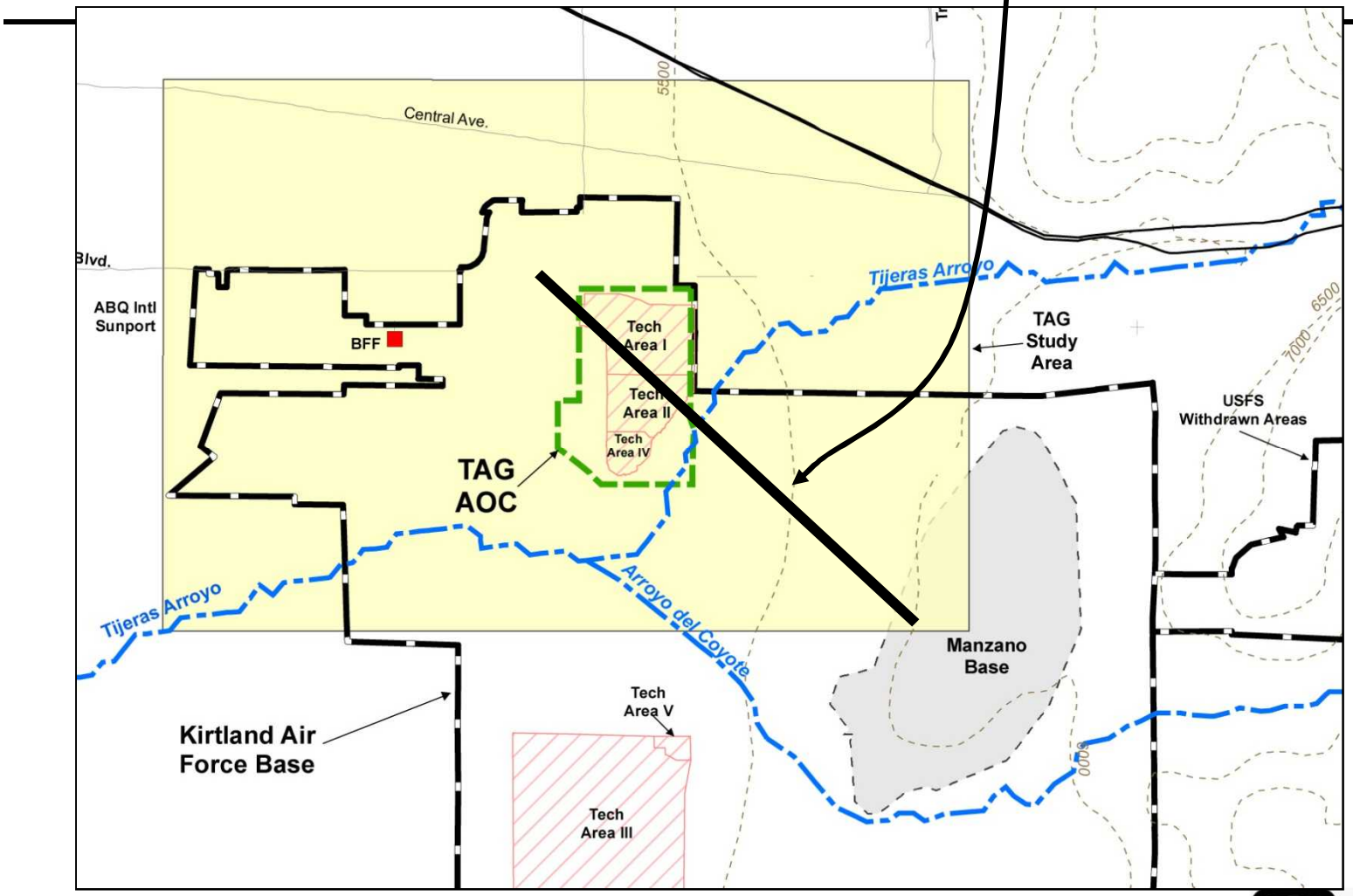
Extensive Groundwater Studies

- In the vicinity surrounding the AOC, water levels are available for 70 KAFB, 4 ABCWUA, and 26 SNL monitoring wells.
- Sandia uses 100 monitoring wells to map the potentiometric surfaces.
- Hydrogeologic setting for Sandia's AOC is thoroughly characterized.
- Sandia collects a variety of analytical data (VOCs, SVOCs, metals, radionuclides, nitrate, high explosives, perchlorate, general geochemistry, and stable isotopes).
- Sandia also uses slug tests, down-hole geophysical logging, surface geophysics, historical aerial photography, and surface mapping data.
- Preparation of the new CCM and CME reports will utilize findings from 30 monitoring wells that KAFB has installed since February 2013 for their nitrate abatement study.

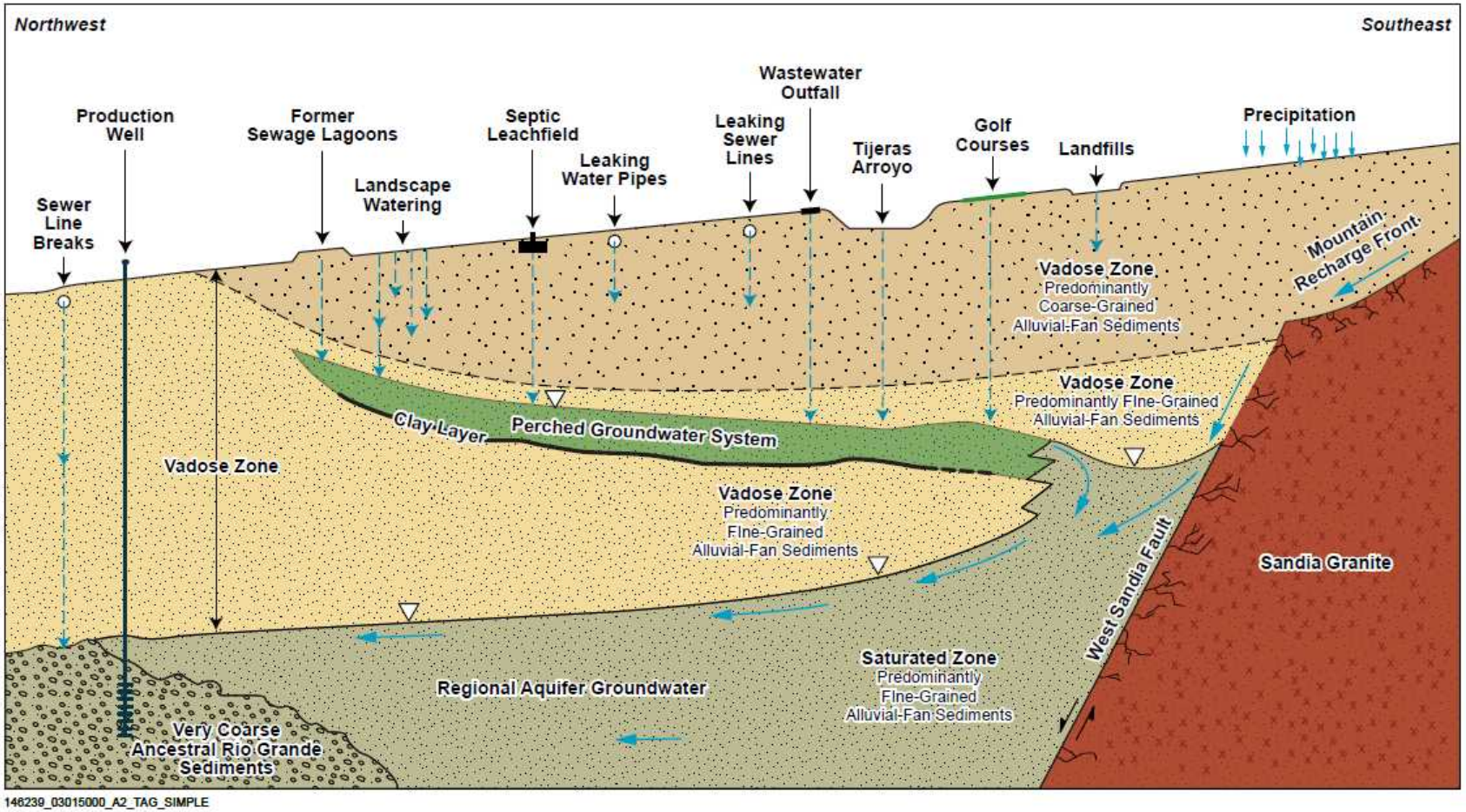
Groundwater Monitoring Wells in the AOC



Location of Cross-Section for TAG

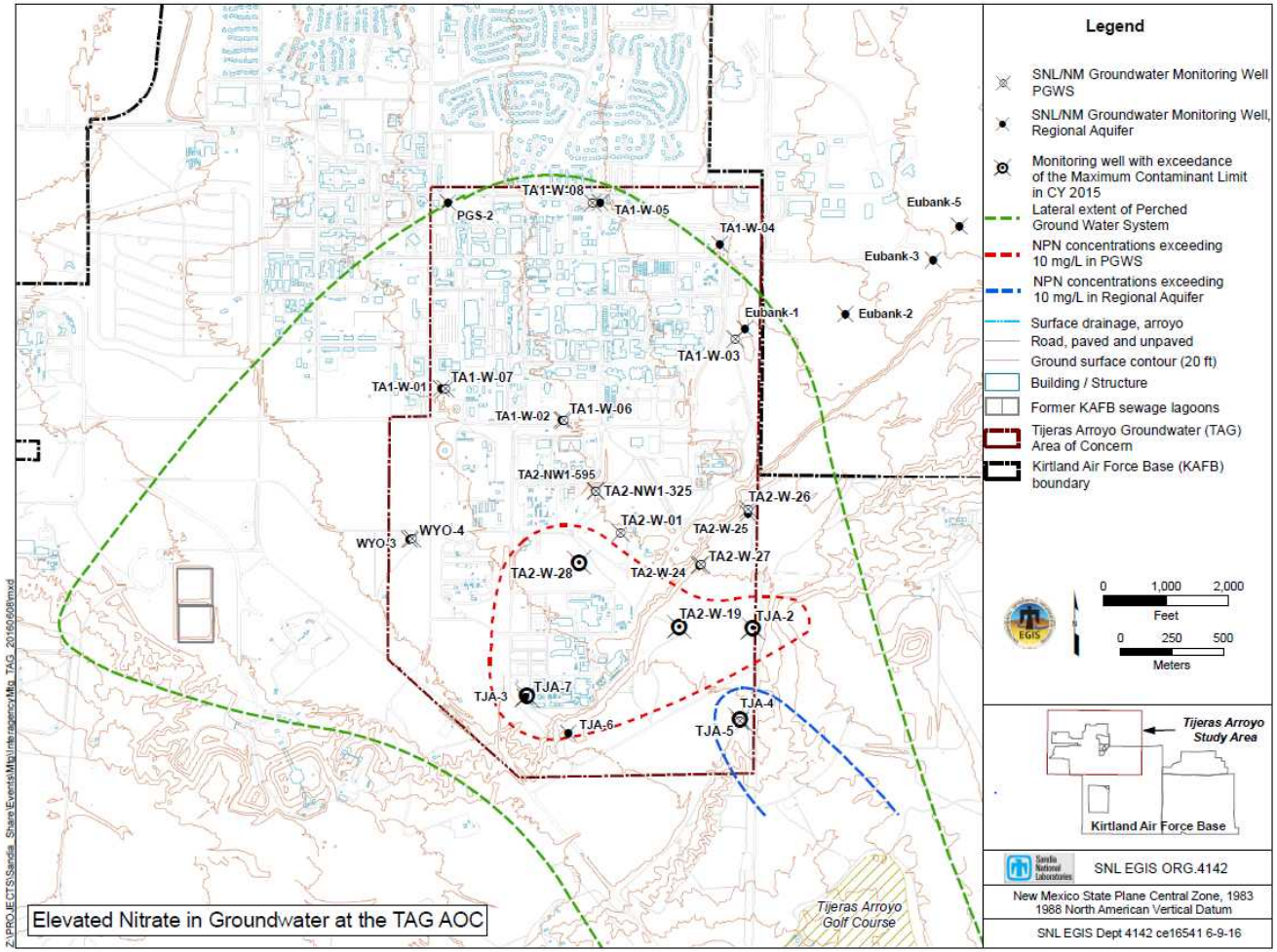


Cross-Section of Tijeras Arroyo Groundwater AOC



Conceptual Site Model for TAG Area Showing Principal Recharge and Discharge Features, View to Northeast, Not to Scale.

Nitrate Exceeding the MCL, October 2015



Most Recent Analyses, October 2015

	Nitrate maximum, mg/L	TCE maximum, µg/L
PGWS	27.8 mg/L	3.82 µg/L
Regional Aquifer	2.7 mg/L maximum Except the extreme SE corner. The 33.0 mg/L value is attributed to the nearby golf course.	1.67 µg/L

Nitrate (NPN) MCL is 10 mg/L.
TCE MCL is 5 ug/L.

No Imminent Threat to Receptor Wells

Perched Groundwater System:

- No wells are used for potable purposes.
- KAFB operates 3 remediation wells at the Tijeras Arroyo Golf Course, pumping rates varying from 5 to 10 gpm.

Regional Aquifer:

- KAFB currently operates 3 potable water-supply wells: KAFB-4, KAFB-14, and KAFB-20.
- ABCWUA operates the Ridgecrest well field north of KAFB.

Reporting Process

- Ongoing groundwater analyses and updated conceptual models are in *Annual Groundwater Monitoring Reports*. http://www.sandia.gov/news/publications/environmental_reports/index.html
- Semiannual DOE/DoD public meetings.
- A special NMED public meeting was held April 27, 2016. http://www.nmenv.state.nm.us/HWB/snlperm.html
- NMED Oversight Bureau collects duplicate samples.
  - Independent laboratory results at the same website.
- Sandia ER documents are available at the same website.
- On-line collection of ER documents available at UNM's Lobo Vault

  http://repository.unm.edu/handle/1928/10963.

Summary

1. Sandia TAG AOC is 1.7 sq. mi. within the larger HPT study area.
2. The TAG AOC is adequately characterized.
3. The perched system has a limited lateral extent and consists of a thin saturated zone.
4. The perched groundwater velocity is low (4-10 ft./yr).
5. Nitrates are near the MCL & the extent of the plume is 0.35 sq. mi.
6. There is no imminent threat to any drinking-water wells.
7. CCM will be submitted to NMED in December 2016.
8. CME Report will be submitted to NMED in December 2016.