

Sandia National Laboratories' Environmental Restoration & Groundwater Protection Programs

Presented to:
Albuquerque Bernalillo County
Water Utility Authority

Presented by:
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Sandia National Laboratories



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Overview of Sandia Environmental Restoration (ER) Operations

- Mission: identify, characterize & remediate sites where hazardous &/or radioactive materials have been released
- Program was initiated in 1989
- Scope: 314 legacy release sites or ER sites
- Successfully closed 279 of 314 ER sites through the New Mexico Environment Department (NMED) regulatory process
- ER Operations addressing the remaining 35 ER sites
- DOE and Sandia Corporation are in compliance with the SNL Compliance Order on Consent as well as Federal and State requirements



Remaining 35 ER Sites

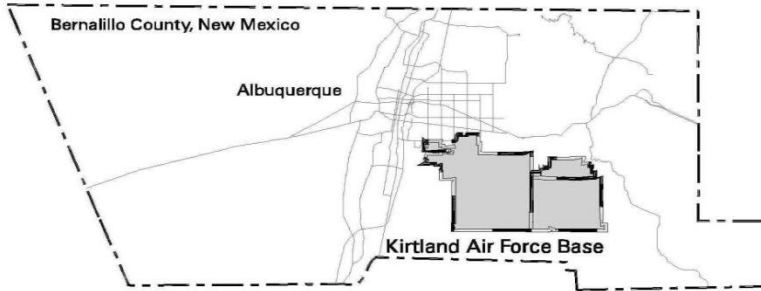
- 23 sites in “Corrective Action Complete” regulatory process
- 3 active mission sites with deferred corrective action
- 1 Mixed Waste Landfill
- 5 soil sites undergoing groundwater (GW) investigations
- 3 GW sites: Burn Site, Tijeras Arroyo & TA-V



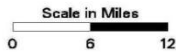
23 ER Sites in Corrective Action Complete Regulatory Process

- Old septic systems, drain fields & surface testing areas
- Characterization and remediation has been completed
- Submitted to NMED for approval of Corrective Action Complete
 - Public comment /review period ended November 2012
 - Any unresolved comments will be included within SNL RCRA Permit hearing, if one is scheduled
- 3 active mission test facilities where corrective action is planned after the facilities are no longer operational

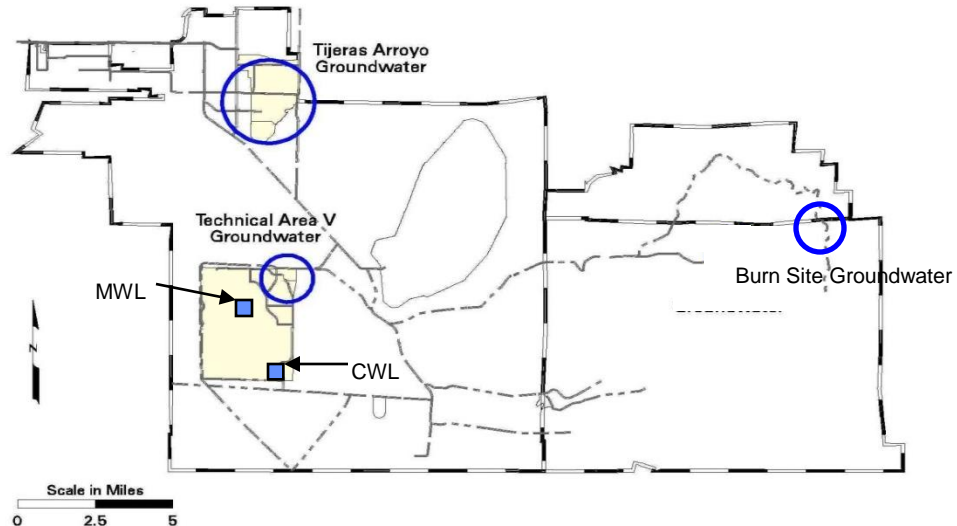
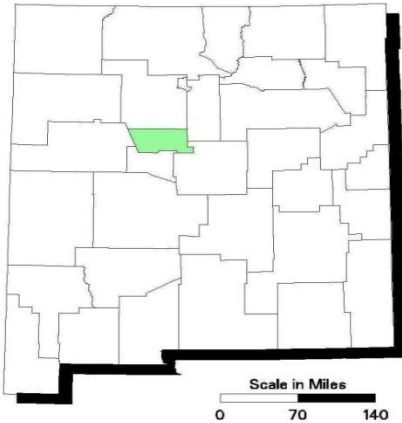
Location of SNL Groundwater Projects



Sandia National Laboratories
New Mexico
Groundwater Investigations



Bernalillo County, New Mexico





General Groundwater Conditions at SNL

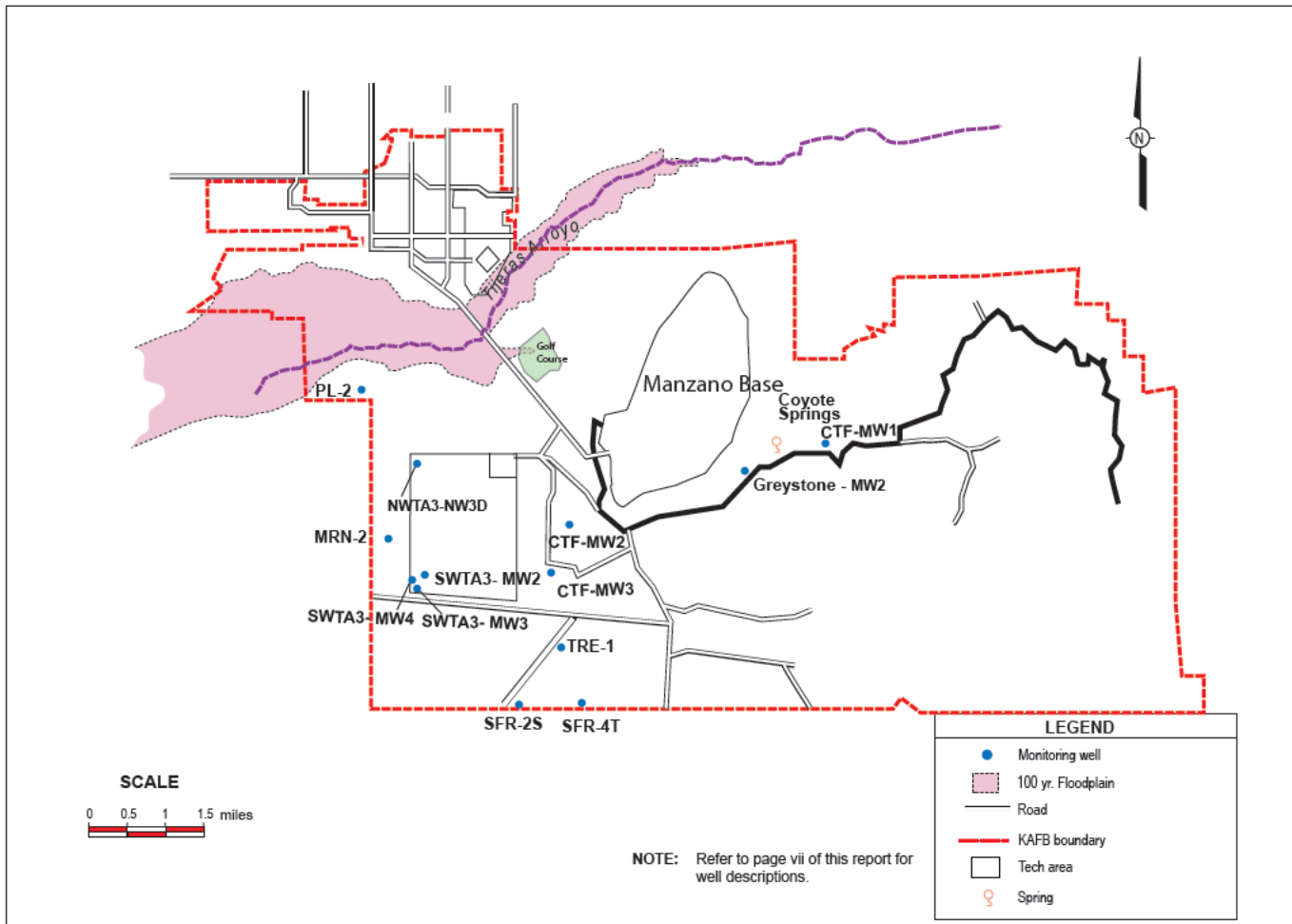
- Groundwater in two regimes, basin-fill aquifer & bedrock aquifer
- Depths to groundwater is 100 ft (bedrock) to 550 ft (basin fill)
- Perched groundwater system near Tijeras Arroyo (~300 ft deep)
- Natural flow from the mountains to the Rio Grande
- Water-supply wells are located in the northern part of KAFB
- Current GW flow NW toward KAFB & ABCWUA production wells
- Water table falling 1 to 2 ft/yr due to pumping, except for wells in the far north that are currently showing an increase
- Minimal recharge from rain--except in mountains & along channels
- Slow flow rates (few ft/yr to 10's of ft/yr), except on the west side of KAFB (100's ft/yr)



Groundwater Protection Program

- Protect GW resources at SNL & surrounding area.
- Determine impact, if any, of operations on quality/quantity of GW
- Establish baseline water quality and GW flow information
- Provide stakeholders an update of GW data for SNL investigations through the publication of an *Annual Groundwater Monitoring Report*

Groundwater Protection Program





Chemical Waste Landfill

- 1.9 acre landfill, operational from 1962 to 1981
- TCE discovered (1990) in GW prompted remediation via soil-vapor extraction and excavation of contaminated soils & debris
- Regulated under a Post-Closure Care Permit
- 5 soil-vapor monitoring wells sampled annually
- 4 GW monitoring wells sampled semiannually, no analytes above regulatory standards

← N



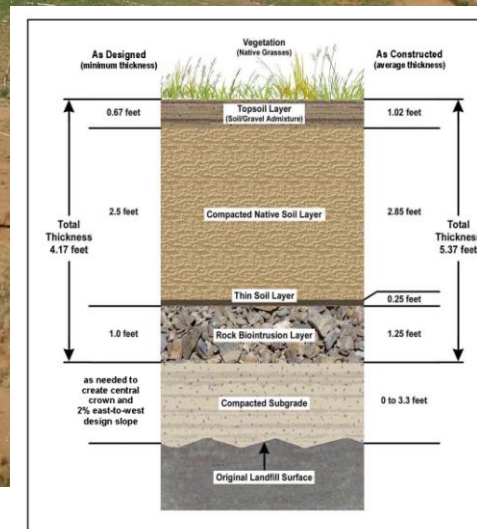
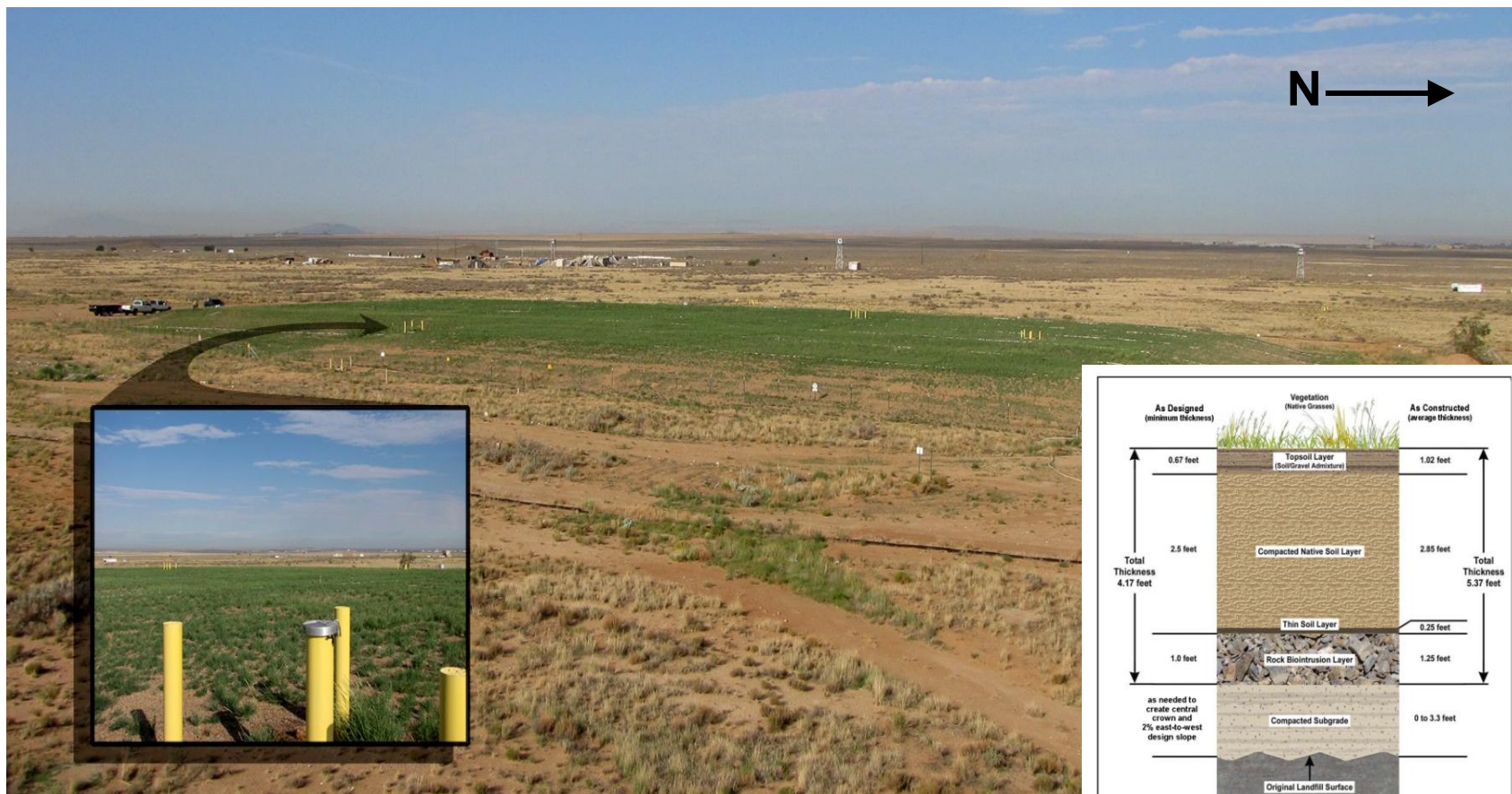


Mixed Waste Landfill

- 2.6 acre landfill, operational 1959 to 1988
- GW monitoring & field investigations began 1990
- Public Hearing on remedy in 2004
- NMED issued Final Order in 2005; selecting evapotranspirative cover w/ bio-intrusion barrier as remedy (constructed in 2009)
- 7 groundwater monitoring wells sampled annually
- No analytes above regulatory standards
- Long Term Maintenance & Monitoring undergoing public review (comment period to ~Nov. 2012)



Mixed Waste Landfill



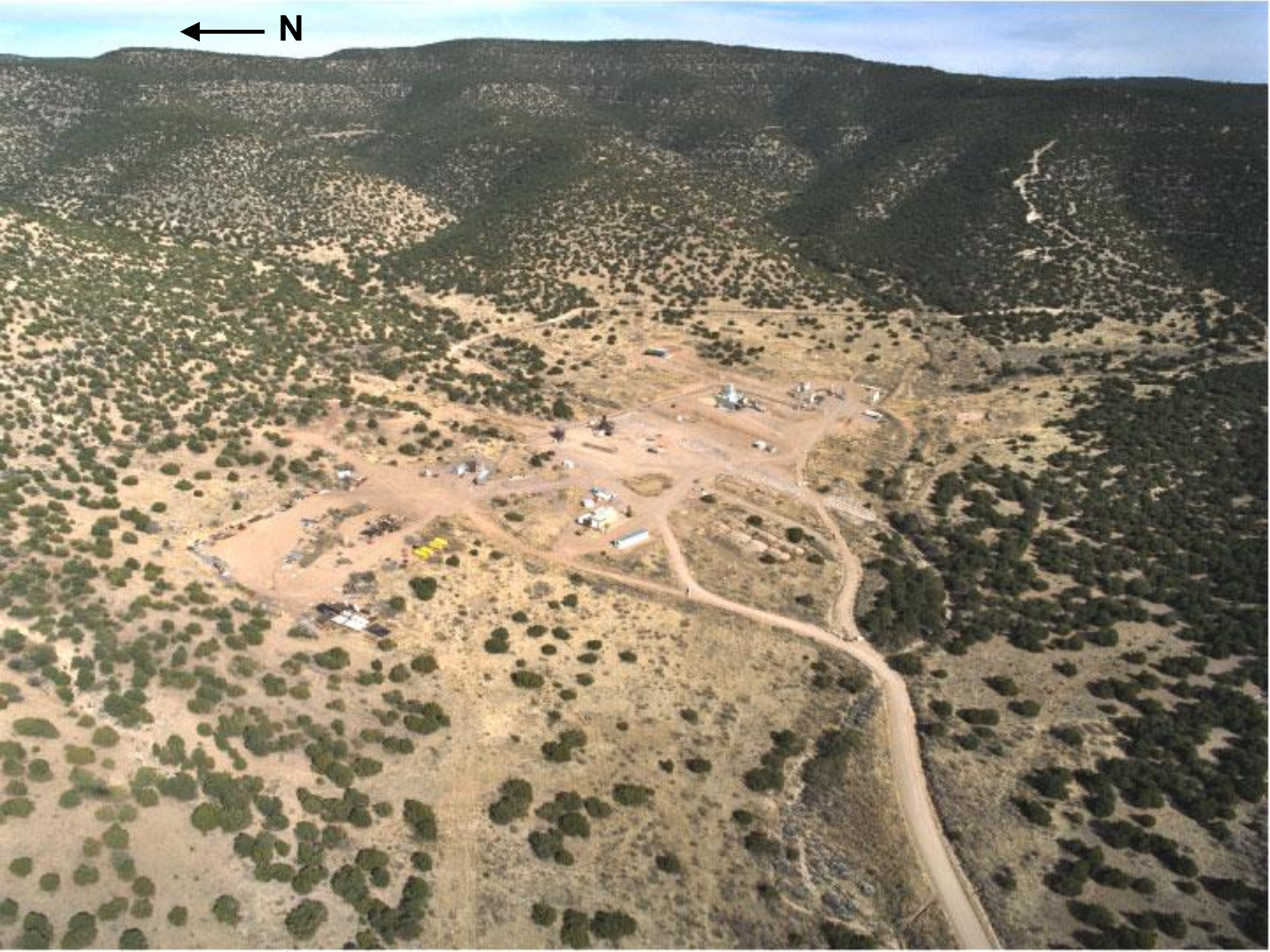


Burn Site Groundwater

- GW monitored since 1996
- GW occurs at ~100 to 200 ft deep in fractured bedrock
- Currently monitoring 10 wells
- Nitrates (6 wells) and perchlorate (1 well)
 - Nitrate: 0 to 37 ppm (std. = 10 ppm)
 - Perchlorate: 0 to 9 ppb (no std. established)
- Small plume 9 mi. away from drinking-water supplies
- Tentative source—suspected wide-spread non-point source from use of high explosives, with a possible contribution from natural nitrate sources

- Corrective Measures Evaluation Report: FY13

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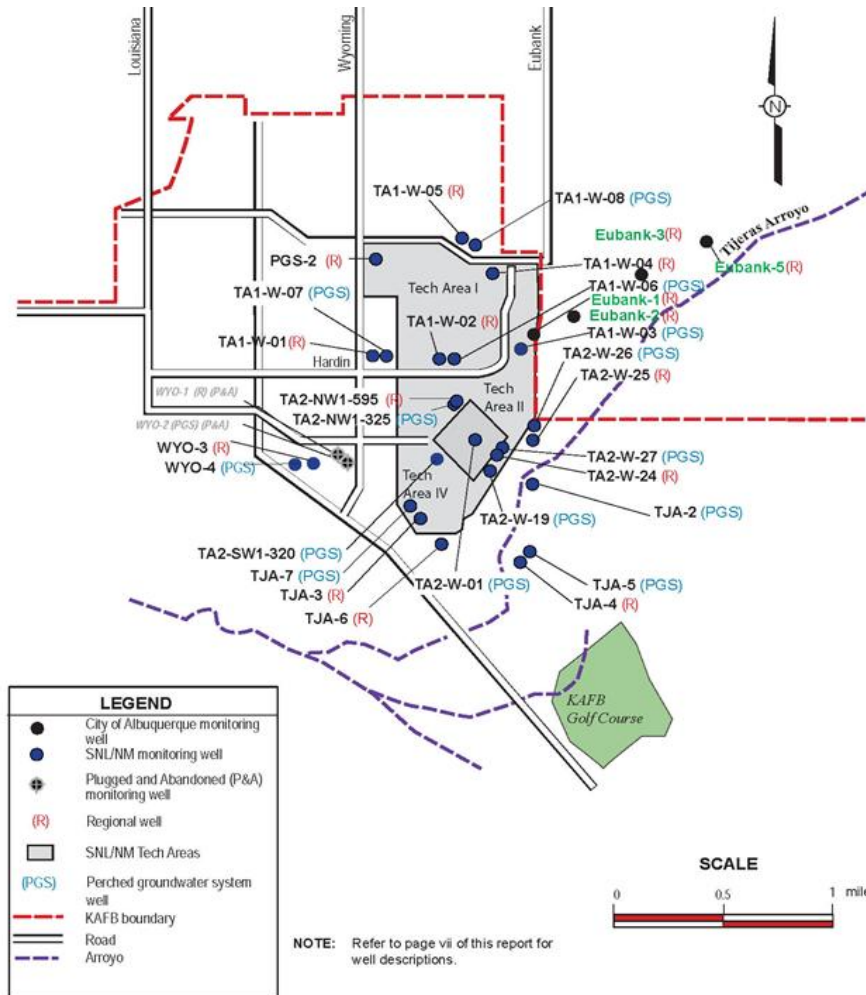


Tijeras Arroyo Groundwater

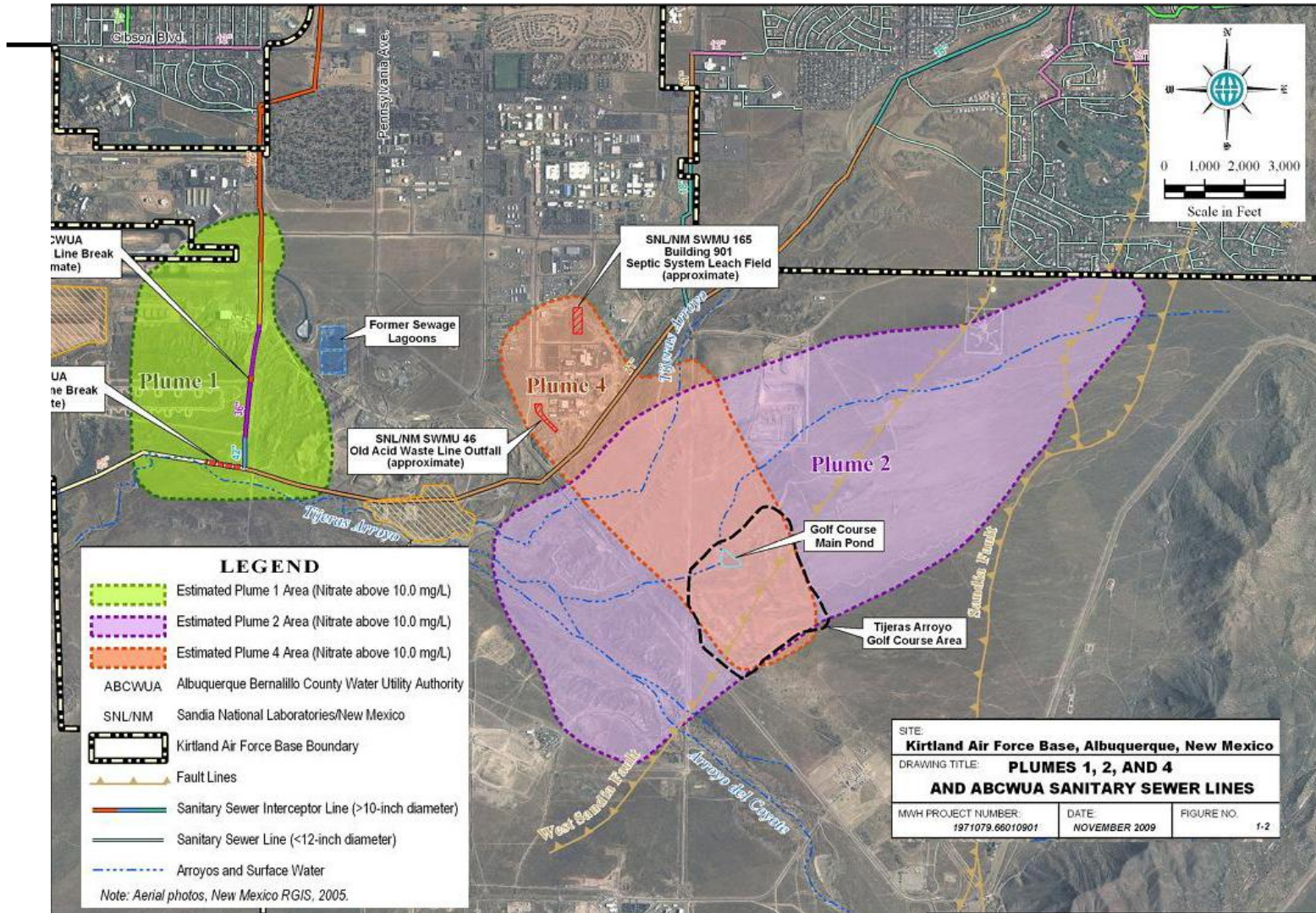
- GW monitored since 1992
- GW occurs at ~300 ft in a perched aquifer & 500 ft in the regional aquifer in unconsolidated sediments
- Large area--covers forty mi², DOE/SNL responsible for less than 2 mi² of the total & limited to the perched aquifer (no production wells in perched system)
- Contaminated with nitrate (5 wells) & TCE (1 well)
 - Nitrate: 0 to 33 ppm (std. = 10 ppm)
 - TCE: 0 to 9 ppb (std. = 5 ppb)
- Suspected sources include former & active waste-water systems owned or operated by DOE/SNL, KAFB and ABCWUA

- Corrective Measures Evaluation Report: FY14

Tijeras Arroyo Groundwater Well Locations



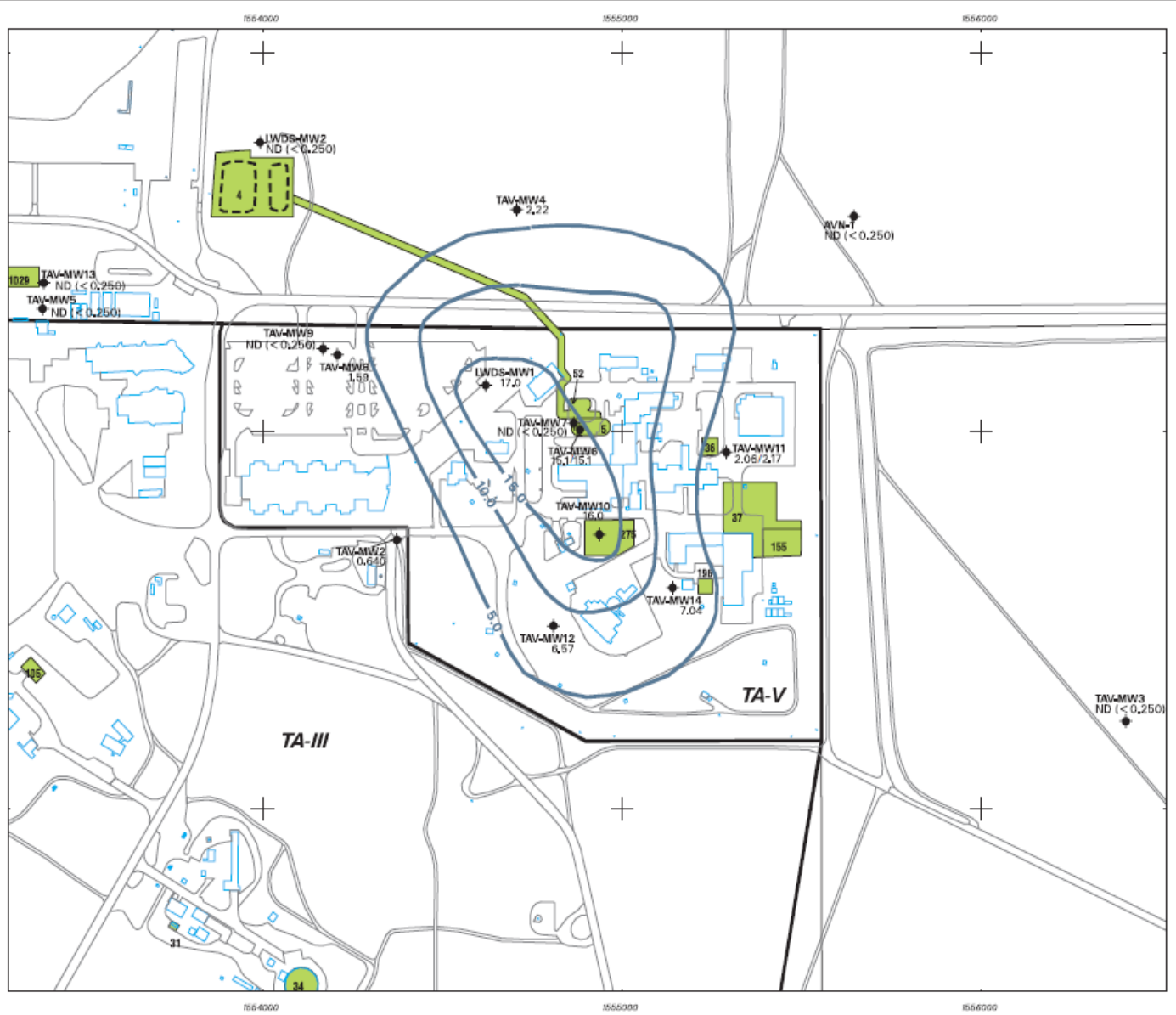
Boundary of Nitrate Plume 4 in Perched Aquifer (orange), Tijeras Arroyo GW above 10 ppm





Technical Area V Groundwater

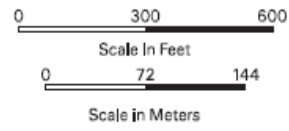
- GW monitored since 1992
- GW occurs ~500 ft deep in unconsolidated sediments
- Contaminated with nitrate & TCE
 - Nitrate: 0 to 14 ppm (std. = 10 ppm)
 - TCE: 0 to 19 ppb (std = 5 ppb)
- Suspected sources include high-volume waste-water disposal systems
- Small plume 4 mi. away from drinking-water supplies
- 16 groundwater monitoring wells sampled four times/yr
- 3 soil-vapor monitoring wells sampled four times/yr
 - low-level detections of TCE in vapor phase
- Corrective Measures Evaluation Report: FY14



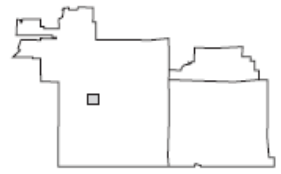
Legend

- Monitoring well, with November 2011 Trichloroethene concentrations ($\mu\text{g/L}$)
- Concentration contour ($\mu\text{g/L}$)
- Road, paved and unpaved
- Impoundment boundary
- Solid waste management unit (SWMU)
- Tech Area boundary
- Building

Notes:
 1) Wells TAV-MW7, TAV-MW9 and TAV-MW13 are completed below the water table, and were not used for contouring.
 2) Higher concentration from duplicate sample analytical results used for contouring.
 3) ND = not detected; method detection limit indicated in parentheses.



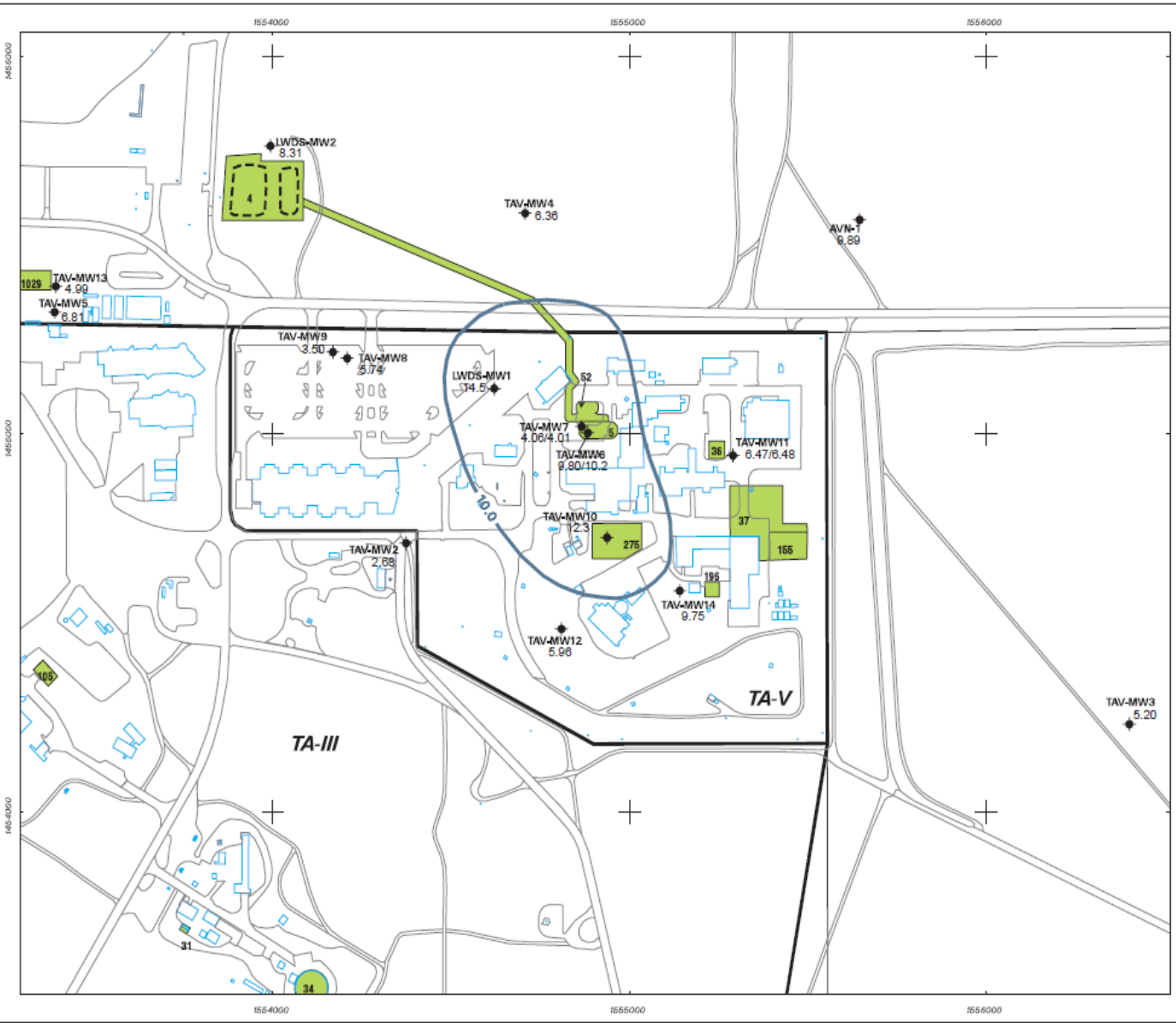
Transverse Mercator Projection, New Mexico State Plane Coordinate System, Central Zone, 1983 North American Horizontal Datum, 1988 North American Vertical Datum



SNL GIS ORG. 4142 13600 MAPID=120049

Sandia National Laboratories, New Mexico
 Environmental Geographic Information System

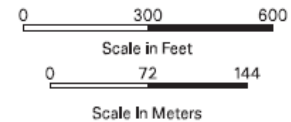
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Legend

- Monitoring well, with November 2011 Nitrate plus Nitrite concentrations (mg/L)
- Concentration contour (mg/L)
- Road, paved and unpaved
- Impoundment boundary
- Solid waste management unit (SWMU)
- Tech Area boundary
- Building

Notes:
 1) Wells TAV-MW7, TAV-MW9 and TAV-MW13 are completed below the water table, and were not used for contouring.
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Transverse Mercator Projection, New Mexico State Plane Coordinate System, Central Zone, 1983 North American Horizontal Datum, 1988 North American Vertical Datum

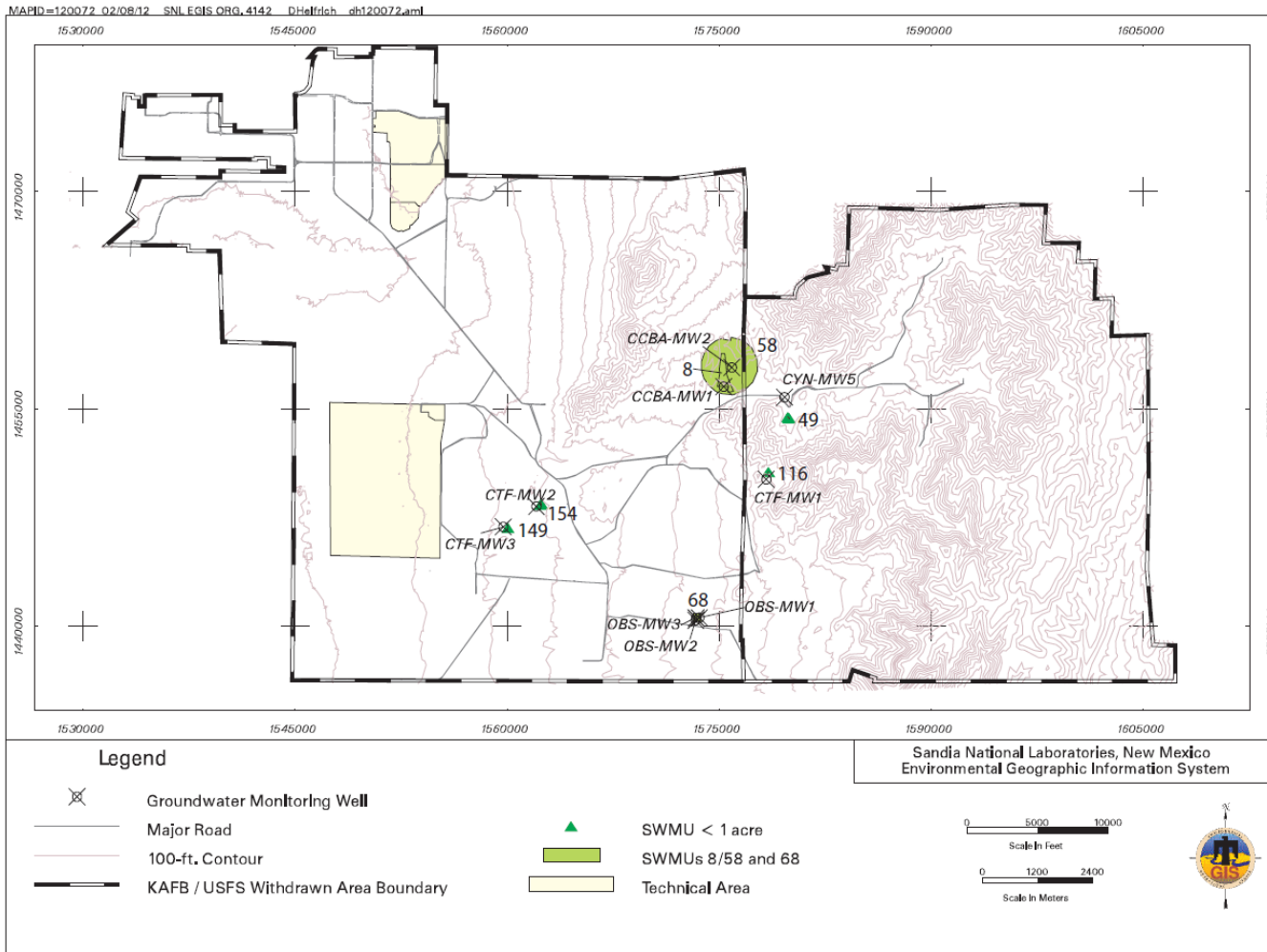


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Sandia National Laboratories, New Mexico
 Environmental Geographic Information System

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Miscellaneous Solid Waste Management Units





Miscellaneous Solid Waste Management Units

- No GW contamination detected above regulatory standards, except as noted
- **SWMU 8 & 58**—Explosives test area, two wells
 - Fluoride above std in 1 well (naturally occurring)
- **SWMU 49**—Septic system drain field, 1 well
- **SWMU 68**—Former burn site, 3 wells
- **SWMU 116**—Septic system drain field, 1 well
- **SWMU 149**—Septic system drain field, 1 well
- **SWMU 154**—Septic system drain field, 1 well
 - Trace (<1 ppb) RDX (no std.)
 - Arsenic up to 0.0774 ppm (std. = 0.01 ppm)
- **Expected Corrective Action Complete Proposal: FY14**



Key Points - Groundwater

- Contamination levels are typically low, below or just above regulatory standards
- Contaminants most commonly nitrate & TCE
- Sites are well characterized and not a threat to the Albuquerque/Bernalillo Co. water supply wells
- Groundwater Protection Program and ER Operations will continue to characterize & monitor GW per requirements



Programmatic Key Points

- SNL's ER Operations successfully investigated & closed 279 of 314 legacy sites through the NMED regulatory process
- The DOE and Sandia Corporation are in compliance with the SNL Compliance Order on Consent as well as Federal and State requirements
- The DOE/EM plans to fully fund SNL's ER Program in FY13
- Restoration of remaining legacy sites is planned for completion by 2020



Additional Information

- **For additional information please contact:**

**Ms. Tami Moore, DOE Sandia Site Office
Director, Public Affairs
505-845-6036**

- **NMED Public Reading Room:**

<http://www.nmenv.state.nm.us/HWB/snlperm.html>