



Air Force Civil Engineer Center



Semi-Annual Public Meeting

Scott Clark Restoration Program Manager 29 Oct 20

Battle Ready Built Right!





Air Force Civil Engineer Center



New Mexico – Arizona PBR



Steve Geiger, P.E., PhD AECOM Technical Services 29 Oct 20

Battle Ready Built Right!





Outline

- Landfill 1 (SWMU-6-1, LF-001); Landfill 2 (SWMU 6-2, LF-002); Landfill 8 (SWMU 6-4, LF-008)
- Explosive Ordnance Disposal (EOD) Hill (CG-570) Perchlorate Groundwater Contamination
- > Oil/Water Separator, Bldgs. 481/482, ST-070E (SWMU ST-219),
- Former Sewage Lagoons (SWMU WP-026)





- Landfills listed on Table I-3 of the Kirtland AFB RCRA Permit as a SWMU or AOC Requiring Corrective Action
- Primarily contain municipal waste and construction waste and debris
- Are 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 covers designed as an equivalent system as a RCRA landfill cap, as permitted under 40 CFR part 264.310(a)(7)
- Are now in the post closure period



Landfill LF-001, LF-002, LF008









Landfill	Selected Remedy	Area (Acres)	Construction Details	Installation Completion Date
LF-001 (SWMU 6- 1)	ET Cover	49	36-inch ET layer over 6-inches compacted clay, 2.5 mm annual percolation rate	2006
LF-002 (SWMU 6- 2)	ET Cover	32	36-inch ET layer over 6-inches compacted clay, 2.5 mm annual percolation rate, drainage and erosion control system	2004 to 2006
LF-008 (SWMU 6- 4)	ET Cover	65	36-inch ET layer over 6-inches compacted clay, 2.5 mm annual percolation rate, drainage and erosion control system	2001 to 2005



Background LF-001 (SWMU-6-1)



Evapotranspiration (ET) Cover – Landfill 1







- 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





Current Inspections and Monitoring Program

Since 2018, biennial groundwater sampling of four monitoring wells with quarterly groundwater depth measurements, and landfill inspections are conducted quarterly and following large rain events

Groundwater Sampling

- > Dissolved metals (21 target analyte list metals)
- > Anions (nitrate, chloride, fluoride, sulfate) and Total Dissolved Solids
- Field Parameters (pH, dissolved oxygen, ORP, specific conductance, turbidity and temperature)





Landfill Inspections and Repairs

- Quarterly inspections inspector walks inspection route across landfill area and documents conditions (fencing, signage, drainage, erosion, burrows, dessication, vegetation) with notes and photographs
- Inspection reports are used to plan maintenance and mitigation measures
- Landfill Repairs significant repairs of LF-001 conducted since 2013 included: Removal of fiber rolls, backfilling of fissures, backfill of rilling and erosional gullies with topsoil, repair of rock berms



Background LF-002 (SWMU 6-2)



Evapotranspiration (ET) Cover – Landfill 2







- 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





Current Inspections and Monitoring Program

Since 2018, 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 quarterly groundwater depth measurements, and landfill inspections are conducted quarterly and following large rain events

Groundwater Sampling

- > Anions (nitrate, chloride, fluoride, sulfate) and Total Dissolved Solids (annual)
- Field Parameters (pH, dissolved oxygen, ORP, specific conductance, turbidity and temperature) (annual)
- Dissolved metals (21 target analyte list metals) (biennial)





Landfill Inspections and Repairs

- Quarterly inspections inspector walks inspection route across landfill area and documents conditions (fencing, signage, drainage, erosion, burrows, dessication, vegetation) with notes and photographs
- Inspection reports are used to plan maintenance and mitigation measures
- Landfill Repairs Significant repairs of LF-002 conducted since 2013 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



Background LF-008 (SWMU 6-4)









- 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





Current Inspections and Monitoring Program

- 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
- Since 2018 sampling changed for removal of radiological analytes from the sampling list, and landfill inspections are conducted quarterly and again following large rain events

Groundwater Sampling

- VOCs (annual)
- Alkalinity and Total Dissolved Solids (annual)
- Field Parameters (pH, dissolved oxygen, ORP, specific conductance, turbidity and temperature) (annual)





Landfill Inspections and Repairs

- Quarterly inspections inspector walks inspection route across landfill area and documents conditions (fencing, signage, drainage, erosion, burrows, dessication, vegetation) with notes and photographs
- Erosion repairs conducted August 2018 with additional maintenance and repairs conducted in November 2018. Additional soil stabilization occurred in April 2019.



Explosive Ordnance Disposal (EOD) Hill (CG-570)









Site Background

- CG-570 is located on a 50 ft high limestone ridge approximately 1 mile west of Kirtland AFB's EOD Range
- The CG-570 well (also referred to as the EOD-borehole, or EOD-BH) a 214 ft borehole was installed by Sandia National Laboratory (SNL) in the early 1970s in support of down-hole geophysical measurements
- Additional small blast craters or mining prospect test pits (c1940s) present at CG-570
- There are no structures present at Site CG-570
- Perchlorate initially detected in groundwater sample from EOD-BH in 2001



EOD Hill (CG-570)



Investigation History

- Historical groundwater samples evaluated for Volatile Organic Compounds (VOCs), metals, radionuclides, cyanide, phenols, herbicides and pesticides, and general anion/alkalinity chemistry
- Perchlorate (ClO₄⁻) was established as the only Contaminant of Concern in groundwater
- Perchlorate is an oxidizing agent, primarily used in propellants for rockets or fireworks
- Colorless solid that is soluble in water
- > Naturally occurring from certain geological source materials
- Source of perchlorate in groundwater from EOD-BH is uncertain





Sampling History - Groundwater

- Ten groundwater samples collected (SNL, KAFB, and/or DOE) and analyzed for perchlorate between 2001 and 2011
- Results varied from Non Detect (at 0.94 µg/L detection limit) in 2001 to
 4,300 µg/L in 2004, with a value of 22 µg/L in 2011
- > There is no established EPA MCL. Listed as a NMWQCC toxic pollutant.
- > 2006 EPA established a Drinking Water Exposure Limit of 24.5 µg/L
- 2008 EPA updated with an Interim Drinking Water Health Advisory level of 15 μg/L
- > 2012 NMED published Tap Water screening value of 25.6 µg/L
- ➤ 2014 NMED updated Tap Water screening value to 13.8 µg/L, which remains the current value





Sampling History – Soils

- Surficial soil samples collected (1 composite from each crater) from low points within each crater (12 samples total)
- Samples analyzed in approved laboratory for perchlorate and high explosives (nitroaromatics)
- Maximum detected perchlorate concentration was 4.43 μg/kg (compared to NMED residential soil screening level of 54,800 μg/kg)
- No other analytes were detected in the soil samples



EOD Hill (CG-570)



Soil Sampling, 2016







Groundwater – Extended Purge Sampling (Dec 2014, Dec 2016)

- Samples collected during purge cycles of borehole volumes
- Dec 2014 perchlorate declined from 27.4 μg/L (initial sample) to 7.7 μg/L after 8 borehole volumes purged
- Dec 2016 perchlorate levels were below the NMED screening value (13.8 μg/L) for all samples, ranging from 7.0 (initial sample) to 8.7 μg/L in sample after 6 borehole volumes were purged





Final RCRA Facility Investigation (RFI) Report— September 2017

- Reported that all soil concentrations were below NMED Residential Soil Screening Levels
- Reported on historical perchlorate concentrations and 'extended purge' testing results in 2014 through 2016
- Based on sampling results, formation groundwater is well below NMED Tap Water screening levels (13.8 μg/L) and EPA's 2008 Interim Drinking Water Health Advisory Level (15 μg/L)



EOD Hill (CG-570)



Path Forward

- Recommendation for Corrective Action Complete (CAC) approved by NMED, December 2017
- NMED approved discontinuation of groundwater sampling and that the borehole be plugged and abandoned for Site closure
- EOD Hill Borehole plugging/abandonment conducted in May 2019
- Kirtland AFB developing a Class 3 Permit Modification Request (PMR) to move Site CG-570 to Table K-1 "Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) for which Corrective Action is Complete Without Controls (Granted No Further Action Status)" of the Kirtland AFB RCRA Permit—Submittal of PMR to NMED planned for January 2021
- The Class 3 Permit Modification will require an additional public meeting



Oil/Water Separator, ST-070E









Site Background

- Area used for aircraft movement and parking around hangar buildings 481 & 482
- Potential historic releases of fuels, lubricants and degreasers
- Former Oil Water Separator (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
- 39 soil borings were advanced and sampled up to 150 feet depth below surface
- > 7 soil vapor monitoring wells were installed





Site Background (cont.)

- Investigations determined that petroleum hydrocarbon contamination (Avgas, jet fuel, diesel and gasoline and limited mineral spirits and chlorinated solvents) impacted soils below the former OWS and drainage sump
- Groundwater characterization began in 2001 with installation of monitoring well KAFB-7001, a 480 ft deep well screened in the regional aquifer
- To date, no site-related contaminants have exceeded regulatory standards in well KAFB-7001, although trichloroethylene (TCE) has been detected at trace levels





Remediation History

> Bioventing was conducted between 1999 and 2001

- Active subsurface ventilation with humidified air though a vapor well and extraction well
- Soil samples collected to confirm presence of hydrocarbon degrading bacteria
- 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 vapor monitoring wells to SVE wells





Remediation History (cont.)

- SVE full scale system operation 2008—2016
 - The SVE treatment system was upgraded in 2008
 - Rebound study conducted in 2011 indicated that three month shutdowns would help operational efficiency
 - ➢ Full operation between June 2014 and June 2016
 - System operated at an air extraction rate of 80 to 85 standard cubic feet per minute (scfm)
- Upgraded SVE System Three New SVE Extraction Wells
 - 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)



Oil/Water Separator, ST-070E



Upgraded SVE System







Remediation History (cont.)

- > New SVE Treatment System:
 - 20 HP SVE blower up to 250 scfm operating at vacuum of 90 inches of water column
 - Two 3,000 lb vapor phase granular activated carbon (GAC) treatment vessels with a third alternate on site for change-outs
- Mass Removal Since SVE Upgrade Restart (March 2018 May 2019)
 - ➤ TPH (gasoline range) 9,760 lbs
 - Tetrachloroethylene (PCE) 5.2 lbs
 - Trichloroethylene (TCE) 15.3 lbs
 - Benzene 0.002 lbs





Path Forward

- Awaiting installation of two new groundwater monitoring wells
- Work plan approval Oct 2020 June 2021
- Monitoring well installations July 2021
- Minimum 2 years quarterly sampling (August 2021 August 2023)
- Re-evaluation of site based on groundwater sampling results



Former Sewage Lagoons (SWMU WP-026)









Site Background

- Site WP-026 includes two distinct areas Former Base Sewage Lagoons and Golf Course Main Pond (GCMP)
- Sites linked because GCMP received effluent from the Sewage Lagoons thus they shared the same waste stream
- A 15-inch gravity fed pipe transferred the partially treated waste water from the Sewage Lagoons to the GCMP
- Both the perched groundwater unit and the regional aquifer are present at the former Sewage Lagoons and at the GCMP
- Three groundwater monitoring wells are located in the perched unit at the GCMP, and nitrate is the only constituent that exceeds regulatory levels.





Former Sewage Lagoons Background

- Constructed in 1962 operated through 1987
- Unlined north and south cells
- Approximately 14 acres filled to 6 ft depth
- Approximately 330 million gallons raw sewage handled from April through October each year
- November to March KAFB sewage diverted into COA sewer system
- Reinforced with soil cement and concrete cap in 1970 & 1975





Former Sewage Lagoons Background (cont.)

- USGS study and Stage 2 RFIs 1988 through 1992
- Post closure groundwater monitoring 1994 through 1996
 - Focus was chromium
 - Several exceedances of nitrate in groundwater (max concentration 14.3 mg/L) (no exceedances since 1997)
- LTM initiated in 1996 (on-going) no nitrate exceedances in perched or regional groundwater
- Soils excavation and removal 2010 Accelerated Corrective Measure (dry sludge near surface)





Former Sewage Lagoons Background (cont.)

- Current remaining contaminant of concern is TCE in perched groundwater unit
- 2012 RFI addressed data gaps with installation of three new monitoring wells in the perched groundwater unit and two new monitoring wells in the regional aquifer for better characterization of extent on the south and east sides of the former sewage lagoons
- Soil samples during borehole installation did not have any analytes above NMED residential soil screening levels
- Limited VOCs were detected in perched unit groundwater, including TCE, but none exceeded regulatory levels in new wells
- In 2015 NMED disapproved the 2012 RFI, and an updated RFI report has been submitted to NMED (December, 2019)



Former Sewage Lagoons (SWMU WP-026)



TCE Plume January 2019















Perched Unit Groundwater - Summary

- Sampled annually for anions (including nitrate), TAL metals, VOCs
- TCE only constituent exceeding groundwater standards (wells KAFB-2622 and KAFB-2625 occasionally)
- Significant decreasing concentration trend in well of highest concentration (KAFB-2622, currently at 10 µg/L), projected to be below MCL (5 µg/L) in 5 to 10 years
- Strong trend in declining water levels in wells (~ 1 ft/year on average);
 3 perched unit wells have gone dry, 5 wells still being sampled





Regional Groundwater - Summary

- 4 wells sampled annually for anions (including nitrate), TAL metals, VOCs
- No regulatory exceedances; all VOC samples "non-detect"





Path Forward

- Following Approval of 2012 RFI (updated in 2019 as Revision 1), conduct Supplemental RFI if required by NMED
- Following Supplemental RFI, conduct Corrective Measures Evaluation, as needed







Questions?



