



# ***Kirtland Air Force Base Bulk Fuels Facility Leak Cleanup***

***Public Meeting  
July 23, 2020 (6:00—7:30 PM)***

**Kathryn Lynnes, Air Force, Office of the Secretary**

**Sheen Kottkamp, Air Force Civil Engineer Center**



# Discussion Topics



- New Mexico Environment Department (NMED) Update
- Pump and Treat Interim Measure Update
  - Ethylene Dibromide (EDB) plume
  - Groundwater Treatment System (GWTS)
- Pilot Tests Update
  - Bioventing pilot test
  - EDB biodegradation pilot test
- Recent Field Work
  - Injection well KAFB-7
  - New injection well KAFB-106IN2
  - NPDES outfall
  - Extraction well KAFB-106239



# *Discussion Topics*



- Upcoming Field Work
  - Data gap monitoring wells
  - Shallow soil vapor monitoring
- Recap/Upcoming Activities
- Community Outreach
  - Public meeting schedule
  - New public reading room



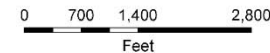
# Pump and Treat Interim Measure Update



## EDB PLUME - 2015 vs 2019



- Legend**
- Drinking Water Supply Well
  - Kirtland AFB Extraction Well
  - Kirtland AFB Installation Fence Boundary
  - Former Fuel Transfer Lines
  - Former Aboveground Storage Tank
  - Bulk Fuels Facility (SWMU ST-106/SS-111)
  - Target Capture Zone for Dissolved-Phase EDB
  - Dissolved-Phase EDB  $\geq 0.05 \mu\text{g/L}$  (EPA MCL)



**General Notes:**  
 -Aerial imagery provided by ESRI Online service  
 -EDB plume models generated with C-Tech MVS Premier Version 9.94

**Acronym(s):**  
 AFB = Air Force Base  
 EDB = ethylene dibromide  
 EPA MCL = Environmental Protection Agency maximum contaminant level  
 REI = reference elevation interval  
 SWMU = solid waste management unit  
 WUA = Water Utility Authority  
 $\mu\text{g/L}$  = microgram(s) per liter

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**\*Plume maps are based on actual field measurements and not computer simulations**

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# Groundwater Treatment System



Over 900 million gallons of groundwater have been treated, to date, using granular activated carbon to remove EDB to at or better than federal drinking water standards



***GWTS on Kirtland AFB***



Groundwater is treated in much the same way that a filter removes dissolved contaminants in a pitcher of drinking water



# Pilot Tests Update



- Bioventing pilot test
  - Summary report submitted to NMED
  - Monitoring will continue through 2021
- EDB biodegradation pilot test
  - Long-term passive monitoring began in March 2020
  - Recent data are consistent with prior observations



***ARCH rig raising drive casing and drill string***



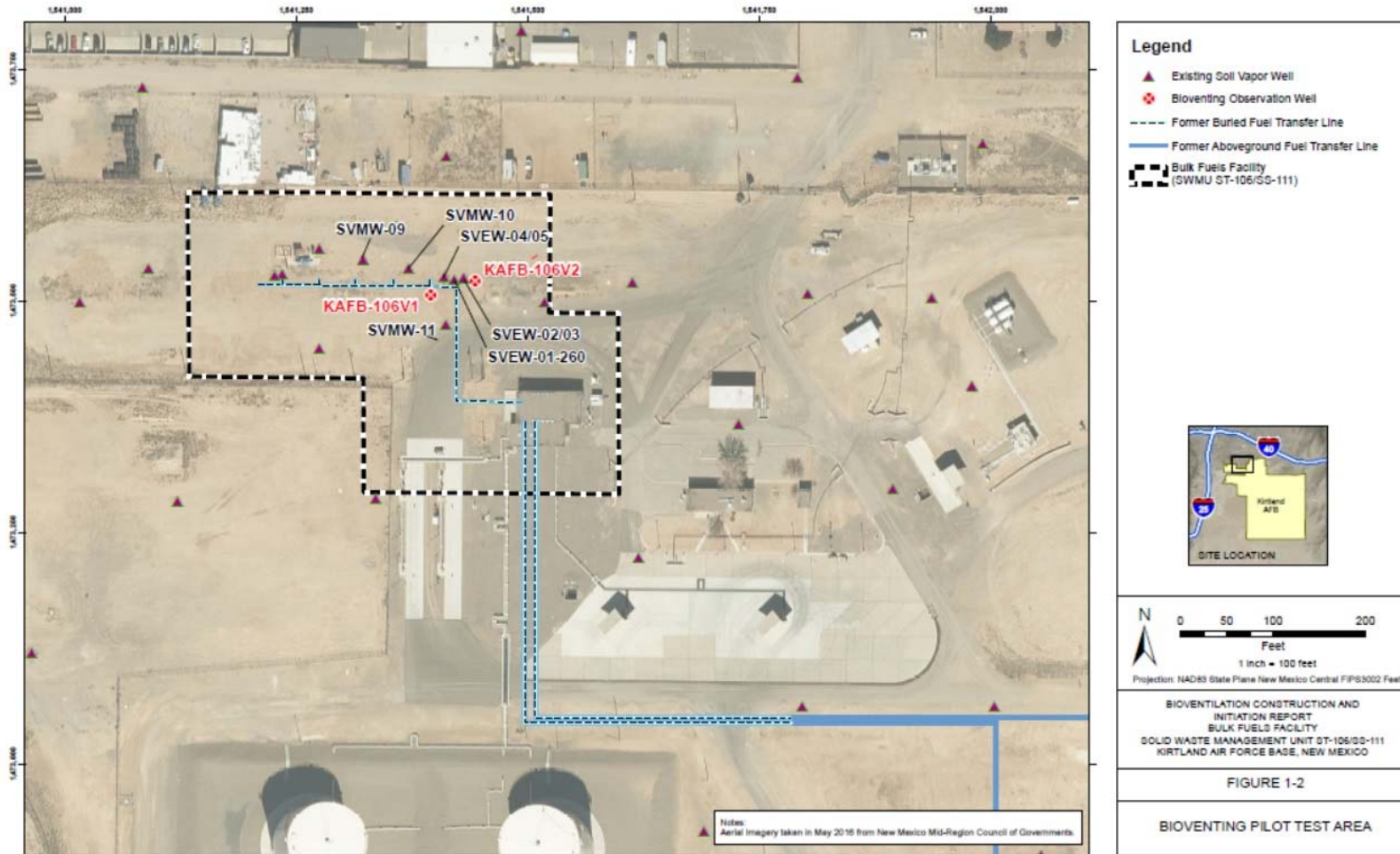
***Well development set-up***



***Double-walled conveyance piping being laid to vault***



# Bioventing Pilot Test Location



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## Recent Field Work



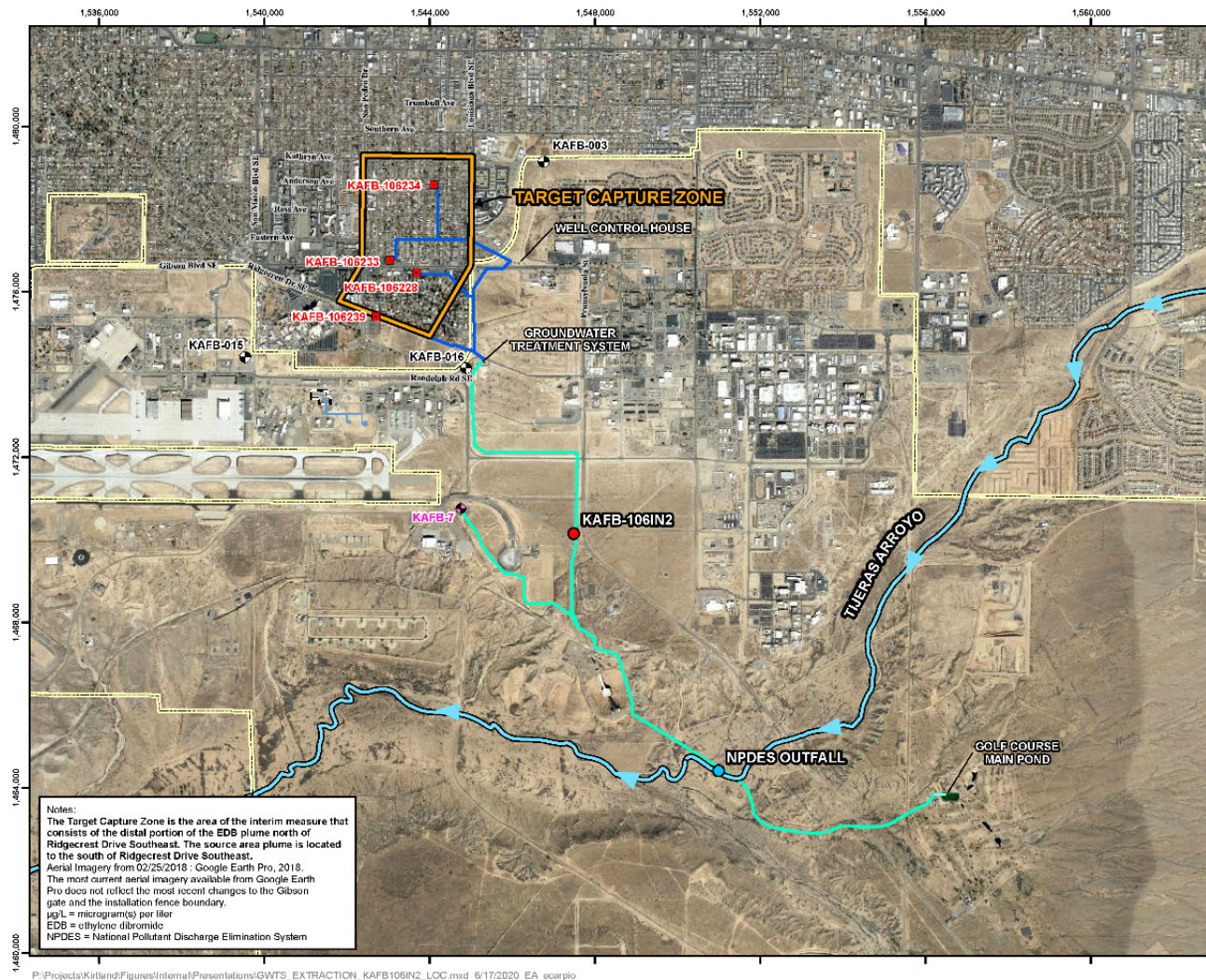
Since our last public meeting, Air Force has:

- Performed routine maintenance and replumbing of injection well KAFB-7 (***Success Story!***)
- Begun construction of new injection well (KAFB-106IN2)
- Completed the construction of the National Pollutant Discharge Elimination System (NPDES) outfall
- Rehabilitated (cleaned and disinfected) extraction well KAFB-106239 (all four extraction wells are currently up and running)





# Recent Field Work



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# *Injection Well KAFB-7 Maintenance & Success Story*



- Routine maintenance began in May 2020 to remove bacterial growth and mineral deposits from casing and well screen
- During field work we found something unexpected:
  - Sand was flowing up from the bottom of the well at ~880 ft below ground surface (bgs)
  - This meant that there was a problem with the well screen and the possibility that we might need to abandon the well
  - Used a video camera to evaluate the condition of the screen
  - Found that the screen was in good condition to a depth of ~870 ft bgs



# Injection Well KAFB-7 Maintenance & Success Story



- Good News:
  - We were able to install a 15-foot gravel plug was installed below 870 ft bgs to stop sand from continuing to enter the well
  - This action effectively ‘saved’ the well by protecting the screened interval from 470 to 870 ft bgs
  - After rehabilitation, KAFB-7’s injection capacity improved **by at least four-fold!**



**Injection well KAFB-7**



**Installing above-grade valves, meters, and piping at injection well KAFB-7**



# *Images of Injection KAFB-7 Well Activities*



*Brush/swab assembly for cleaning*



*Inserting pump for over-pumping*



*Lowering video camera into well*



# State-of-the-Art Replumbing of Injection Well KAFB-7



- Replumbed injection well KAFB-7 so all meters and valves are above-ground
- Installed new flow meter, pressure sustaining valve, and butterfly valve
- Expanded concrete pad and well enclosure to house meters and valves
- Improvements allow easier inspection and maintenance of equipment





# *New Injection Well KAFB-106IN2*



***Drilling Rig used for KAFB-106IN2***

- Groundwater Discharge Permit DP-1839 allows Air Force up to four additional injection wells
- After consultation with NMED and stakeholders, Air Force funded new injection well KAFB-106IN2
- Well installation July through August 2020
  - Borehole drilling
  - Borehole geophysics to optimize well construction
  - Borehole widening and well construction
  - Pipeline, valve, and meter installation and testing



# New NPDES Outfall



***Field crew working on construction of the NPDES outfall***

- Completed construction in late April for the National Pollutant Discharge Elimination System (NPDES) outfall, located at the Tijeras Arroyo on Kirtland AFB
- The Air Force doesn't intend to use it unless the other options are not available

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# *Upcoming Field Work*



- Data gap monitoring wells – Round II
  - The revised scope of work is a good example of the data-driven RCRA process
  - Goal is to get to the end of the investigation stage of BFF
- Shallow soil vapor sampling
  - Once work plan is approved by NMED, shallow soil vapor sampling will take place north of Base
  - The objective of this sampling is to confirm that there are no vapor intrusion risks to residents north of Bullhead Park or the VA buildings near the northwest base boundary





# Data Gap Monitoring Wells



- The Source Area Report was submitted to NMED on 07 Nov 2019
  - Addressed data gaps in the horizontal and vertical extent of residual light non-aqueous phase liquid (LNAPL)
  - Report evaluated movement of LNAPL from the source to the groundwater
- The Air Force submitted a second data gap well work plan to NMED on 11 Dec 2019
  - Proposed to install five new wells (one north and four south of Ridgecrest)
  - Primary purpose was to address data gaps from rising water table



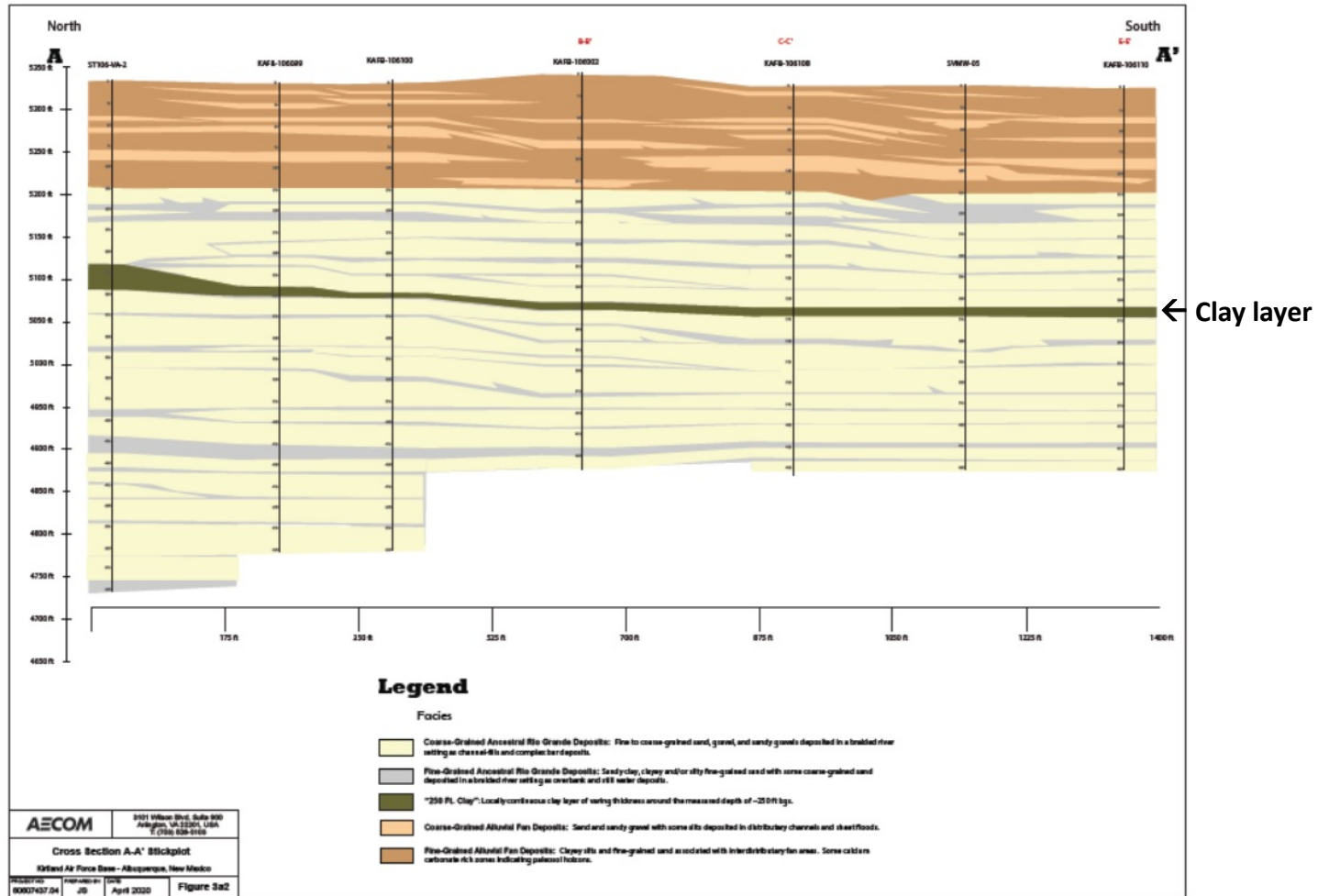
# Data Gap Monitoring Wells



- How the scope evolved:
  - As NMED was reviewing the Source Area Characterization Report and the data gap work plan they identified a coring/well location that would help pinpoint where the LNAPL moved through the vadose zone through the clay layer at 250 bgs and down to the groundwater
  - The Air Force had been independently evaluating the clay layer and LNAPL migration in the source area and agreed with NMED that the original data gap well scope should be revised to put a well in the area where the LNAPL likely moved through the clay layer
  - NMED issued an Approval with Modifications for the work plan on 14 July 2020



# Data Gap Monitoring Wells



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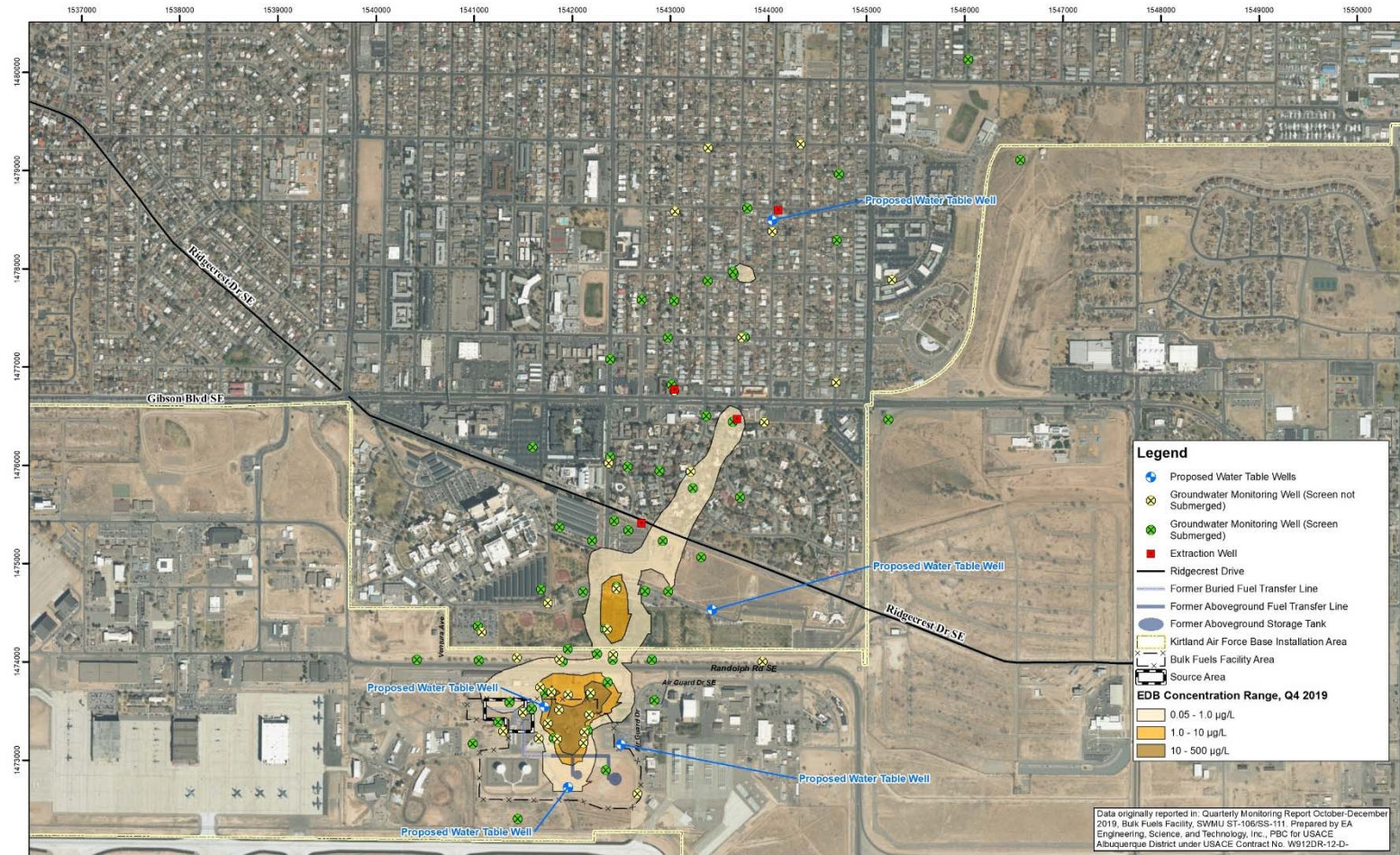
# Data Gap Monitoring Wells



- The revised scope of work will:
  - Move one of the well locations to the area where the LNAPL likely moved through the clay layer
  - If the first borehole “hits the gap” install a groundwater monitoring well
  - If the clay layer is encountered, the boring will be converted to a soil vapor well and a step-out boring will be advanced further to the east
  - The Air Force will use drilling and sampling techniques employed during the coring



# Data Gap Monitoring Wells



Document Path: N:\Kirtland\GIS\GIS\_Projects\BFF\_new\_well\_plan\Figure 2-1. Proposed Wells.mxd

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# *Recap/Upcoming Activities*



## **Scheduled or underway for 2020**

- Continue to operate the EDB interim measure
- Bioventing pilot test will continue (and will be discussed in an upcoming presentation when more results are available)
- Second injection well will be completed
- Data gap wells will be installed and sampled
- Quarterly monitoring will continue

## **Anticipated for 2021**

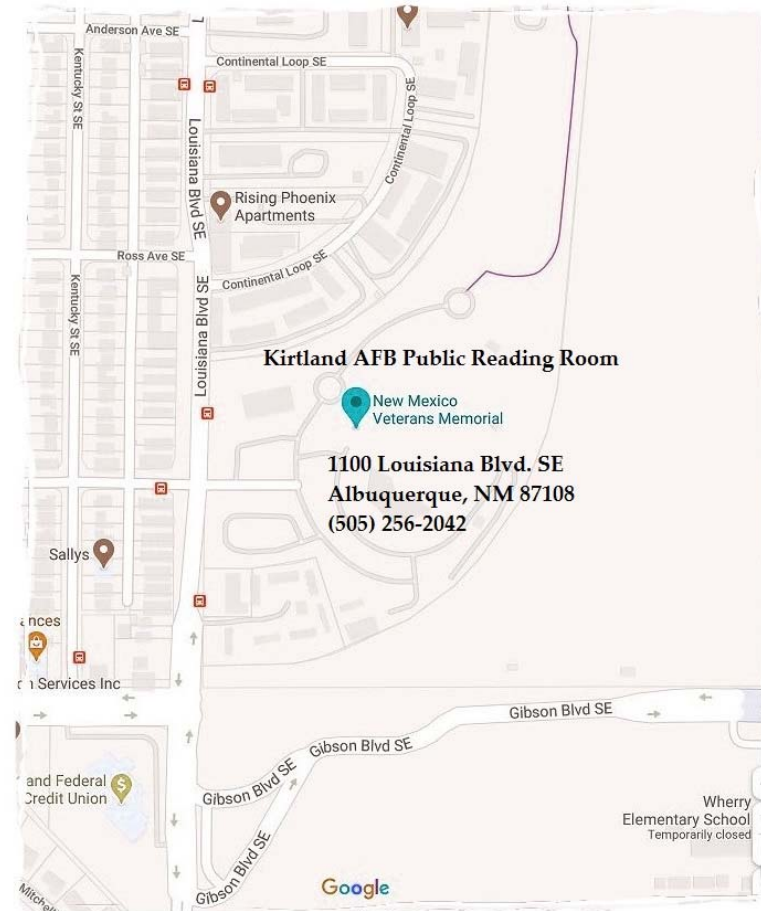
- Shallow soil vapor sampling will be performed
- Phase II RFI Report will be submitted
- Bioventing and EDB pilot test monitoring will continue
- Quarterly monitoring and EDB interim measure will continue



# Community Outreach



- We welcome your input and look forward to seeing you at the next public meeting scheduled for 5 November 2020
- Note that we have a new public reading room located at the New Mexico Veterans Memorial at 1100 Louisiana Blvd SE, Albuquerque, just north of Gibson Blvd
- However, the Veterans Memorial will remain closed, pending further guidance from our governor





# Questions?



## Point of Contact:

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## Additional information:

Online at <https://www.kirtland.af.mil/Home/BFF/> and <https://ar.afcec-cloud.af.mil/> or visit our New Information Station at the New Mexico Veterans Memorial at 1100 Louisiana Blvd SE, Albuquerque, NM





# *Back-Up Slides*





# BFF Ongoing Monitoring



Ongoing Monitoring Activities		
<b>Groundwater Monitoring</b>	Sample and test groundwater monitoring wells quarterly in accordance with permit requirements.	2001–present (ongoing)
<b>Soil Vapor Monitoring</b>	Sample and test SVM wells semi-annually in accordance with permit requirements and to support the Corrective Measures Evaluation.	2001–present (ongoing)
<b>Drinking Water Monitoring</b>	Sample and test drinking water wells monthly for the Albuquerque Bernalillo County Water Utility Authority, Raymond G. Murphy Veteran’s Administration (VA) Medical Center, and Kirtland Air Force Base.	2006–present (ongoing)
<b>Optimize Vadose Zone Monitoring Plan</b>	Optimize annual vadose zone monitoring plan to focus sampling on representative, targeted fuel-related compounds and reduce redundant sample locations based on current data. Schedule is dependent on NMED approval.	2020–2021 (estimate)
<b>Optimize Groundwater Monitoring Plan</b>	Prioritize groundwater monitoring of VA water supply by conducting supplemental monitoring of sentinel wells closer to the VA well. Adjust sampling locations and frequency based on current data. Schedule is dependent on NMED approval.	2020–2021 (estimate)



# BFF Interim Measures



Interim Cleanup Measures		
<b>Contaminated Soil Removal</b>	Excavated and removed 5,000 tons of contaminated soil from the source area to a depth of about 20 feet. Hauled soils off-Base to a disposal facility.	1999–2014
<b>Soil Vapor Extraction (SVE) System</b>	Removed about 775,000 equivalent gallons of jet fuel from the soils above groundwater using SVE wells.	2003–2015
<b>Light Non-Aqueous Phase Liquid (LNAPL) Skimmer</b>	Removed less than 300 gallons of fuel from one groundwater well. Discontinued the skimmer system within a year because of poor fuel (LNAPL) recovery.	2007–2008
<b>Modified Bioslurping/SVE</b>	Removed about 225,000 equivalent gallons of fuel through a modified bioslurping/SVE system (included in total removed by SVE).	2008–2011
<b>Temporary Pump and Treat System</b>	Installed one groundwater extraction well and constructed a temporary groundwater treatment system (GWTS) for the dissolved phase ethylene dibromide (EDB) groundwater plume.	Completed June 2015
<b>Full-Scale Pump and Treat System</b>	Installed two additional groundwater extraction wells and constructed a full-scale dissolved EDB GWTS. The temporary system was dismantled.	Completed December 2015
<b>Injection Well KAFB-7</b>	Retrofitted existing groundwater well KAFB-7 to serve as an injection well for treated groundwater. The NMED temporarily allowed KAFB-7 to operate beginning in 2015 prior to issuing the Class V injection well discharge permit (DP-1839) in 2017.	2015–present



# ***BFF Interim Measures (Continued)***



Interim Cleanup Measures		
<b>GWTS Upgrade</b>	Doubled the capacity of the GWTS from 400 to 800 gallons per minute.	2017
<b>Extraction Well KAFB-106239</b>	Installed and started up groundwater extraction well KAFB-106239 near the foot of the EDB plume.	Started up February 2018
<b>Injection Well KAFB-7</b>	Reconstructed wellhead for injection well KAFB-7 and performed routine maintenance to ensure continued high performance.	May 2020–June 2020
<b>Injection Well KAFB-106IN2</b>	Installed a second groundwater injection well (KAFB-106IN2) for treated water from the GWTS. This is also a Class V permitted injection well.	July 2020–August 2020 (estimate)
<b>National Pollutant Discharge Elimination System (NPDES) Outfall</b>	Obtained NPDES permit from the Environmental Protection Agency to discharge treated water to Tijeras Arroyo. Obtained Section 404 dredge and fill permit from Army Corps of Engineers and constructed discharge pipe. (NPDES outfall is not currently in use).	2019–2020
<b>GWTS Upgrade</b>	Upgraded GWTS plant equipment, including conveyance valves and controls, and installed a new computer control system.	October 2019–November 2019
<b>Golf Course Main Pond (GCMP)</b>	Conduct routine maintenance on the Tijeras Arroyo GCMP, which receives a portion of the treated water from the GWTS.	2020–2021 (estimate)



# BFF Pilot Testing and GW Modeling



Pilot Testing		
In Situ Bioremediation Pilot Test	Conducted a pilot test to evaluate in situ biostimulation to enhance anaerobic EDB biodegradation in groundwater. Pilot test ended in 2018. Passive monitoring began in March 2020.	2016–2020
Bioventing Pilot Test	Conducted a pilot test to evaluate the addition of air and moisture to enhance aerobic biodegradation of fuel constituents in the vadose zone. Pilot test ended in 2019. Passive monitoring continues.	2019–2021

Groundwater Modeling		
Plume Capture Modeling	Perform plume capture modeling using groundwater monitoring data to estimate the size of the plume and assess the effectiveness of the pump and treat system.	Ongoing (biannually during Q2 and Q4)