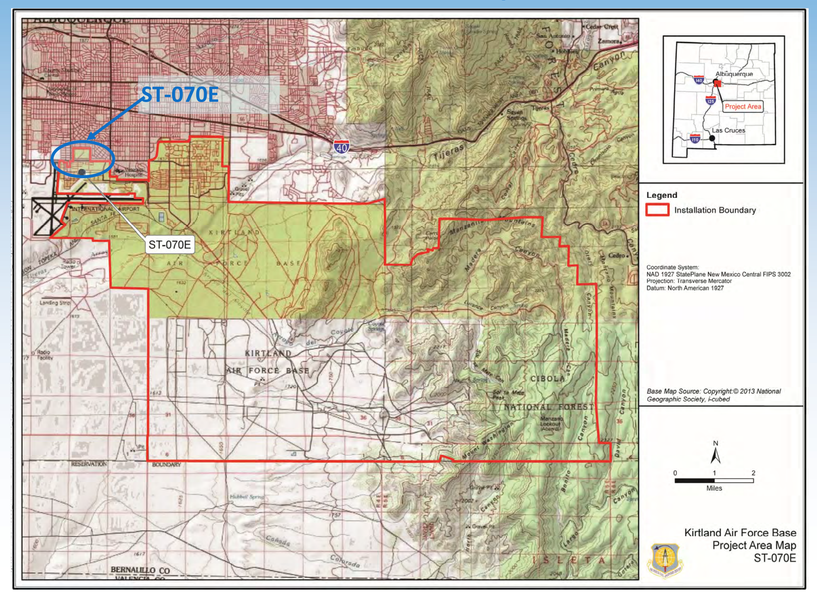
Kirtland Air Force Base—Site ST-070E

Oil Water Separator ST-219

Location Map



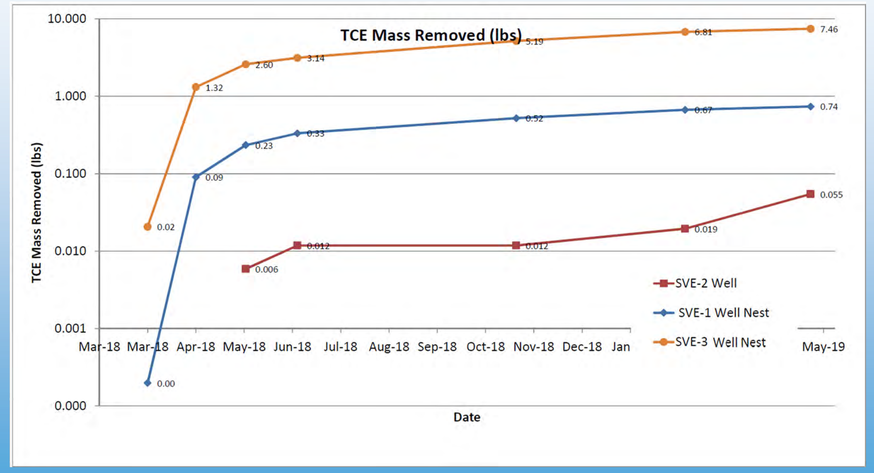
Site Background

- Area used for aircraft movement and parking around hangar buildings 481 & 482
- Historical releases of fuels, oils, and solvents
- Former OWS identified as a contaminant release site based on inspections and sampling in 1990 & 1992
- Several RCRA Facility Investigation (RFI) phases conducted between 1993 & 1999
- Several mobilizations for soil vapor and soil investigations were performed during the RFI
- 7 soil vapor monitoring wells were installed
- Petroleum fuels (Avgas, jet fuel, diesel and gasoline) and chlorinated solvents were detected in soils below the former OWS and drainage sump
- Groundwater characterization began in 2001 with installation of monitoring well KAFB-7001, screened in the regional aquifer, approximately 480 ft below the ground surface
- To date, no site-related contaminants have exceeded drinking water standards in groundwater samples. Chlorinated solvents trichloroethylene [TCE] and tetrachlorethylene (PCE) have been detected at levels below drinking water standards.

Remediation History

- **Bioventing was conducted between 1999 and 2001**
  - Active subsurface ventilation with humidified air though a vapor well and extraction well to promote in-situ contaminant degradation
  - Soil samples collected to confirm fuel degradation
  - Lower than anticipated degradation rates were achieved
- **Soil Vapor Extraction (SVE) Pilot Tests conducted in 2003**
  - Results of pilot testing indicated SVE would be an effective alternative for remediation of TPH and chlorinated solvents
  - Between 2007 and 2008 the SVE pilot scale system was expanded to full scale system by converting two monitoring wells to SVE wells
- **SVE full scale system operation 2008—2016**
  - The SVE treatment system was upgraded in 2008 with 3 SVE wells
  - Full operation through June 2016
- **Upgraded SVE System – Three New SVE Extraction Wells (2016)**
  - SVE-1 (nested well screens at 7-12 ft; 16-26 ft; and 31-36 ft)
  - SVE-2 (single well screen at 32-42 ft)
  - SVE-3 (nested well screens at 35-50 ft; 94-104 ft; 132-142 ft)

ST-070E TCE Mass Removed Mar 2018—May 2019



ST-070E Proposed SVE Monitoring Wells

Additional Investigation

- **Installation of groundwater monitoring wells KAFB-7004 and KAFB-7005**
  - Two down-gradient, 4-inch wells installed in September 2021 (approx. 460 ft total depth)
- **Three new soil-vapor monitoring (SVM) wells planned**
  - Three SVM wells with 7 sampling intervals (2 - triple nested and 1 - single nested) will be installed at locations proximate to the 2016 SVE wells
  - The SVM well installation work plan is currently in NMED review

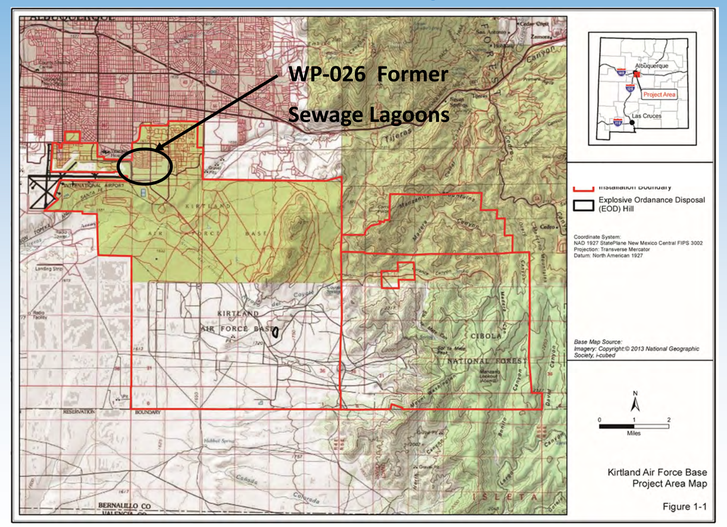
Path Forward

- SVE System is currently shut down (May 2019)
- Awaiting installation of three new soil vapor monitoring (SVM) wells
- Initiation of quarterly soil vapor monitoring
- Continued quarterly groundwater sampling of three site wells
- Re-evaluation of site risk and determine appropriate path forward

Kirtland Air Force Base—Site WP-026 (SWMU WP-026)

Former Sewage Lagoons

Location Map



Site Background

- Site WP-026 includes two distinct areas – Former Base Sewage Lagoons and Golf Course Main Pond (GCMP)
- Sites linked because GCMP historically received effluent from the Sewage Lagoons thus they shared the same waste stream
- Both the perched groundwater zone and the regional aquifer are present at the former Sewage Lagoons and at the GCMP
- Three groundwater monitoring wells are screened in the perched unit at the GCMP, and nitrate is the only constituent that exceeds regulatory levels
- Nitrate in groundwater at the GCMP is regulated under Kirtland AFB Site ST-105, through NMED Ground Water Quality Bureau

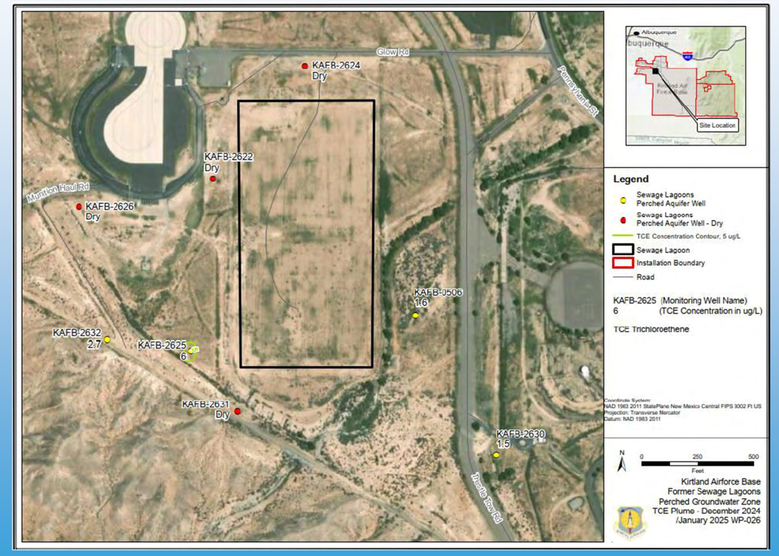
Former Sewage Lagoons Background

- Constructed in 1962 – operated through 1987
- Unlined north and south cells
- Approximately 14 acres filled up to 6 ft depth of sewage water
- Approximately 330 million gallons raw sewage handled from April through October each year
- November to March KAFB sewage was diverted into City of Albuquerque sewer system
- Lagoon side slopes reinforced with soil cement and concrete in 1970 & 1975

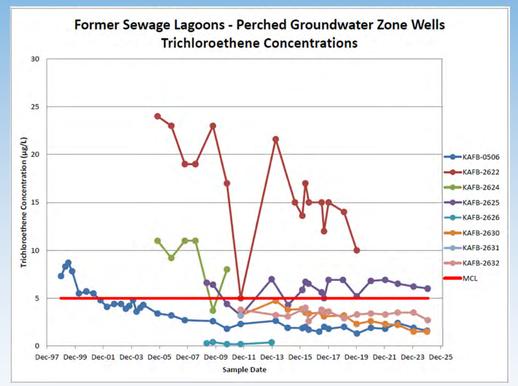
Former Sewage Lagoons Background (cont.)

- USGS study and Stage 2 RFIs – 1988 through 1992
- Groundwater monitoring initiated 1994 through 1996
  - Focus was chromium
  - Several exceedances of nitrate in groundwater (max concentration 14.3 mg/L, but no nitrate exceedances since 1997 in the perched groundwater zone)
- Annual monitoring initiated in 1996 (on-going)
- Supplemental soil investigations 1998 through 2000
- Soils excavation and removal (dry sludge near surface) — 2010 Accelerated Corrective Measure
- Current remaining contaminant of concern (COC) is chlorinated solvent TCE in perched groundwater zone
- 2012 RFI addressed data gaps with installation of three new monitoring wells in the perched groundwater zone and two new wells in the regional aquifer
- Soil samples during well/borehole installation did not detect COCs above NMED residential screening levels

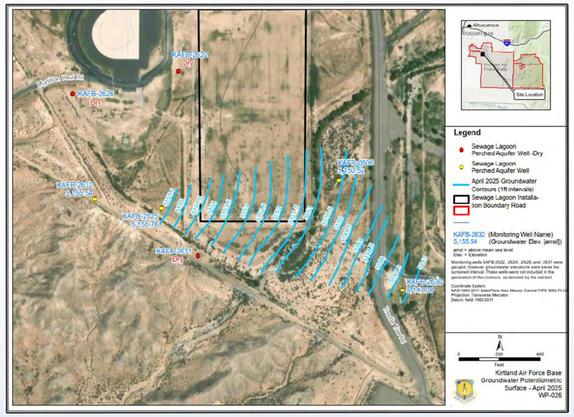
TCE Distribution - Perched Groundwater Zone - December 2024



Perched Groundwater Zone TCE Trends - Dec. 2024



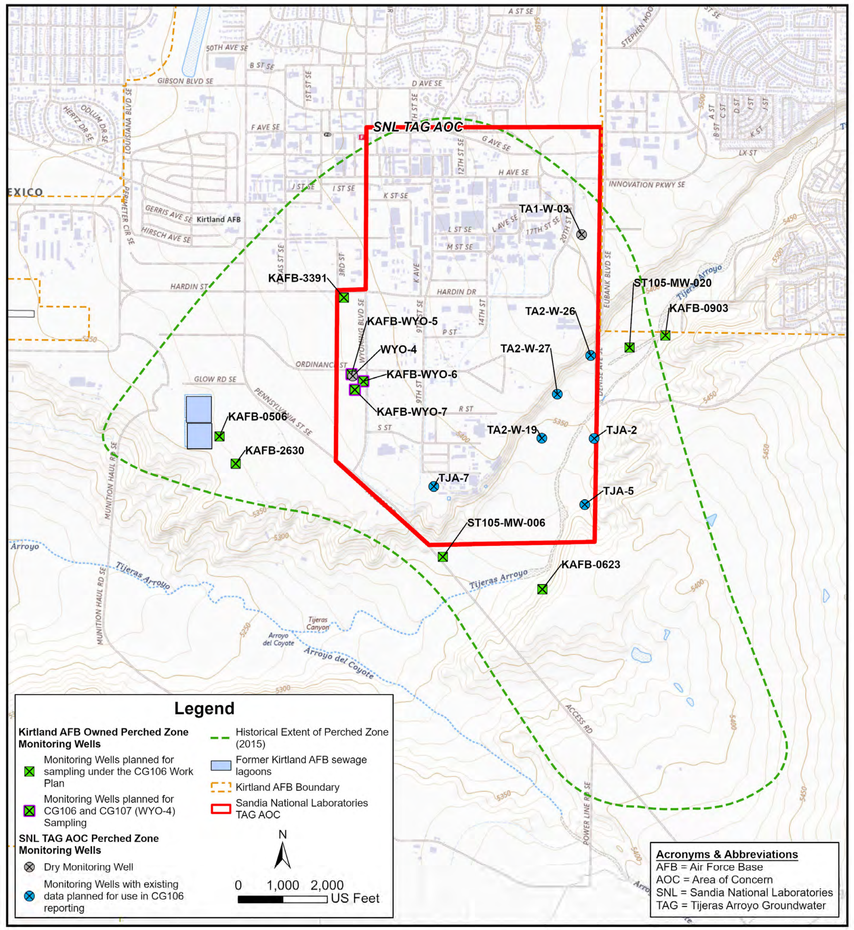
Perched Unit Groundwater Map—April 2025



Current Conditions and Site Management

- Remaining perched groundwater zone wells water level declining at average of 0.35 ft per year (ranging from 0.1 to 0.5 ft per year)
- One remaining perched groundwater unit well has TCE in exceedance of 5 µg/L (NMWQCC) standard (well KAFB-2625)
- At request of NMED an aquifer test was conducted in 2022 in perched groundwater zone well KAFB-2630
- Aquifer Test Report (Revision 1) under NMED review
- ***Groundwater Sampling***
- Four perched groundwater zone wells and four regional aquifer wells sampled annually and gauged quarterly under current monitoring program
- Samples analyzed for nitrate, ammonia, anions, TDS, VOCs (both perched and regional) and metals (perched unit only)
- Annual Monitoring Reports submitted to NMED

Kirtland Air Force Base—CG107 (WYO-4) Area of Concern
RCRA Facility Investigations and Monitoring



Site Location and Background

- The CG107 (WYO-4) AOC is on Kirtland AFB, within the footprint of the SNL TAG AOC, and associated with monitoring well WYO-4.
- Historically, detections of trichloroethylene (TCE) were observed in the perched groundwater zone in monitoring well WYO-4.
- Monitoring well WYO-4 became dry as the perched groundwater zone declined

Objective

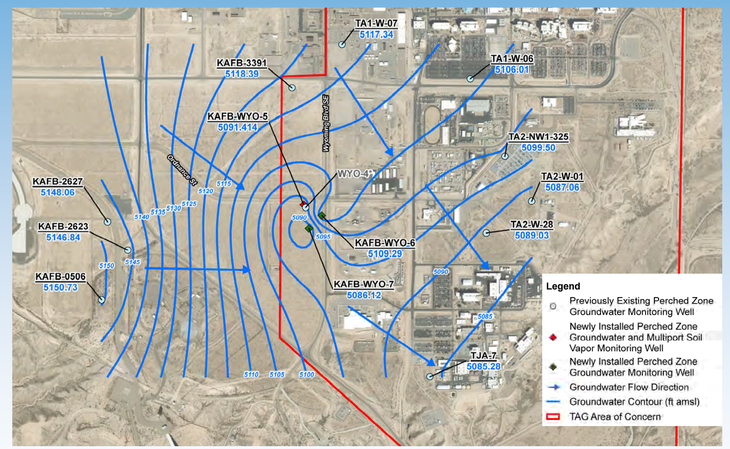
- To investigate the nature and extent of TCE above the EPA Drinking Water Standard of 5 µg/L in the perched groundwater zone at the CG107 (WYO-4) AOC.

2024 RCRA Facility Investigation

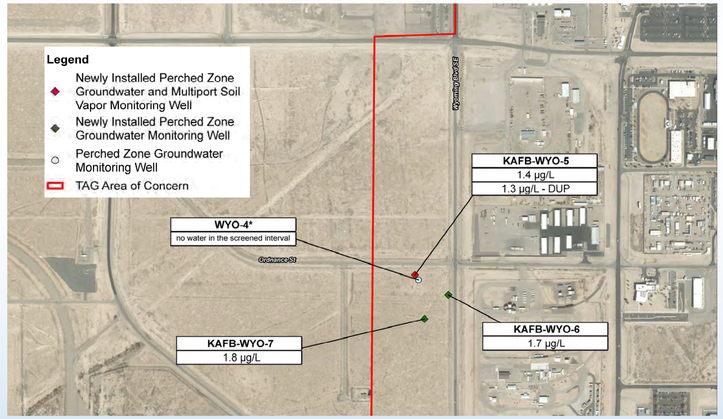
- Three perched groundwater zone wells were installed:
  - KAFB-WYO-5 (replacement for dry well WYO-4)
  - KAFB-WYO-6 and KAFB-WYO-7 (downgradient of dry well WYO-4)
- Initial sampling and gauging were conducted in the perched groundwater zone.
- A RCRA Facility Investigation Report was developed to document monitoring well installation activities and the results of sampling and monitoring. This report was delivered to NMED on April 30, 2025.

Results

- TCE concentrations in the perched groundwater zone at CG107 (WYO-4) were below the screening level (5 µg/L). TCE concentration in KAFB-WYO-5 was 1.4 µg/L, KAFB-WYO-6 was 1.7 µg/L, and KAFB-WYO-7 was 1.8 µg/L.



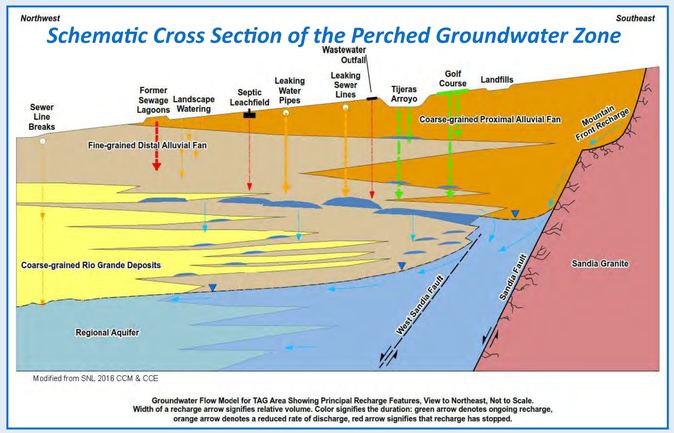
Potentiometric Surface, 2024



TCE Concentrations in Groundwater, 2024

Perched Groundwater Zone Conceptual Site Model

- Perched groundwater zone is:
  - primarily from anthropogenic sources (now removed or fixed),
  - approximately 300 feet below ground surface, and
  - has been observed to be declining over the past 20 years.
- Declining water levels may impact investigations in the perched groundwater zone as monitoring wells may become dry in the future.
- Regional aquifer is approximately 515 feet below ground surface.



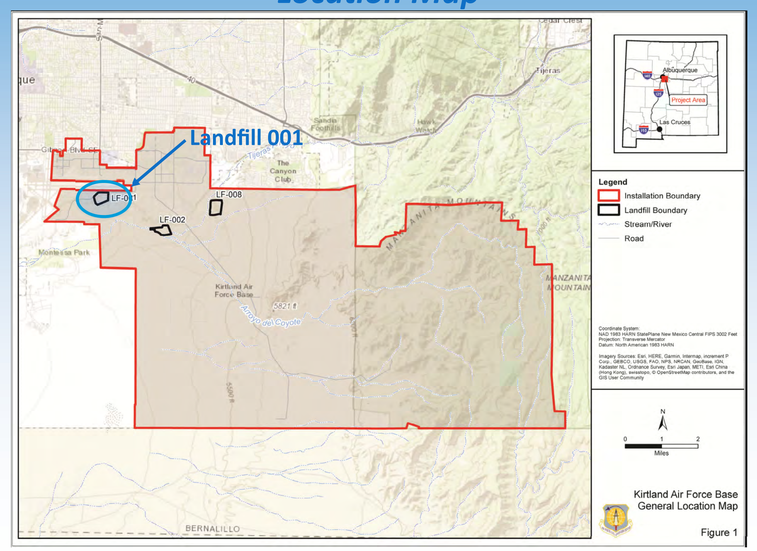
Installation of KAFB-WYO-5

Groundwater Sampling of KAFB-WYO-6

Kirtland Air Force Base—Landfill 001 (SMWU 6-1)

Monitoring and Inspections

Location Map



Site Background

- Operated as early as 1951 but primarily between 1960 and 1975
- Waste was disposed in 'trench-and-fill' fashion
- Estimated 425,000 cubic yards (CY) of municipal waste and 175,000 CY of construction waste and demolition debris
- Depth to groundwater ranges from 420 to 450 feet
- Currently four regional aquifer groundwater monitoring wells
- Long-Term Monitoring (LTM) program initiated in 1996
- Evapotranspiration (ET) cover installation completed in 2006

ET Cover System

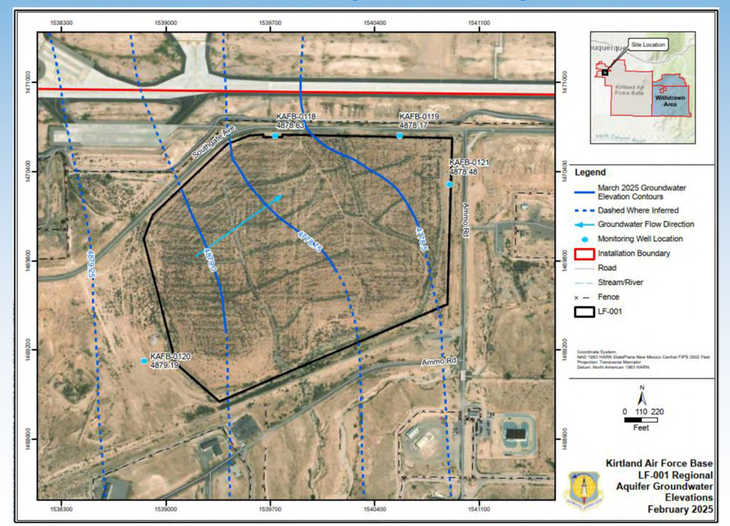
- Selected as preferred alternative in Corrective Measures Study
- ET cover is 49 acres in area
- ET cover system includes 36" ET cover overlaying a 6" compacted subgrade layer
- Soils for ET cover specified as silty sand, silty-clayey sand, or silty clay, with 99% passing a 1 inch sieve
- Design objective of ET cover was to achieve target percolation rate of 2.5 millimeters per year or less

Regulatory Framework

- LF-001 (SWMU 6-1) is listed on Table I-3 of the Kirtland AFB RCRA Permit as a SWMU or AOC Requiring Corrective Action
- LF-001 primarily contains municipal waste and construction waste and debris
- The landfill is regulated under NMAC 4.1.500, which addresses RCRA landfill requirements under CFR Parts 264.111 and 264.310
- The regulations prescribe closure requirements and post-closure care and monitoring requirements
- The ET cover was designed as an equivalent system as a RCRA landfill cap, as permitted under 40 CFR part 264.310(a)(7)
- The ET cover was installed in 2006 and the landfill is now under long-term monitoring and maintenance

Evapotranspiration (ET) Cover

Groundwater Map—February 2025



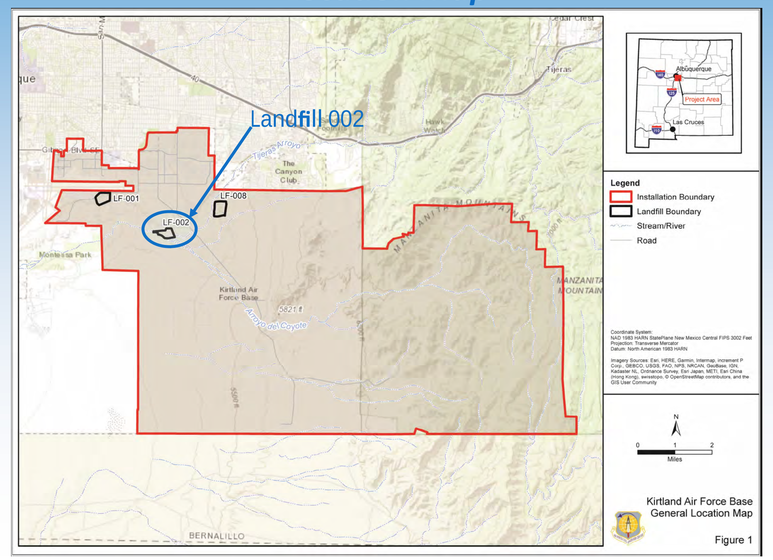
Current Inspections and Monitoring Program

- Through 2017, annual groundwater sampling of four monitoring wells with quarterly groundwater depth measurements, and monthly landfill inspections or following large rain events
- Current monitoring: biennial groundwater sampling of four monitoring wells with semi-annual groundwater depth measurements, and landfill inspections are conducted semi-annually and again following large rain events, when they occur
- ***Groundwater Sampling***
  - Dissolved metals (21 target analyte list metals) - biennial
  - Anions (nitrate, chloride, fluoride, sulfates) and Total Dissolved Solids - biennial
- ***Landfill Inspections***
  - Inspector walks inspection route across landfill area and documents conditions with notes and photographs
  - Evaluates for fencing/signage condition, tumbleweed/debris accumulation in drainages and pipes, rill erosion, piping erosion, desiccation cracking, animal burrows, drainage system conditions, inlets, outlets, sedimentation
  - Inspection reports used to plan maintenance and mitigation measures
- ***Landfill Repairs***
  - Landfill cover is repaired periodically, including backfilling of fissures, backfill of rilling and erosional gullies with topsoil, repair of rock berms

Kirtland Air Force Base—Landfill 002 (SWMU 6-2)

Monitoring and Inspections

Location Map



Site Background

- Operated between 1942 and 1965
- Waste was disposed in 'trench-and-fill' fashion
- Estimated 1,321,700 cubic yards (CY) of general refuse, construction and demolition debris
- Depth to groundwater ranges from 370 to 415 feet
- The Water Authority's 21-inch Tijeras Interceptor sanitary sewer line crosses the site
- Currently six regional aquifer groundwater monitoring wells
- Long-Term Monitoring (LTM) program initiated in 1996
- Tijeras arroyo was modified in 1999 to reduce flooding potential at LF-002 under the 100-yr runoff event

ET Cover System

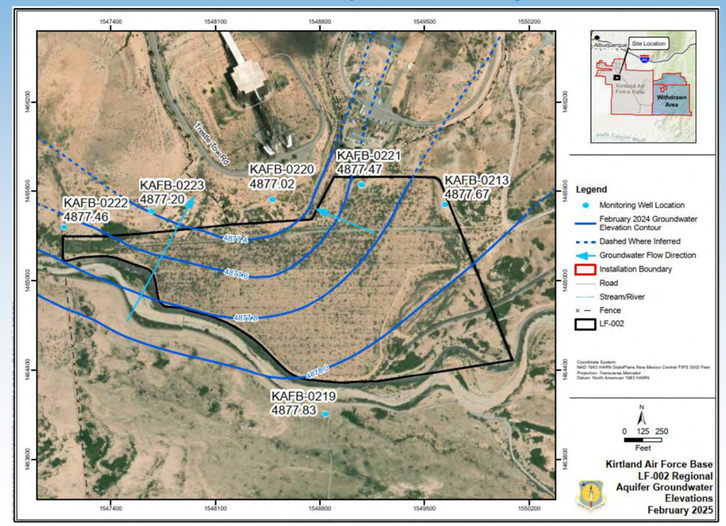
- Selected as preferred alternative in Corrective Measures Study
- ET cover is 32 acres in area
- ET cover system includes 36" ET cover overlaying a 6" compacted subgrade layer
- Soils for ET cover specified as silty sand, silty-clayey sand, or silty clay, with 99% passing a 1 inch sieve
- Design objective of ET cover was to achieve target percolation rate of 2.5 millimeters per year or less

Regulatory Framework

- LF-002 (SWMU 6-2) is listed on Table I-3 of the Kirtland AFB RCRA Permit as a SWMU or AOC Requiring Corrective Action
- The landfill is regulated under NMAC 4.1.500, which addresses RCRA landfill requirements under CFR Parts 264.111 and 264.310
- The regulations prescribe closure requirements and post-closure care and monitoring requirements
- The ET cover was designed as an equivalent system as a RCRA landfill cap, as permitted under 40 CFR part 264.310(a)(7)
- The ET cover and drainage/erosion control system were constructed between 2004 and 2006 and the landfill is now under long-term monitoring and maintenance

Evapotranspiration (ET) Cover

Groundwater Map—February 2025



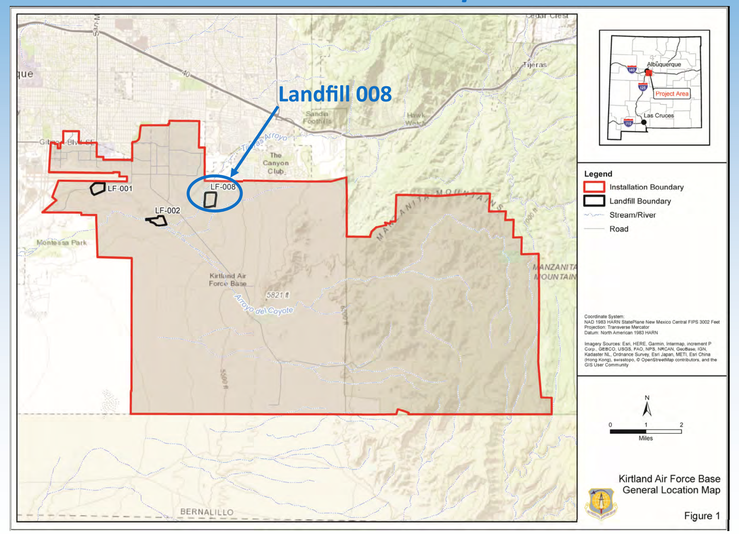
Current Inspections and Monitoring Program

- Through 2017, annual groundwater sampling of six monitoring wells with quarterly groundwater depth measurements, and monthly landfill inspections or following large rain events
- Currently, annual groundwater sampling of sanitary sewer indicator parameters (nitrate, anions and TDS) to account for the Water Authority sewer line underneath LF002, biennial groundwater sampling for expanded analyte list with semi-annual groundwater depth measurements and landfill inspections, and inspections following large rain events, when they occur
- *Groundwater Sampling*
  - Anions (nitrate, chloride, fluoride, sulfates) and Total Dissolved Solids - annual
  - Dissolved metals (21 target analyte list metals) - biennial
  - VOCs, Radium-226, Radium-228, Gross alpha, Gross beta (ceased all in 2018)
- ***Landfill Inspections***
  - Inspector walks inspection route across landfill area and documents conditions with notes and photographs
  - Evaluates for fencing/signage condition, tumbleweed/debris accumulation in drainages and pipes, rill erosion, piping erosion, desiccation cracking, animal burrows, drainage system conditions, inlets, outlets, sedimentation
  - Inspection reports used to plan maintenance and mitigation measures
- *Landfill Repairs*
  - Significant repairs of LF-002 were conducted in 2015 included: Removal of fiber rolls, backfilling of fissures, backfill of rilling and erosional gullies with topsoil, removal of debris from intake #1, and revegetation of disturbed areas.
  - Sediment removal was conducted at Landfill 002 channel #3 in March 2025.

Kirtland Air Force Base—Landfill 008 (SWMU 6-4)

Monitoring and Inspections

Location Map



Site Background

- LF-008 comprises 3 former landfills: Landfill 004, 005 & 006, located adjacent to the currently operational construction/demolition debris landfill (LF-268, since 1989)
- Landfill 4 operated by City of Albuquerque and KAFB from 1964 to 1969, where approximately 600,000 cubic yards (CY) of general refuse was placed over a 25 acre area
- Landfills 5 and 6 operated from 1960 through 1989
- Landfill 5 was used for construction/demolition debris and Landfill 6 was general refuse
- Landfills 5 and 6 comprise approximately 1,746,000 CY of waste disposed over an area of approximately 40 acres
- Long-Term Monitoring (LTM) program initiated in 1995
- Monitoring at the site also covers the active portion of LF-268 under requirements of the New Mexico Solid Waste Bureau

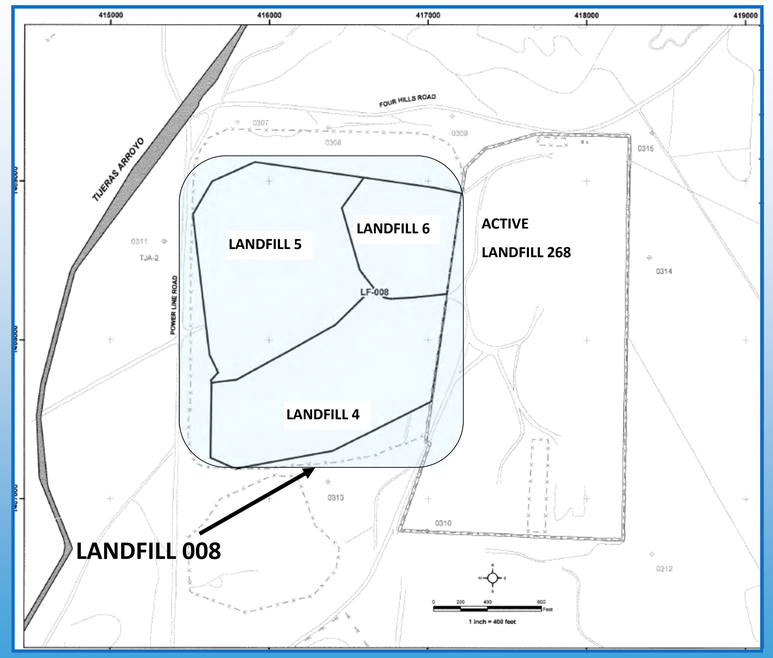
ET Cover System

- Selected as preferred alternative in Corrective Measures Study
- 36” RCRA landfill cover of native soil was installed in 1992
- ET cover is 65 acres in area
- ET cover system includes 36” ET cover overlaying a 6” compacted subgrade layer
- Design objective of ET cover was to achieve target percolation rate of 2.5 millimeters per year or less

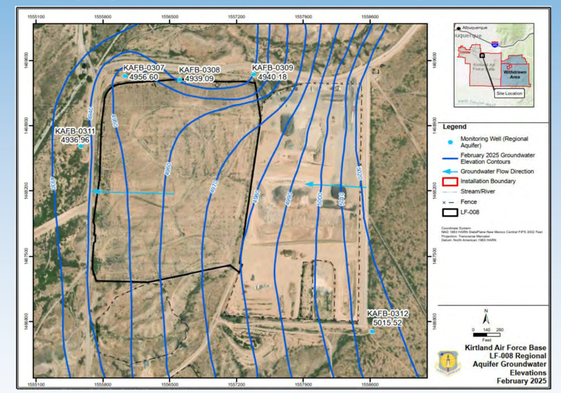
Regulatory Framework

- LF-008 (SWMU 6-4) is listed on Table I-3 of the Kirtland AFB RCRA Permit as a SWMU or AOC Requiring Corrective Action
- The landfill is regulated under NMAC 4.1.500, which addresses RCRA landfill requirements under CFR Parts 264.111 and 264.310
- The regulations prescribe closure requirements and post-closure care and monitoring requirements
- The ET cover was designed as an equivalent system as a RCRA landfill cap, as permitted under 40 CFR part 264.310(a)(7)
- The ET cover and drainage/erosion control system were constructed between 2001 and 2005 and the landfill is now under long-term monitoring and maintenance
- Numerous modifications were made to facilitate future use of the construction and demolition landfill (LF-268), including construction of a new Waste Transfer Facility and re-alignment of the access haul road

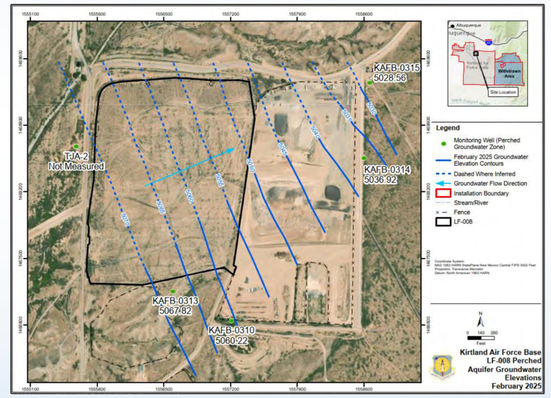
Site Map



Regional Aquifer Groundwater Map— February 2025



Perched Unit Groundwater Map—February 2025



Current Inspections and Monitoring Program

- Through 2017, annual groundwater sampling of 5 regional aquifer and 5 perched unit monitoring wells with quarterly groundwater depth measurements, and monthly landfill inspections or following large rain events
- Currently, sampling changed for removal of radiological analytes from the sampling list, and landfill inspections are conducted semi-annually and again following large rain events, when they occur
- Erosion repairs conducted August 2018, November 2018, and March 2022. Extensive landfill maintenance (erosion rills, sediment removal, berm repairs) conducted in March 2025.
- *Groundwater Sampling*
  - Volatile Organic Compounds (VOCs) - annual sampling
  - Dissolved metals (21 target analyte list metals) - annual sampling
  - Radium-226, Radium-228, Gross alpha, Gross beta (ceased sampling in 2018)
  - Nitrate plus Nitrite (as Nitrogen) - annual sampling