

Technical Area-V Groundwater Investigation



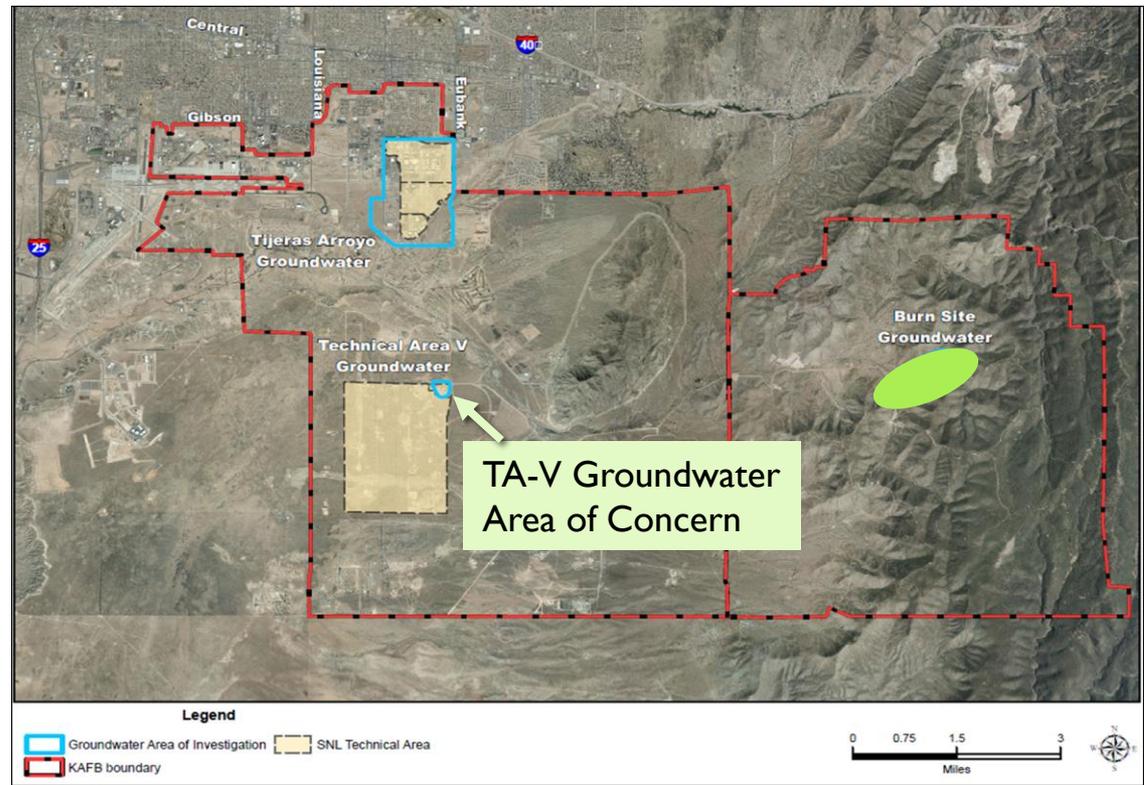
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TA-V Groundwater Area of Concern Site Description



- TA-V Groundwater Area of Concern (AOC) is located at Sandia National Laboratories (SNL) Technical Area-V (TA-V).
 - TA-V covers 35 acres.
 - TA-V is an industrial area in the west-central portion on Kirtland Air Force Base (KAFB).

- SNL activities at TA-V began in 1961 and involve operating research reactors.
- Corrective action is required only for the groundwater at TA-V.
- Groundwater occurs approximately 500 feet below the ground surface at TA-V.



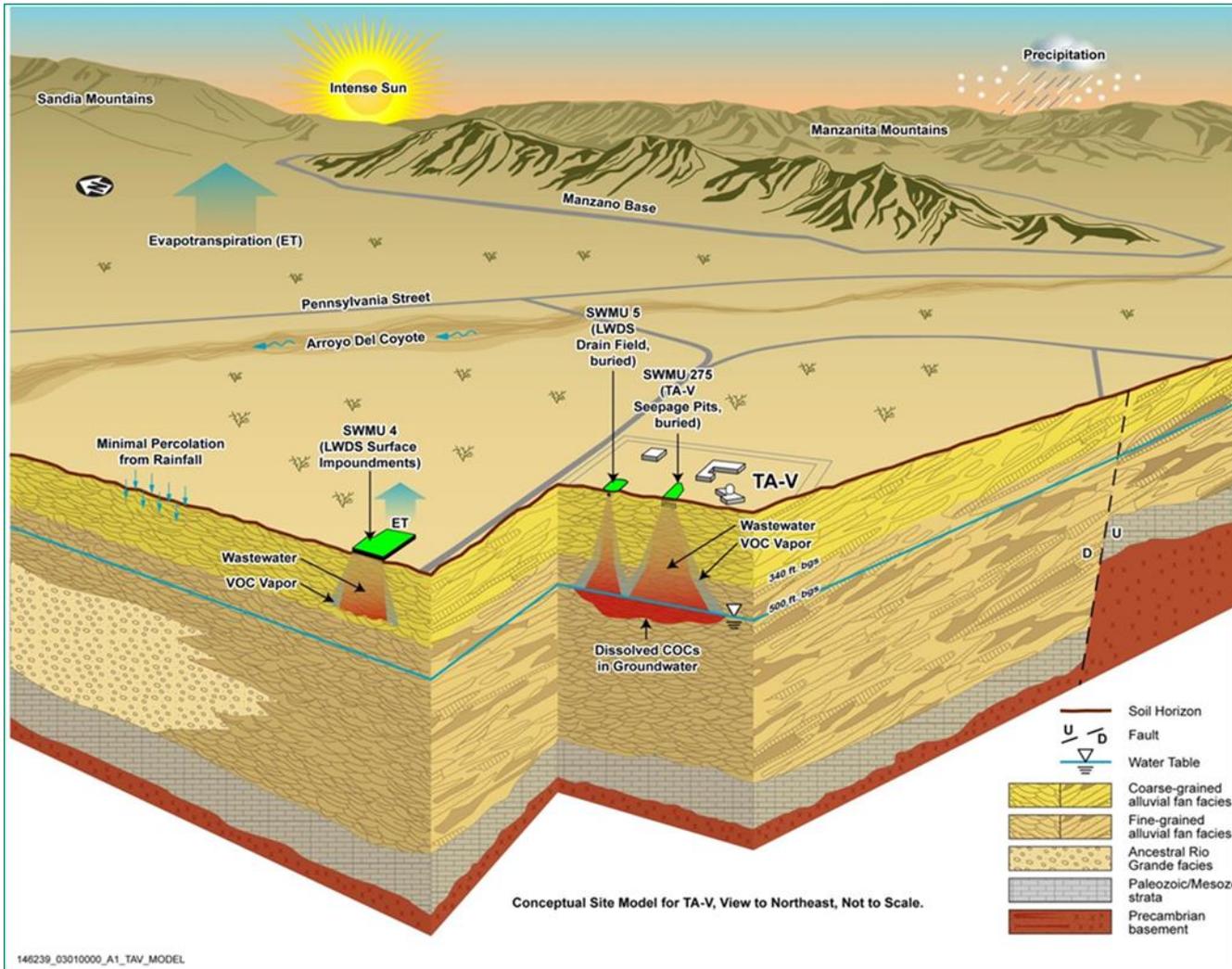
TA-V Groundwater Monitoring



- Groundwater monitoring began in 1992.
 - Current monitoring network consists of 18 wells.
 - Groundwater is contaminated with nitrate and trichloroethene at concentrations above the U.S. Environmental Protection Agency maximum contaminant levels (MCLs) for drinking water.
 - The nitrate plume covers approximately 1.4 acres.
 - The trichloroethene plume covers approximately 13 acres.
 - No other constituents in groundwater exceed the MCLs.
 - Neither plume is moving beyond the current area.
 - The groundwater in this area is not used for any purpose.
 - The nearest downgradient drinking-water supply well (KAFB-4) is 2.7 miles to the north.
 - The plumes are not adversely impacting human health and the environment.

Constituent of Concern	Maximum Concentration in 2019	MCL
Nitrate	15.3 milligrams per liter (well TAV-MW10)	10 milligrams per liter
Trichloroethene	20.2 micrograms per liter (well LWDS-MW1)	5 micrograms per liter

Conceptual Model of Groundwater Contamination Process at TA-V

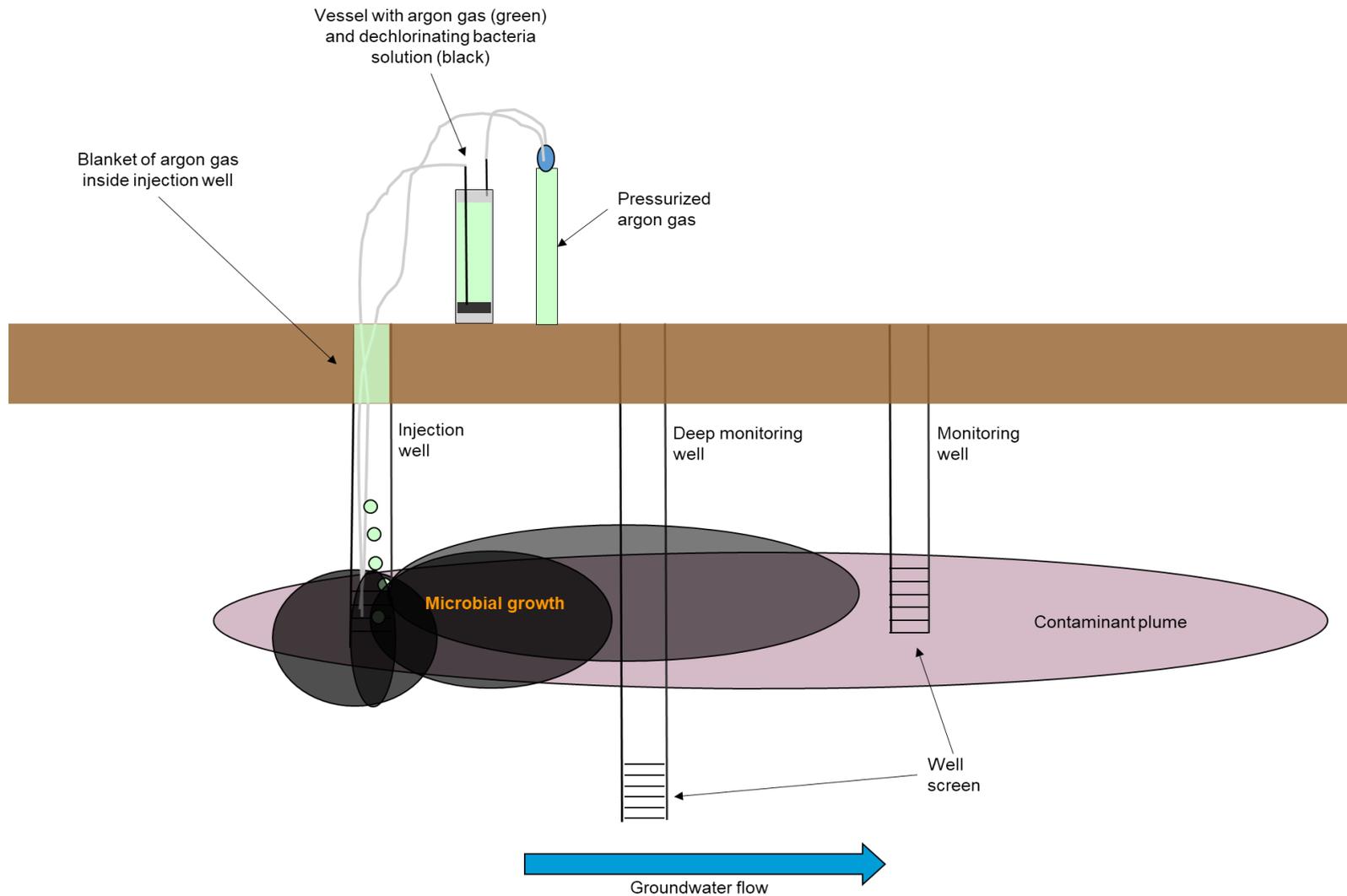


Treatability Study: In-Situ Bioremediation



- The objective is to evaluate the effectiveness of in-situ bioremediation as a potential technology for remediation of the TA-V Groundwater AOC.
 - “In-situ” means treating the contamination in place (in the aquifer sediments).
 - “Bioremediation” means using biological processes (bacteria) to remediate the groundwater by degrading the nitrate and trichloroethene to levels below drinking water standards.
- The plan of the treatability study is to deliver bioremediation solution using one injection well first and possibly up to three injection wells.
- The New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) is the regulator for the investigation.
- Sandia has obtained the Discharge Permit DP-1845 from the NMED Ground Water Quality Bureau (GWQB) to use up to three injection wells to deliver bioremediation solution.
- Progress on the treatability study is provided to the NMED HWB and GWQB through quarterly reporting.

Conceptual Model of In-Situ Bioremediation Process



7 In-Situ Bioremediation Treatability Study at TA-V

- Question to be answered: How large an area can be treated by the bioremediation solution injected?
 - Groundwater at TA-V is aerobic and biodegradation is not naturally occurring.
 - Bioremediation solution provides the nutrients and pH buffer for the bacteria to biodegrade nitrate and trichloroethene.
- Treatability Study at the first Injection Well TAV-INJ1
 - Injected approximately 531,000 gallons of bioremediation solution mixed with 123 liters of trichloroethene-degrading bacteria.
 - The solution was injected from November 2018 through April 2019.
 - Injection well TAV-INJ1 and monitoring well TAV-MW6 are monitored for the performance of in-situ bioremediation.
- One deep well and eight surrounding wells are being monitored to determine potential impact on groundwater quality caused by the bioremediation solution.



Findings of Treatability Study at Injection Well TAV-INJ1



- Groundwater at injection well TAV-INJ1 has been maintaining optimal conditions for biodegradation.
- The inert tracer (bromide) injected with the bioremediation solution has reached monitoring well TAV-MW6.
- Dissolved oxygen level has decreased in the groundwater at well TAV-MW6; however, anaerobic condition is not established.
- No change in groundwater quality has been observed in the deep monitoring well and the eight surrounding wells.



- Delivery of bioremediation solution was limited by low hydraulic conductivities of the aquifer at TA-V.
- Infrastructure at TA-V limits installation of multiple injection wells for the success of the ISB technology across the entire lateral extent of the nitrate and TCE plumes.
- Findings of the treatability study of in-situ bioremediation at injection well TAV-INJ1 were shared with NMED HWB in September 2020.