Technical Area-V Groundwater Area of Concern
presented to the Water Protection Advisory Board

August 12, 2016

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Sandia National Laboratories

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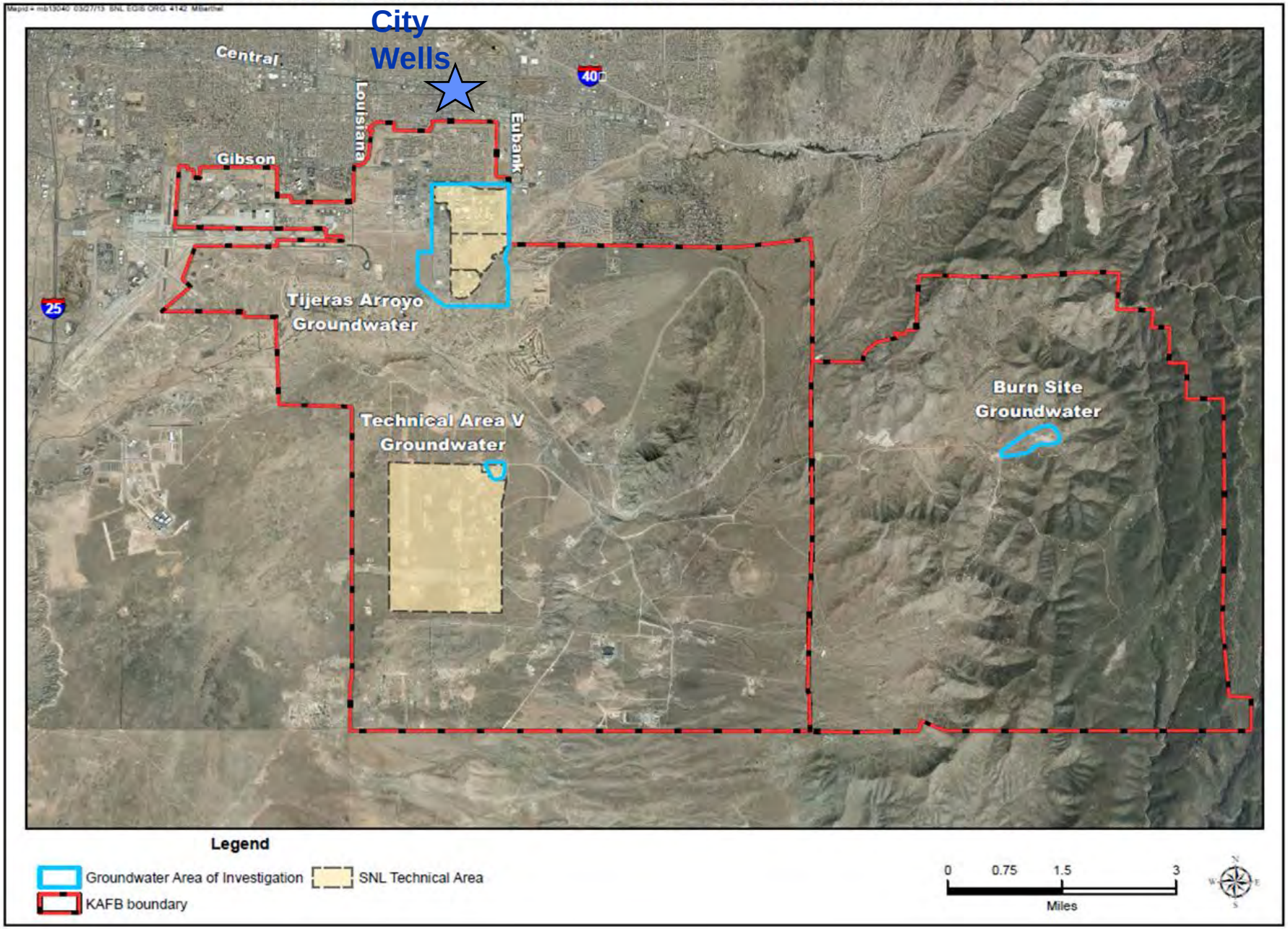
Sandia National Laboratories, New Mexico - Groundwater Areas of Concern

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Sources of Contamination at TA-V Groundwater AOC

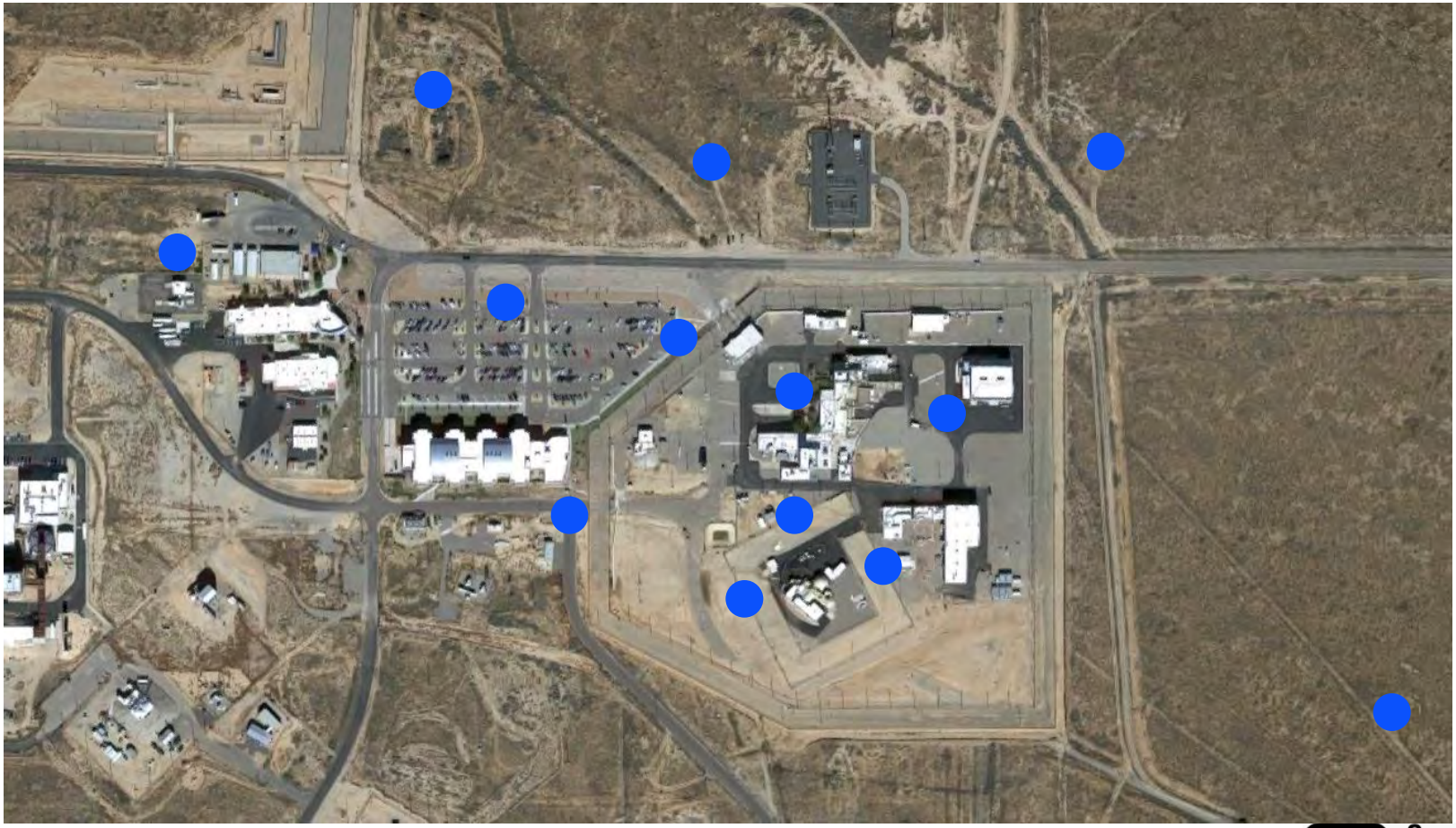
- **Technical Area-V is about 35 acres.**
- **Sources of contamination are wastewater discharges prior to 1992.**

Discharge Site that Impacted Groundwater	Date of Discharge	Estimated Volume	Wastewater
Liquid Waste Disposal System (LWDS) Drain Field	1962 – 1967 (5 years)	6.5 Million Gallons	Industrial waste water
TA-V Seepage Pits	1960s – 1992 (30 years)	30-50 Million Gallons	Septic waste and industrial waste water

Groundwater Monitoring at TA-V

- Groundwater is at 500 ft below ground surface in low permeability sediments.
- Extensively monitored since 1992.
- Current monitoring network has 16 wells including three deep wells.
- Quarterly monitoring for most wells.

Groundwater Monitoring at TA-V



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Regulating Groundwater Contamination at TA-V

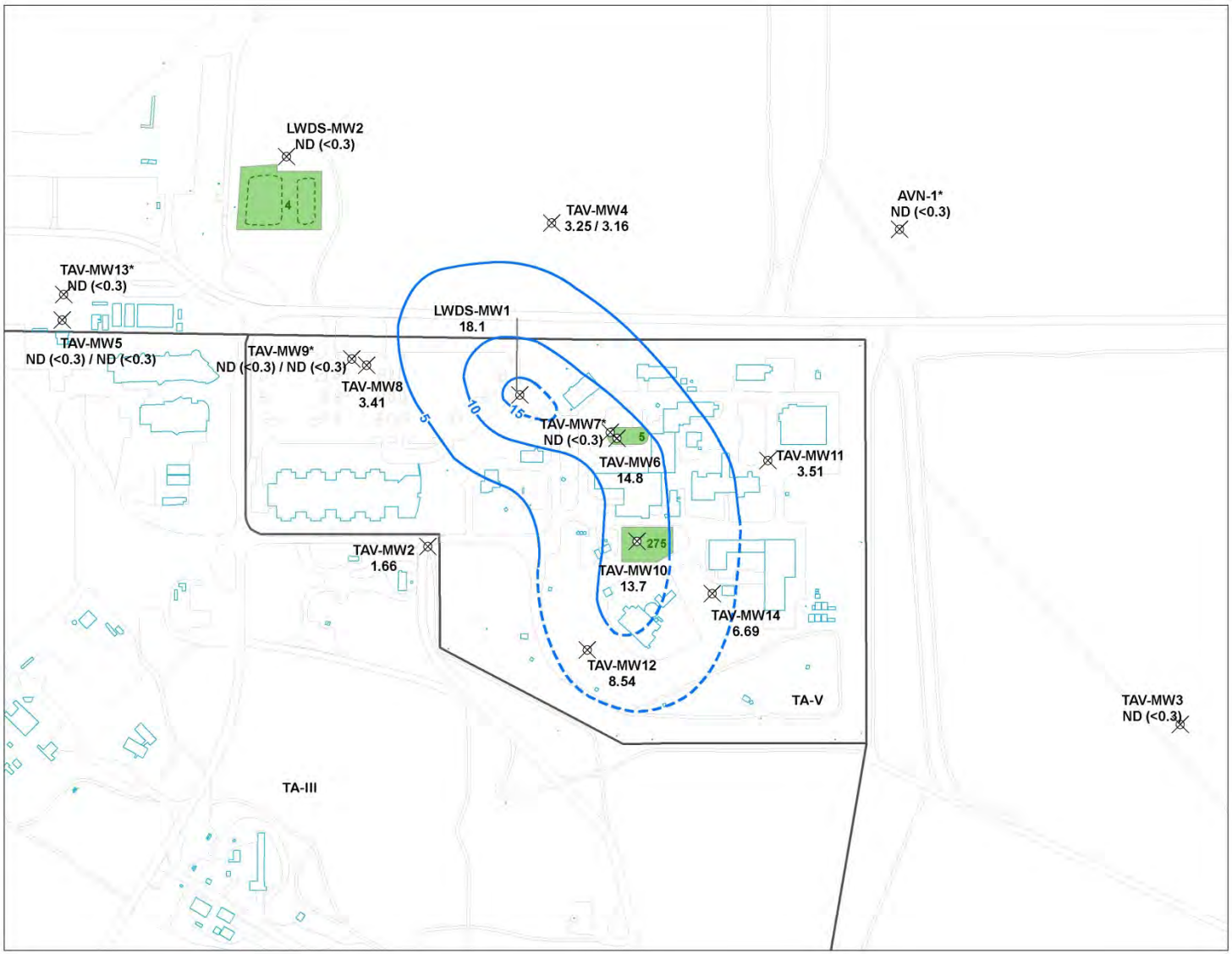
- **NMED Hazardous Waste Bureau regulates the site.**
- **Regulatory standards for groundwater contamination at Sandia are EPA Drinking Water Standards.**

Contaminant in Groundwater at TA-V	Maximum Concentration	EPA Drinking Water Standard
Nitrate	~ 15 mg/L	10 mg/L
Trichloroethene (TCE)	~ 20 µg/L	5 µg/L

- **There is no pure phase TCE in the groundwater at TA-V.**

TCE Distribution in Groundwater at TA-V

November/December 2015



Legend

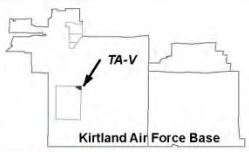
- 3.51 Monitoring well, with November/December 2015 Trichloroethene concentrations (µg/L)
- Isoconcentration contour (µg/L), dashed where inferred
- Road, paved and unpaved
- Building / structure
- Inactive impoundment boundary
- Solid Waste Management Unit (SWMU)
- Technical Area (TA) boundary

Notes:
* Wells AVN-1, TAV-MW7, TAV-MW9, and TAV-MW13 are completed below the water table, and were not contoured.

ND = not detected, method detection limit indicated in parentheses.

0 300 600
Feet

0 100 200
Meters



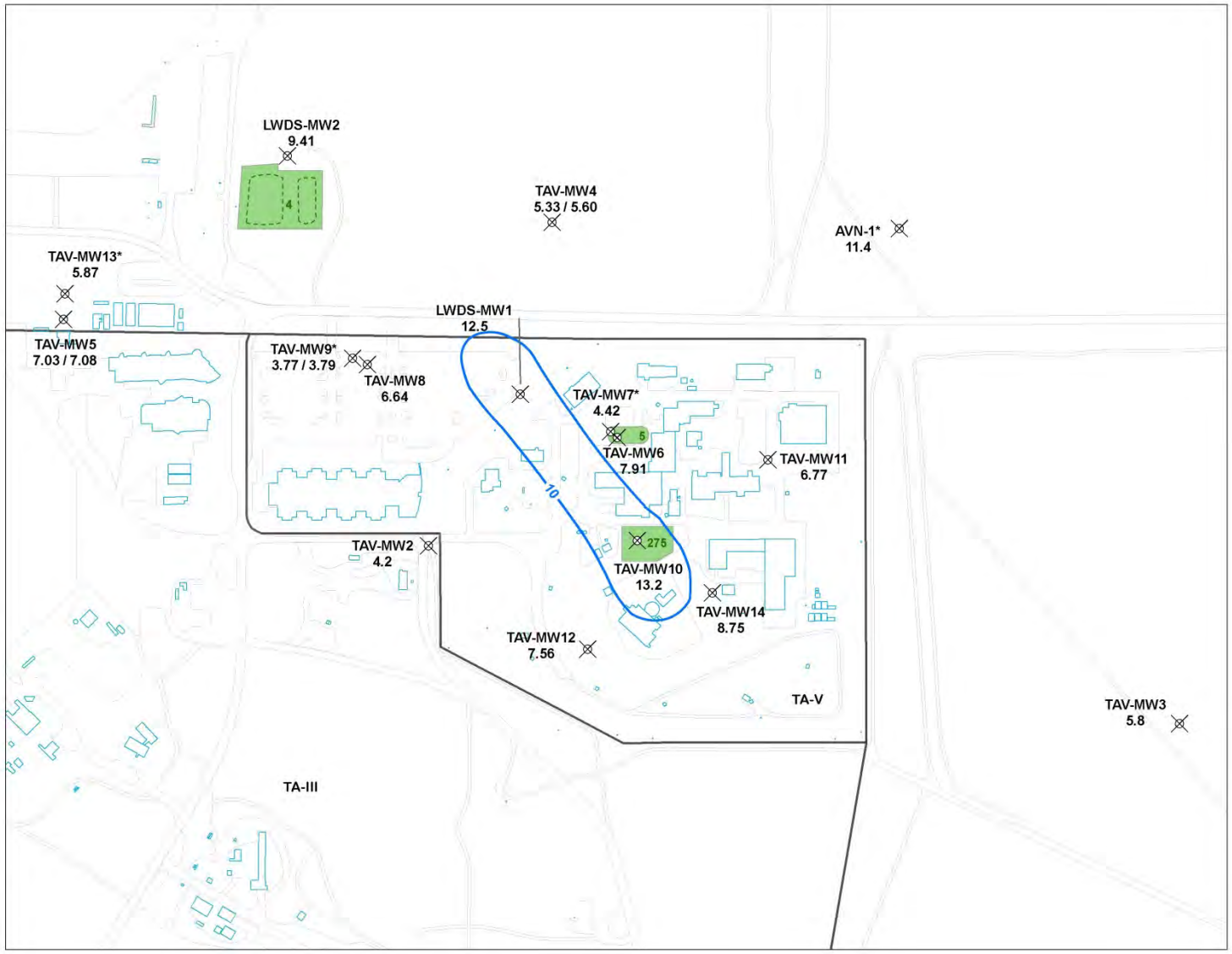
SNL EGIS ORG.4142

New Mexico State Plane Central Zone, 1983
1988 North American Vertical Datum

SNL, EGIS Dept 4142 ce16515 3-16-16 / mb13135

Nitrate Distribution in Groundwater at TA-V

November/December 2015



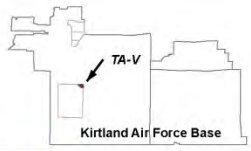
Legend

- 7.91 Monitoring well, with November/December 2015 Nitrate plus Nitrite concentrations (mg/L)
- Isoconcentration contour (mg/L)
- Road, paved and unpaved
- Building / structure
- Inactive impoundment boundary
- Solid Waste Management Unit (SWMU)
- Technical Area (TA) boundary

Note:
* Wells AVN-1, TAV-MW7, TAV-MW9, and TAV-MW13 are completed below the water table, and were not contoured.

0 300 600
Feet

0 100 200
Meters



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New Mexico State Plane Central Zone, 1983
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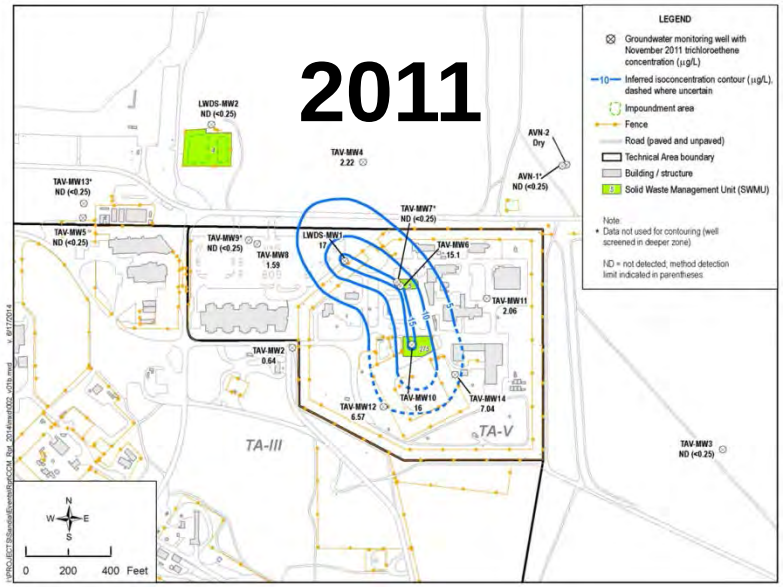
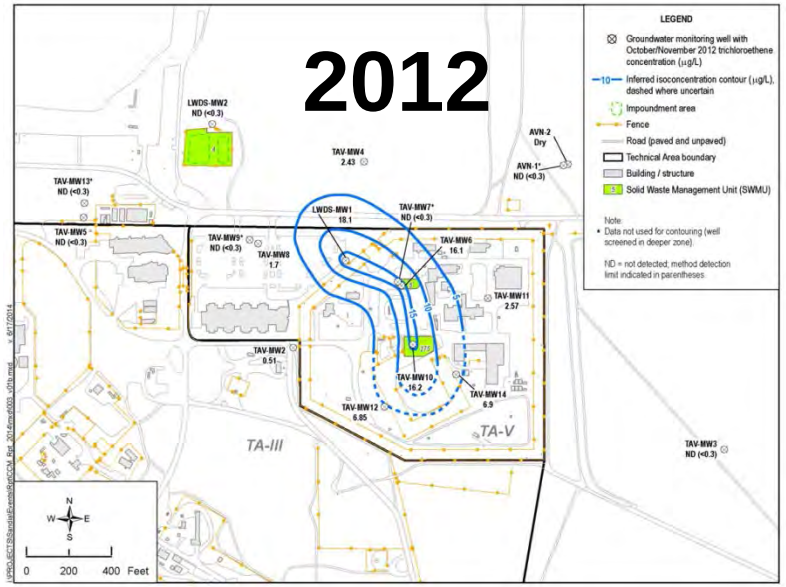
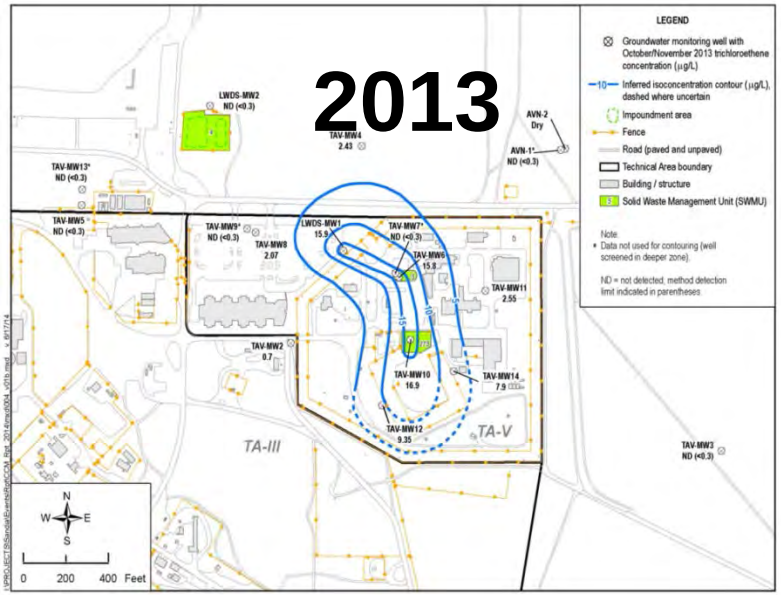
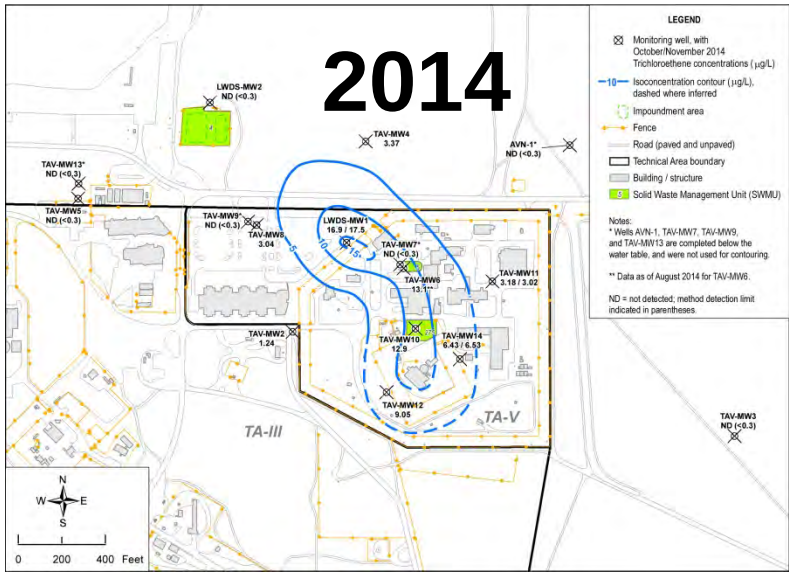
SNL, EGIS Dept 4142 ce16516 3-16-16 / mb13135

TCE Distribution in Groundwater 2011 - 2014

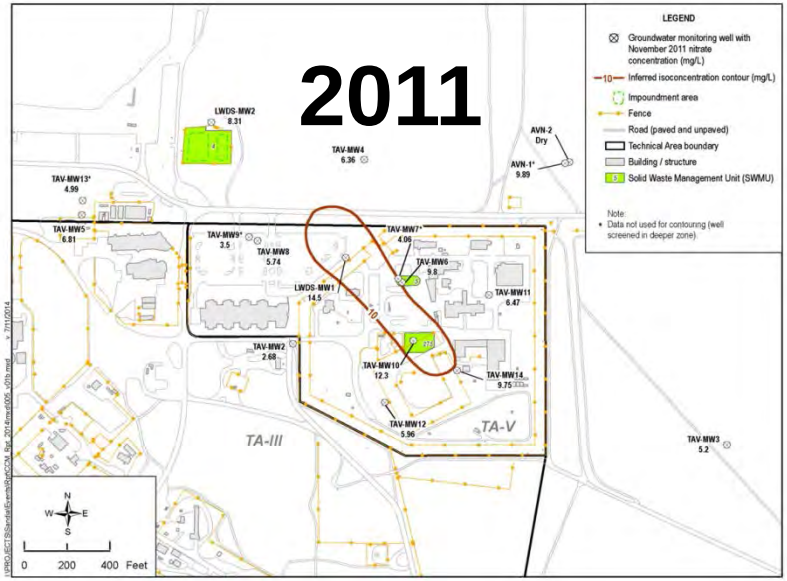


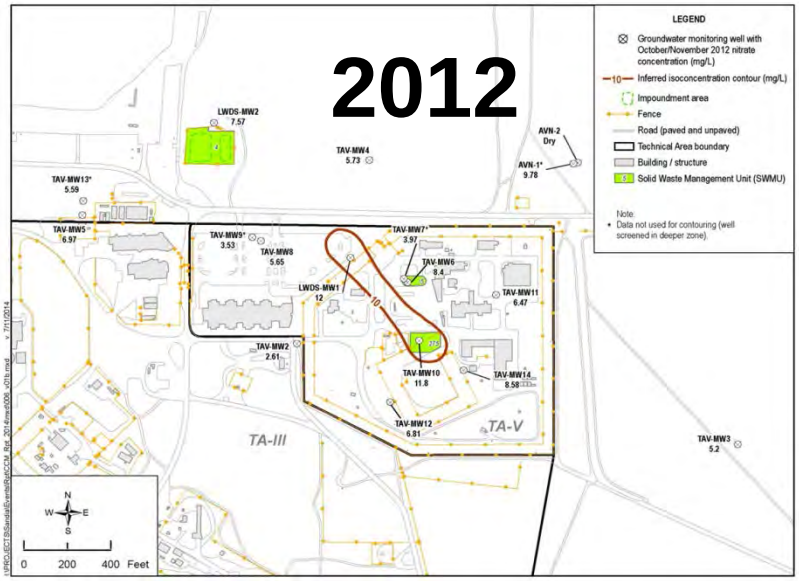


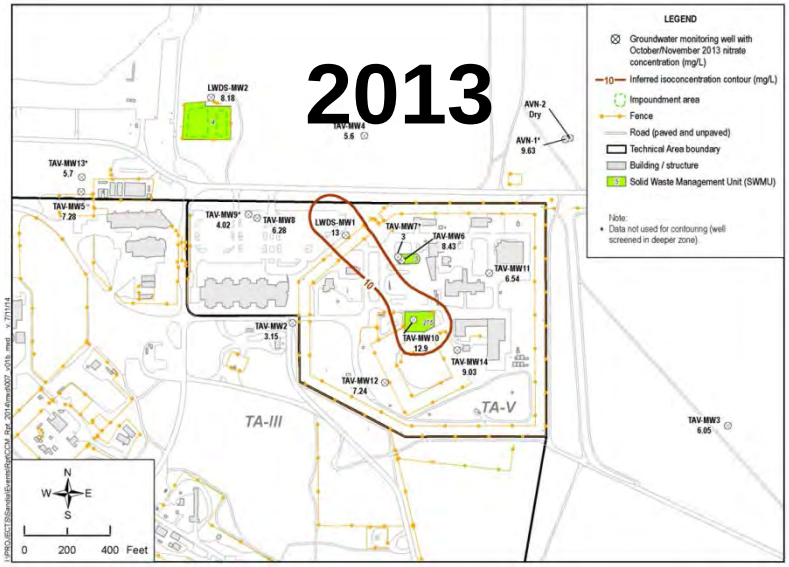


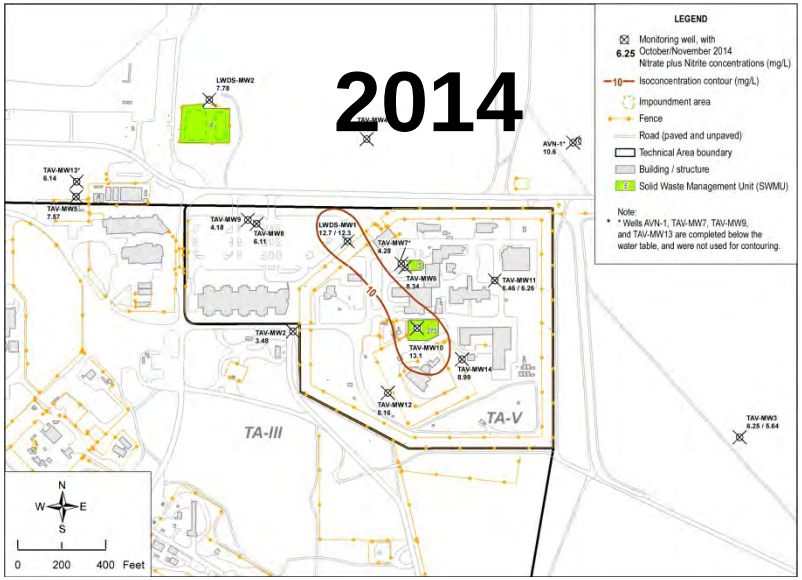


Nitrate Distribution in Groundwater 2011 - 2014



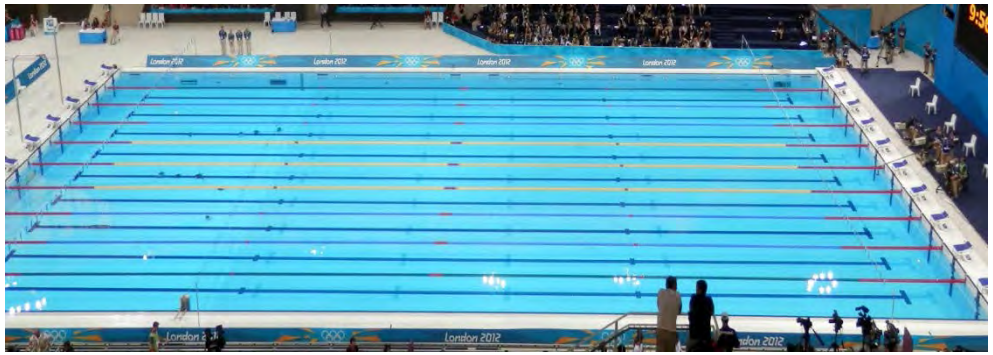






Characteristics of TCE and Nitrate Plumes at TA-V Groundwater AOC

- **Plumes are not moving.**
- **Plumes are approximately five miles south of City drinking water wells.**
- **Plumes are low concentrations.**
  - **No TCE detected in perimeter wells and deep wells.**



45 Olympic-Size Swimming Pools

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Path forward: a Phased Treatability Study of In-Situ Bioremediation

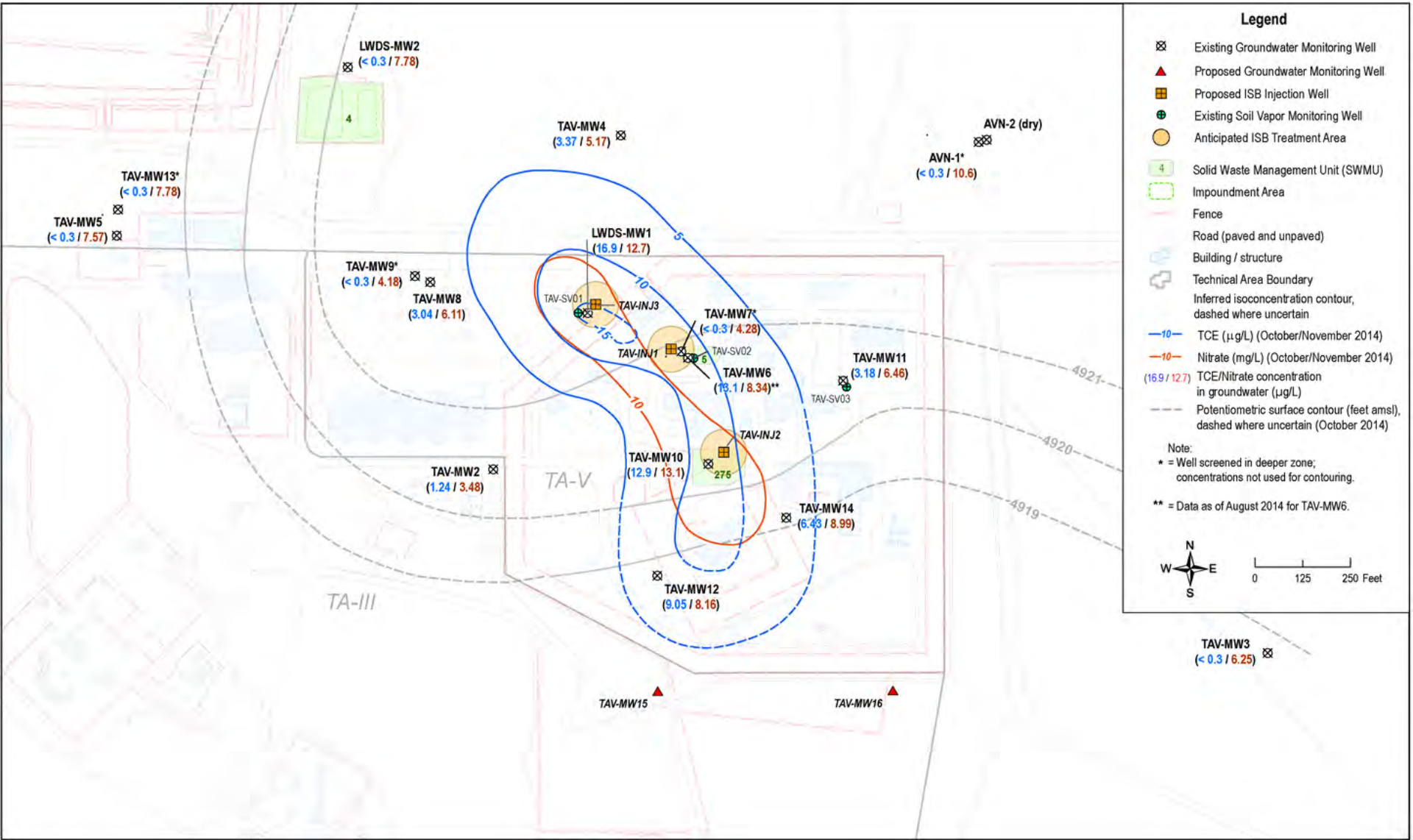
- **“In-Situ” means to treat the contamination in place.**
- **“Bioremediation” means we will make biodegradation happen by supplying the following:**
  - **Dechlorinating bacteria to break down TCE.**
  - **Food and nutrients (i.e., substrate solution) to stimulate the growth of natural bacteria and injected dechlorinators.**

★ Animation video if there is time.

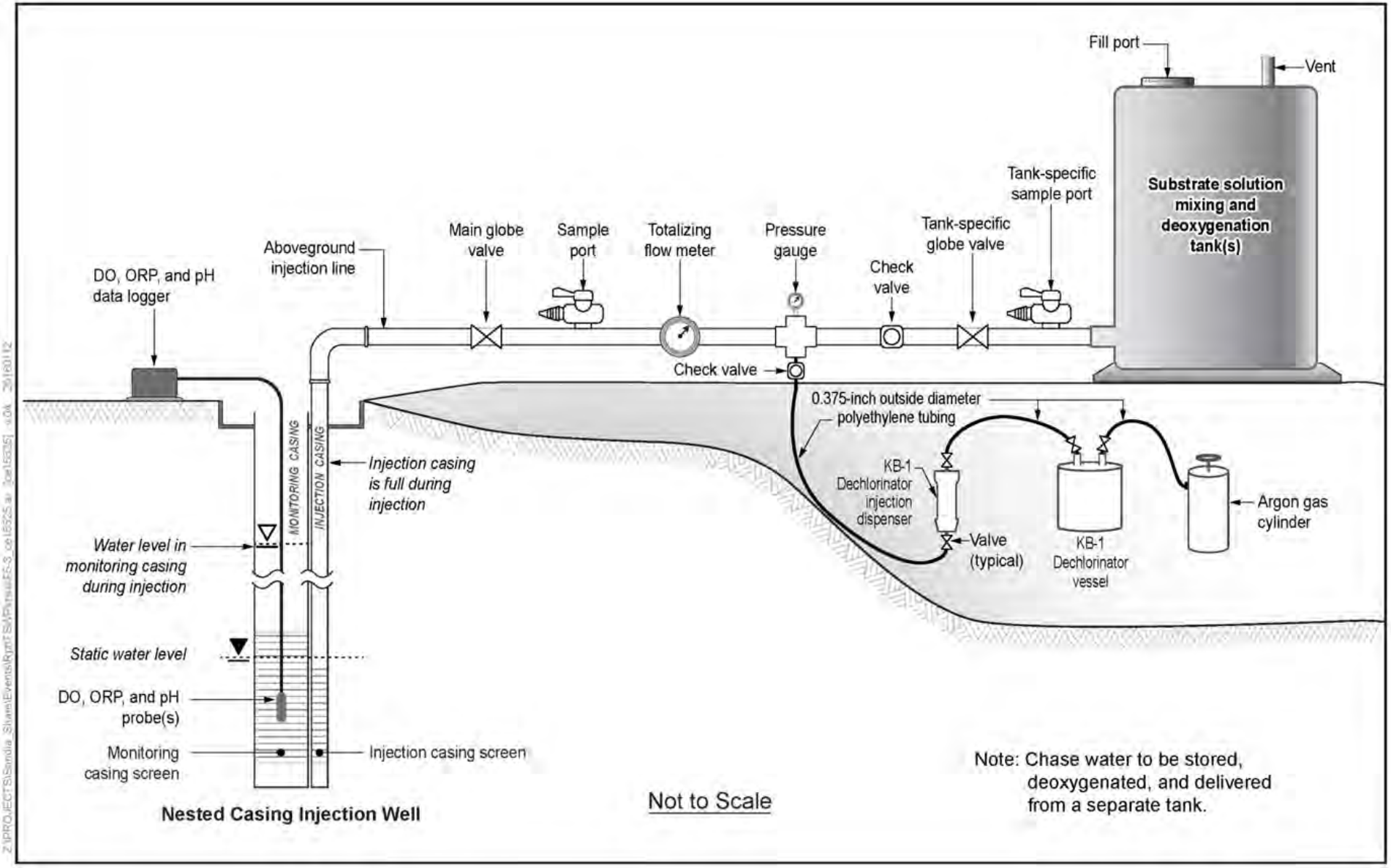
Treatability Study: Target the Heart of the Plume

- **Install up to three injection wells where the highest TCE and nitrate concentrations are detected.**
- **Assemble an aboveground injection system to deliver the dechlorinating bacteria and substrate solution.**
- **“Treatability Study” to test the effectiveness of in-situ bioremediation technology at TA-V.**

Treatability Study:
Install up to Three Injection Wells at Heart of the Plume



Treatability Study:
Assemble an Aboveground Injection System



Implementation of Treatability Study

- **Phase I Pilot Test.**
  - **Injection volume is 3,700 gallons**
  - **Injection completes in one day**
  - **Performance monitoring for four months**
- **Phase I Full-Scale Injection at the first injection well.**
  - **Injection volume is 530,000 gallons**
  - **Injection occurs for six months**
  - **Performance monitoring for two years**
- **Phase II Full-Scale Injection at the second and third injection wells.**

Progress: Treatability Study Work Plan

- **Treatability Study Work Plan approved May 2016.**

Sandia National Laboratories, New Mexico
Environmental Restoration Operations

Revised Treatability Study Work Plan for
In-Situ Bioremediation at the Technical Area-V
Groundwater Area of Concern

March 2016

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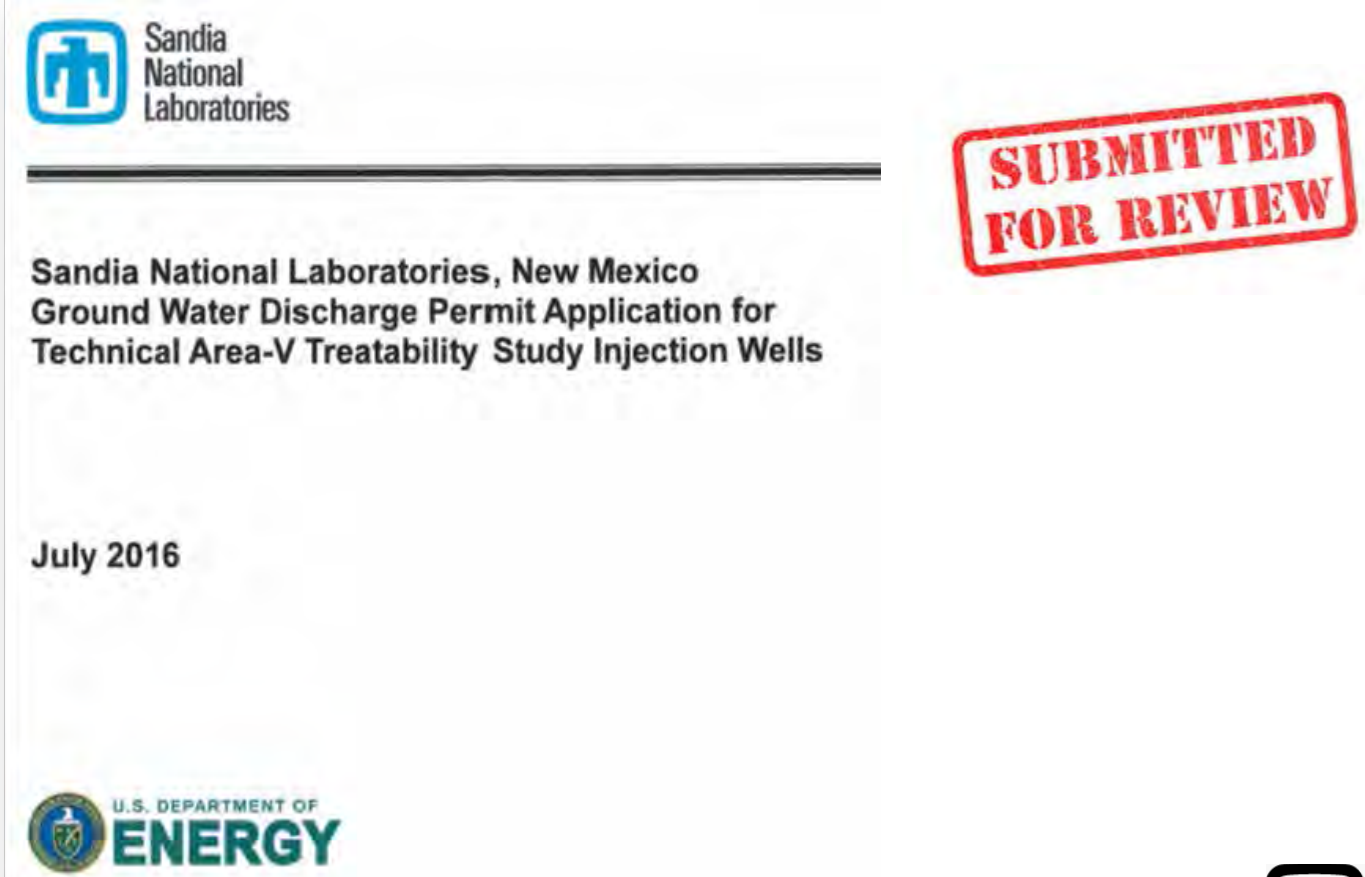
Progress: Discharge Permit Application

- **Discharge Permit Application submitted July 2016.**



Discharge Permit

DP-1845 for Sandia National Laboratories, NM
TA-V Treatability Study Injection Wells

- **NMED Ground Water Quality Bureau is the regulator for Discharge Permits.**

- **NMED and Sandia will put out public notice for 30 days for this DP application.**
- **NMED GWQB will make available a proposed approval or disapproval of the DP application.**
- **The Pubic and Sandia will have opportunities to comment on the proposed approval or disapproval during a 30-day public comment period.**

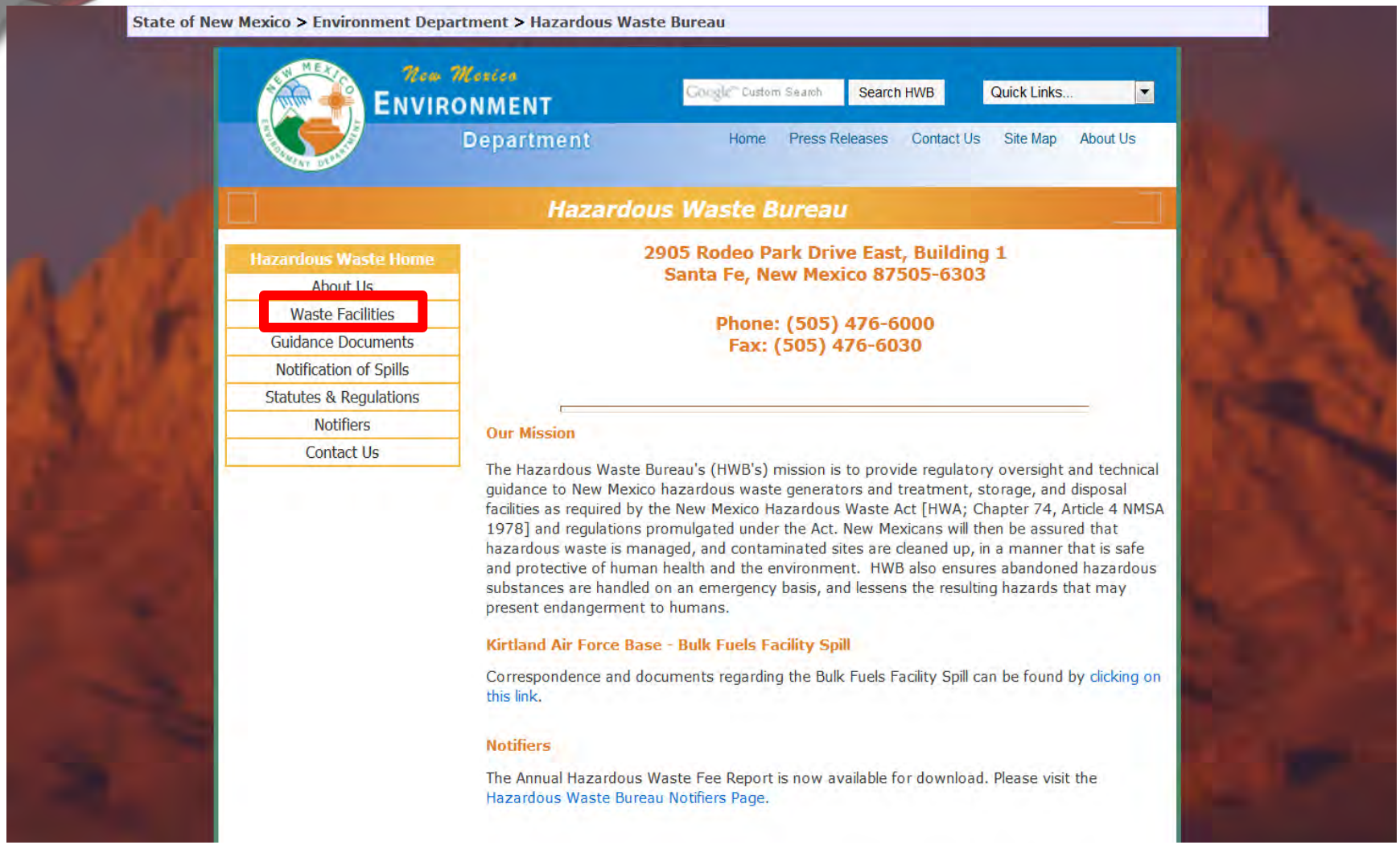
Summary

- **TA-V groundwater AOC is adequately characterized with TCE and nitrate contamination.**
  - **Plumes are stagnant and far from drinking water wells.**
  - **Plumes are of low concentrations.**
  - **No TCE detected in perimeter wells and deep wells.**
- **NMED HWB regulates the site to drinking water standards.**
- **Sandia plans to implement a Treatability Study of in-situ bioremediation contingent on funding from Congress.**
- **NMED GWQB regulates the Discharge Permit for injection wells used for Treatability Study.**

Information Available to Public

- **NMED HWB Website, https://www.env.nm.gov/HWB/ ⇗ "Waste Facilities", then ⇗ "Sandia National Laboratories (SNL)":**
  - **Consolidated Quarterly Report (most recent is April 2016)**
  - **CY 2015 Annual Groundwater Monitoring Report**
  - **NMED DOE Oversight Bureau data on groundwater sites at SNL**

- **Physical copies of the Quarterly Reports and the Treatability Study Work Plan are available at UNM Zimmerman library.**



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