

Kirtland Air Force Base Bulk Fuels Facility Leak Cleanup

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**AWWA/WEA Luncheon
November 9, 2017**



Site History

- The Kirtland Air Force Base (KAFB) Bulk Fuels Facility (BFF) is located in the northwestern portion of the base and began operation in 1953.
- BFF was the fueling area for the installation and received bulk shipments of fuel from railcars and trucks.
- An underground pipeline extending from the fuel off-loading area to the fuel pump house gradually leaked jet fuel into the ground.
- The leak was discovered in 1999 and KAFB sealed off the underground pipe and removed it from service.
- The KAFB fuels facility was replaced in 2011 with all above-ground piping and tanks along with state-of-the-art leak detection technology.

1999 Leak Photos at BFF

Metal Stair Step

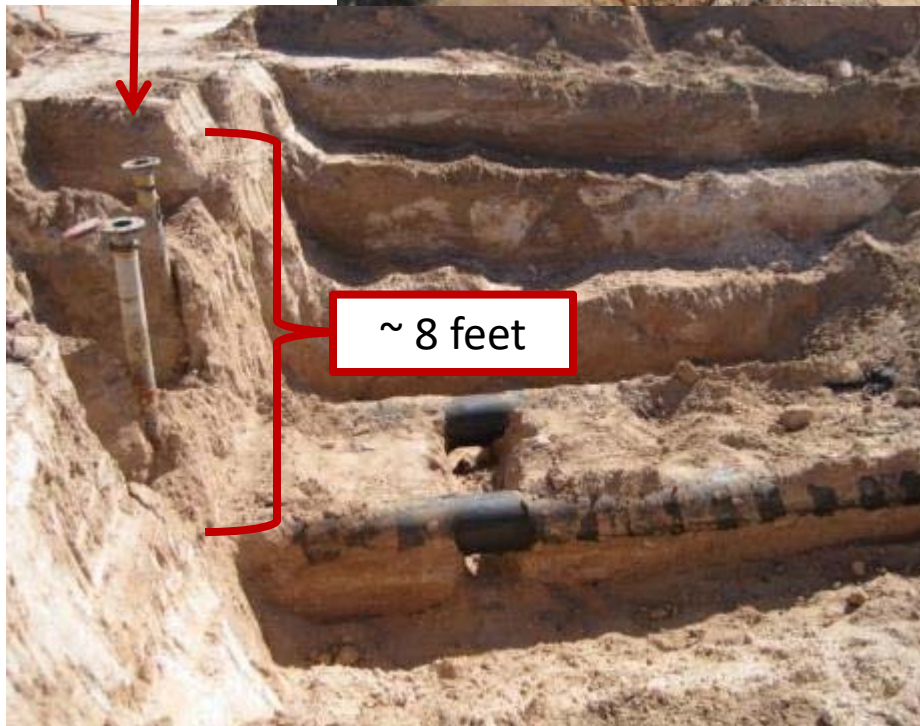


Removal of Piping 2010 Photos

Pipe Connect
into the Pump
House Building



Hole in Bottom
of Transfer Pipe

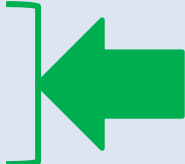


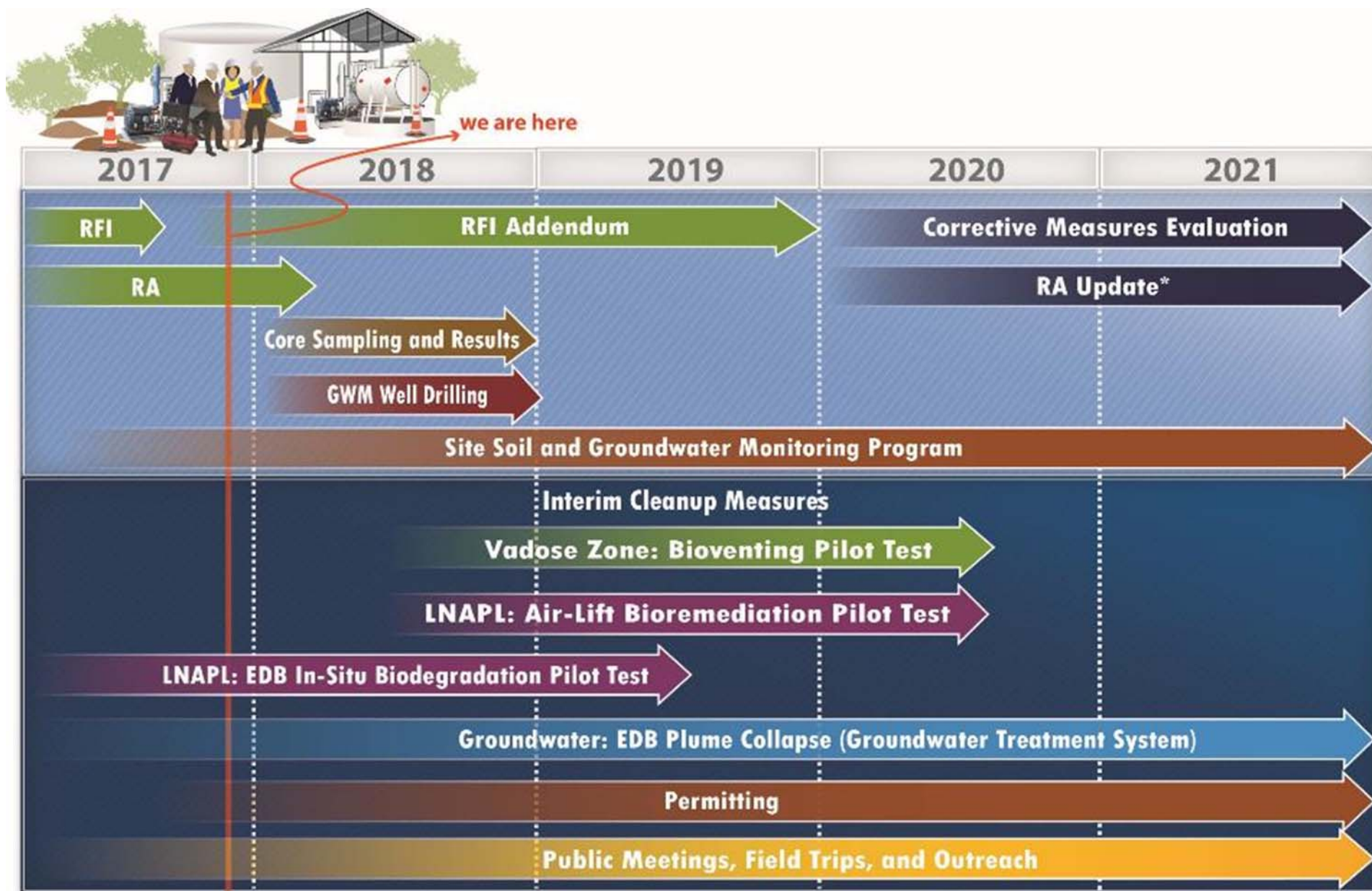
~ 8 feet



Pipe Bent
when Removed
from Trench

Regulatory Framework

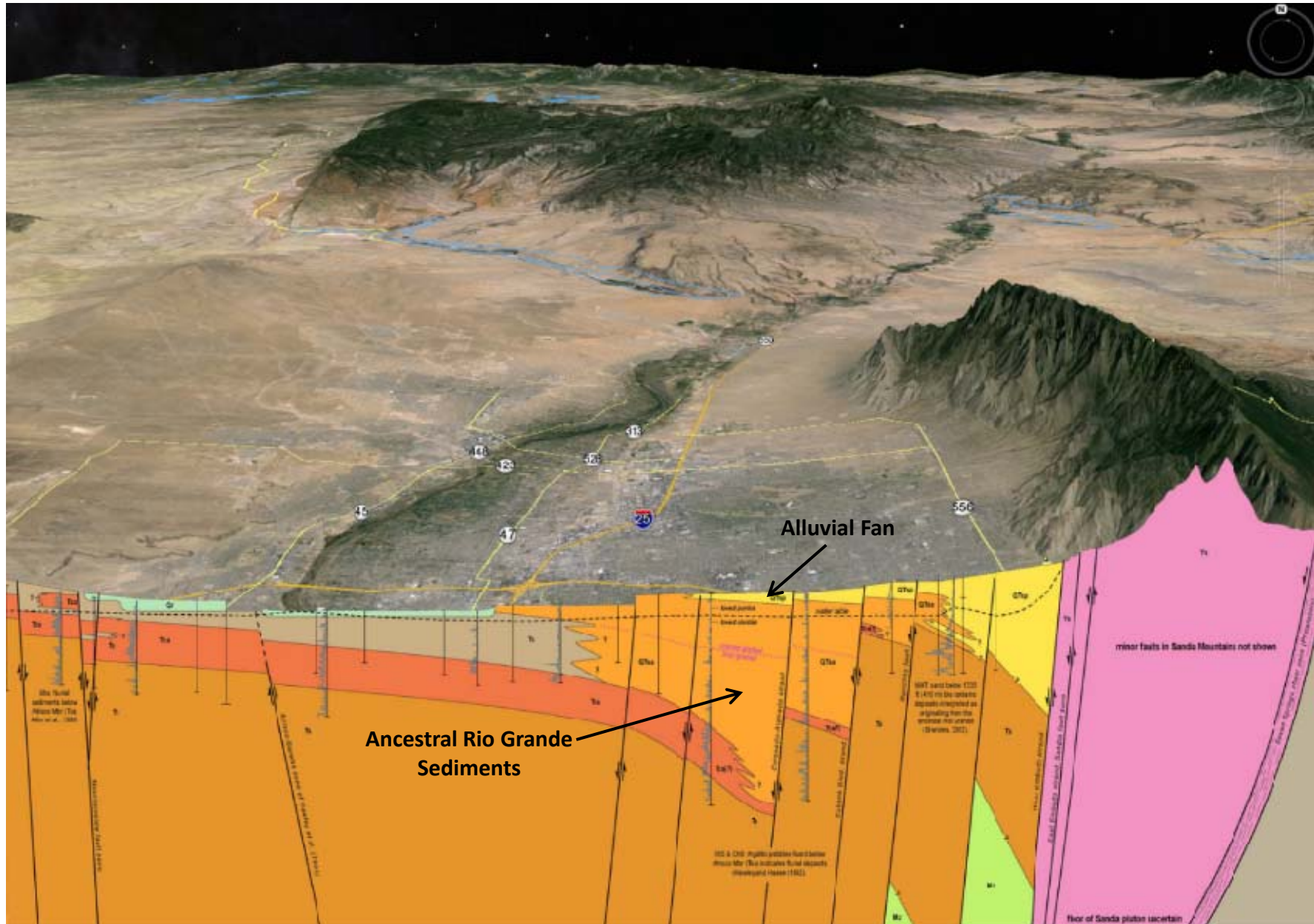
- The New Mexico Environment Department (NMED) governs the fuel leak site through the administration of two federal acts:
 - Safe Drinking Water Act (SWDA)
 - Resource Conservation and Recovery Act (RCRA)
 - Site activities are being completed under the Corrective Action provision of RCRA and KAFB's permit:
 - Site Investigation
 - Interim Measures (IMs)
 - Corrective Measures Evaluation (CME)
 - Corrective Measures Implementation (CMI)
-  The BFF project is here



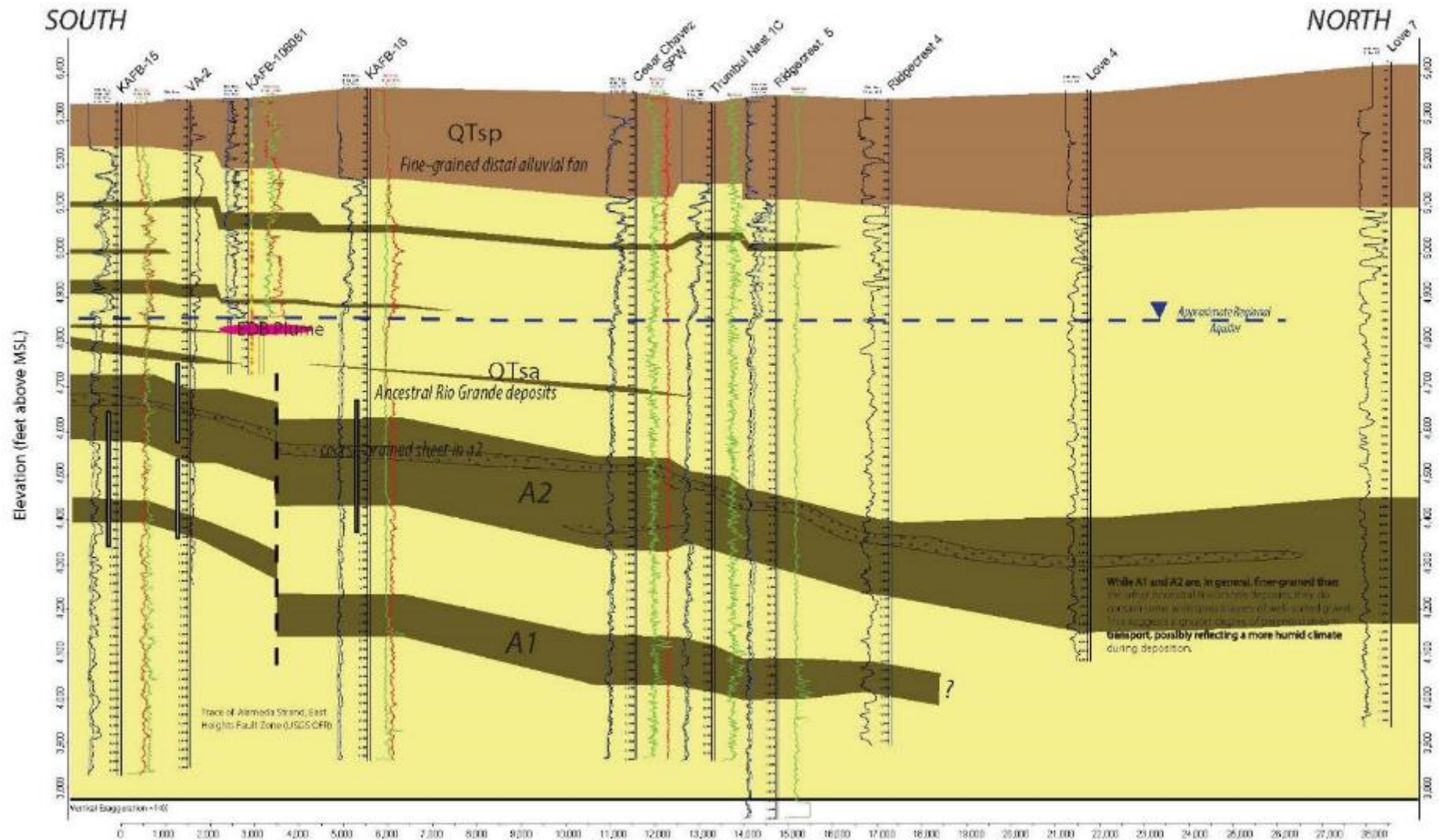
» EDB - Ethylene Dibromide • LNAPL - Light Non-Aqueous Phase Liquid • RA - Risk Assessment • RFI - RCRA Facility Investigation Report

* Risk numbers may be re-evaluated during CME if necessary

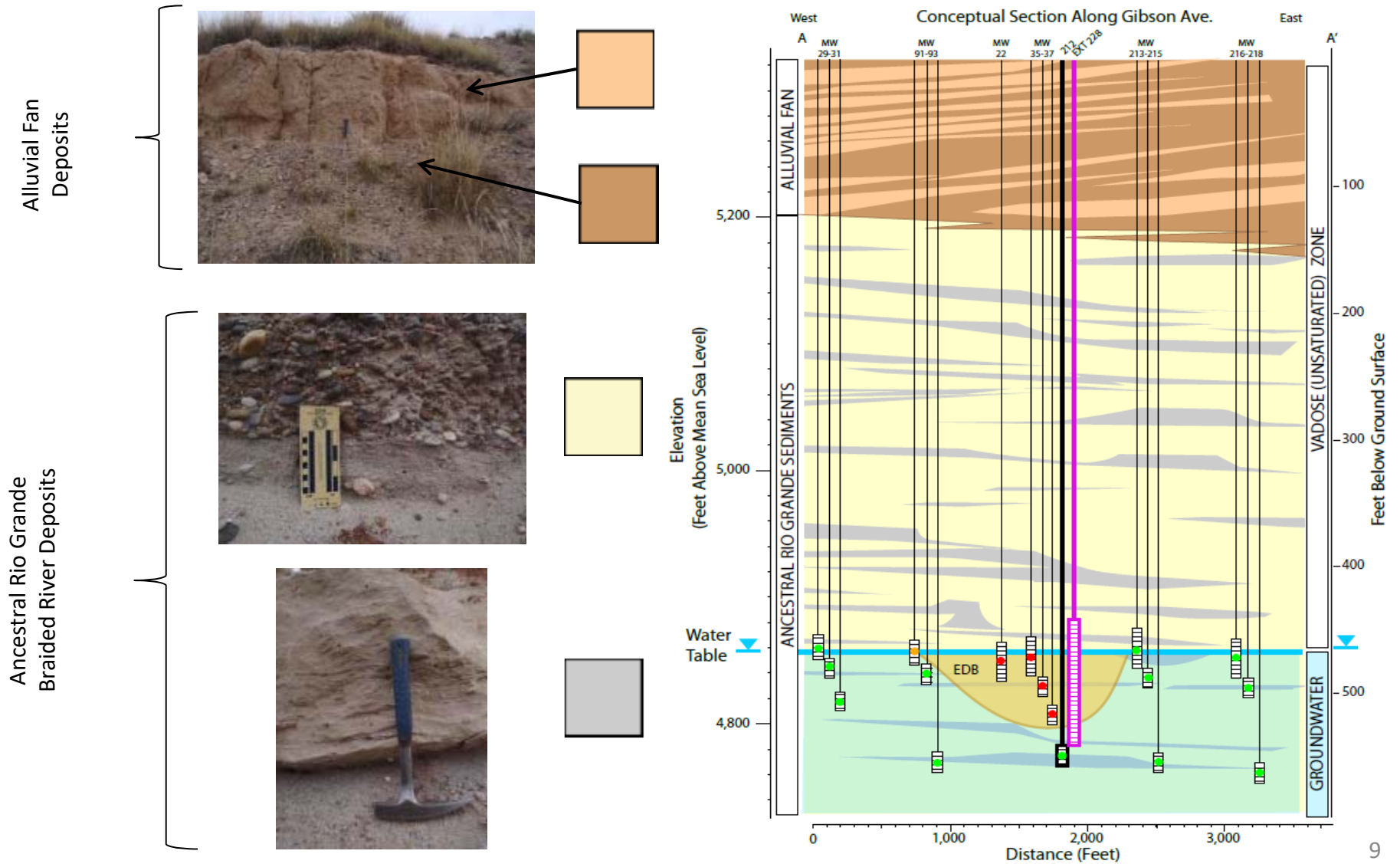
Understanding the Hydrology



Regional Scale Geology

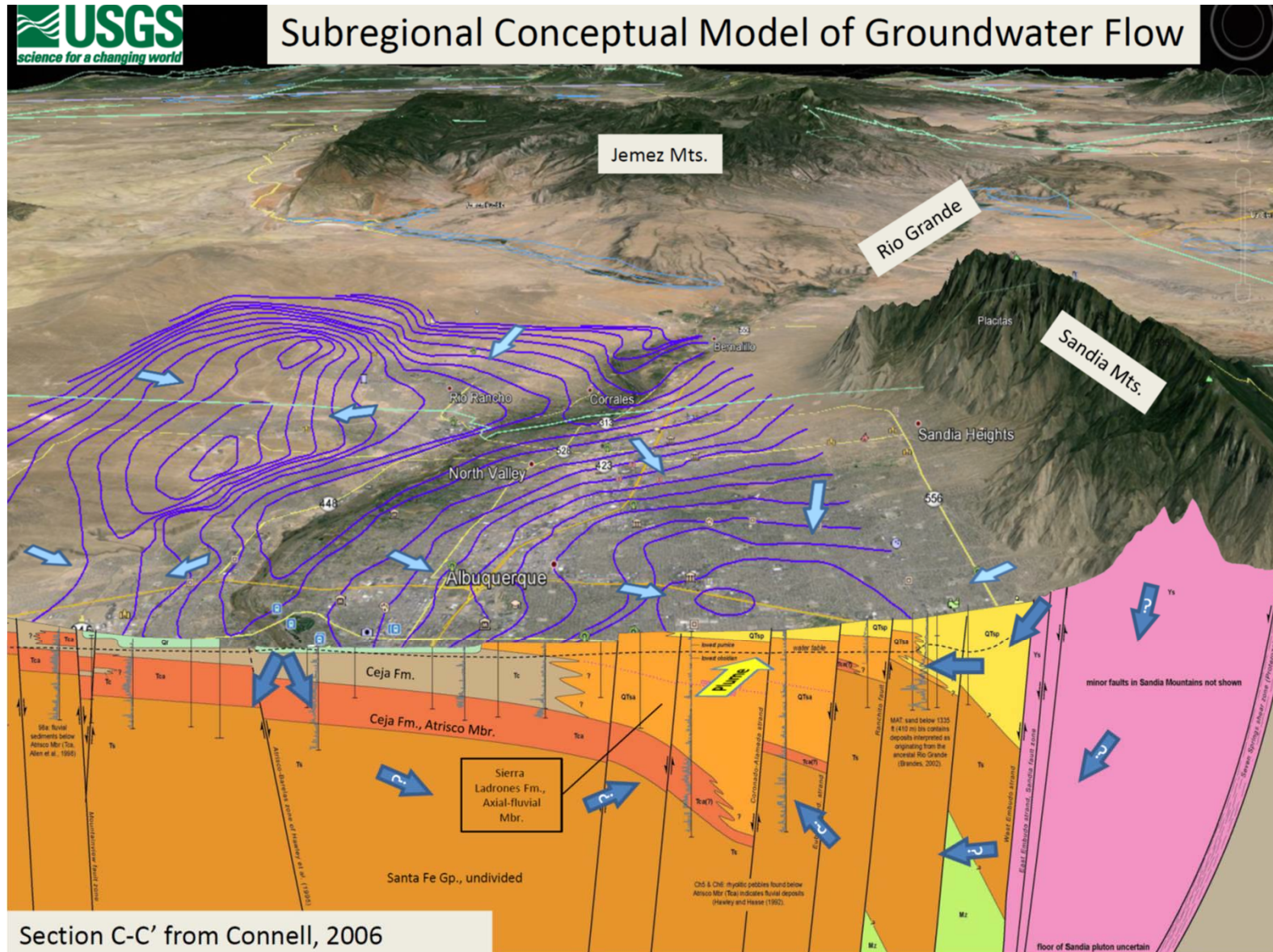


Understanding the Geology



Conceptual Site Model

<https://www.env.nm.gov/NMED/Issues/KirtlandFuelPlume/KAFBProjectImages.html>



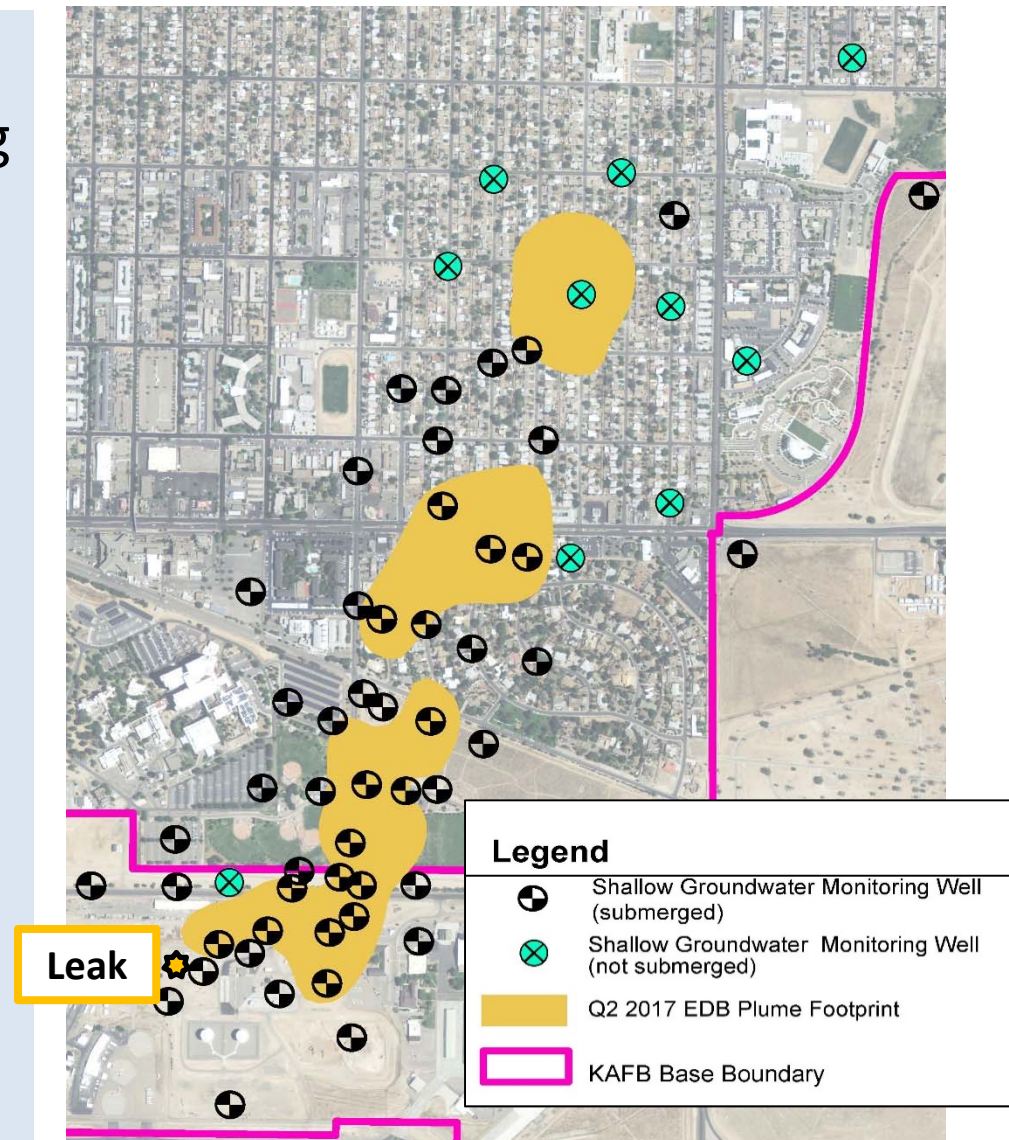
More to be done!

Vadose Zone and LNAPL:

- Interim measure bioslurping removed light non-aqueous phase liquid (LNAPL)
- Historic rise and fall of water table affected LNAPL
- Need to estimate mass of LNAPL remaining in vadose zone and submerged

Groundwater

- Rapid rise in water table observed in Q2 2017
- Reduction of water table monitoring network as water table rises



Pulling it all together

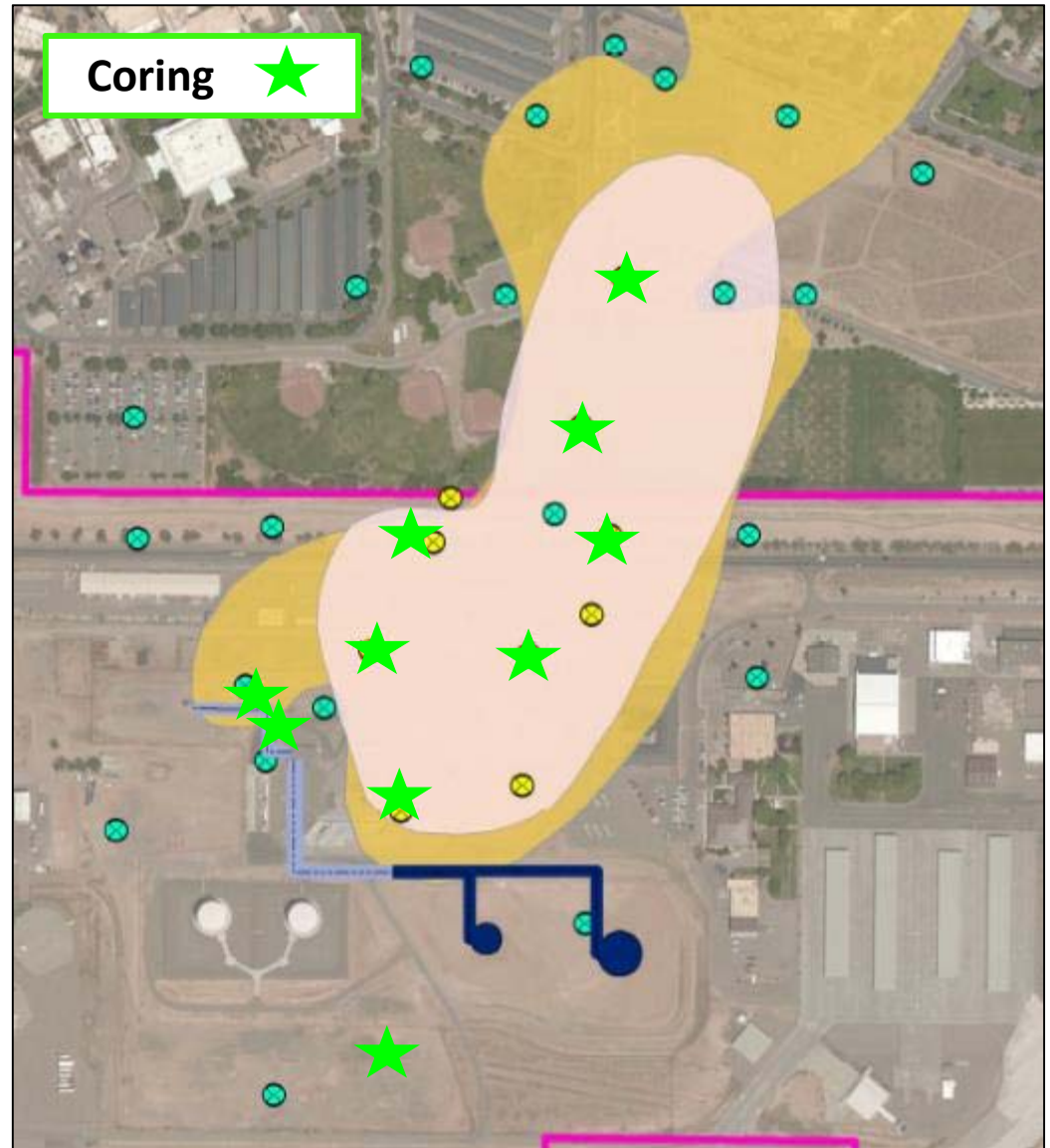
- As we continue to collect data, we are able to further refine the conceptual site model
 - *Vadose zone*: Collection of continuous cores in the unsaturated zone to refine soil vapor rebound test results and evaluate the nature of LNAPL suspended in the soil
 - *Groundwater*: Rising water table necessitates additional wells to evaluate EDB plume mass. Continuous core samples within the saturated soil will refine understanding of “drowned” LNAPL.

2017 LNAPL Data Gaps

- Interim measure
bioslurping removed LNAPL
- Water table fall and rise
affected LNAPL
- Understanding LNAPL
remaining vertically (i.e.,
smearing)

Legend

- Shallow Groundwater Monitoring Well
- Groundwater Monitoring Well with Historic LNAPL Observation
- Former Aboveground Fuel Transfer Lines and Tanks
- Former Buried Fuel Transfer Lines
- Q2 2016 Benzene Plume
- Q2 2016 EDB Plume
- KAFB Base Boundary



What's Next for Site Investigation?

- Site Investigation Report (RFI Report) currently in NMED review
- Groundwater and LNAPL data gaps will remain
- Refinement of site conceptual model and understanding of contaminant fate and transport
 - Incorporating of data gap results
 - Results from operation of interim measures key

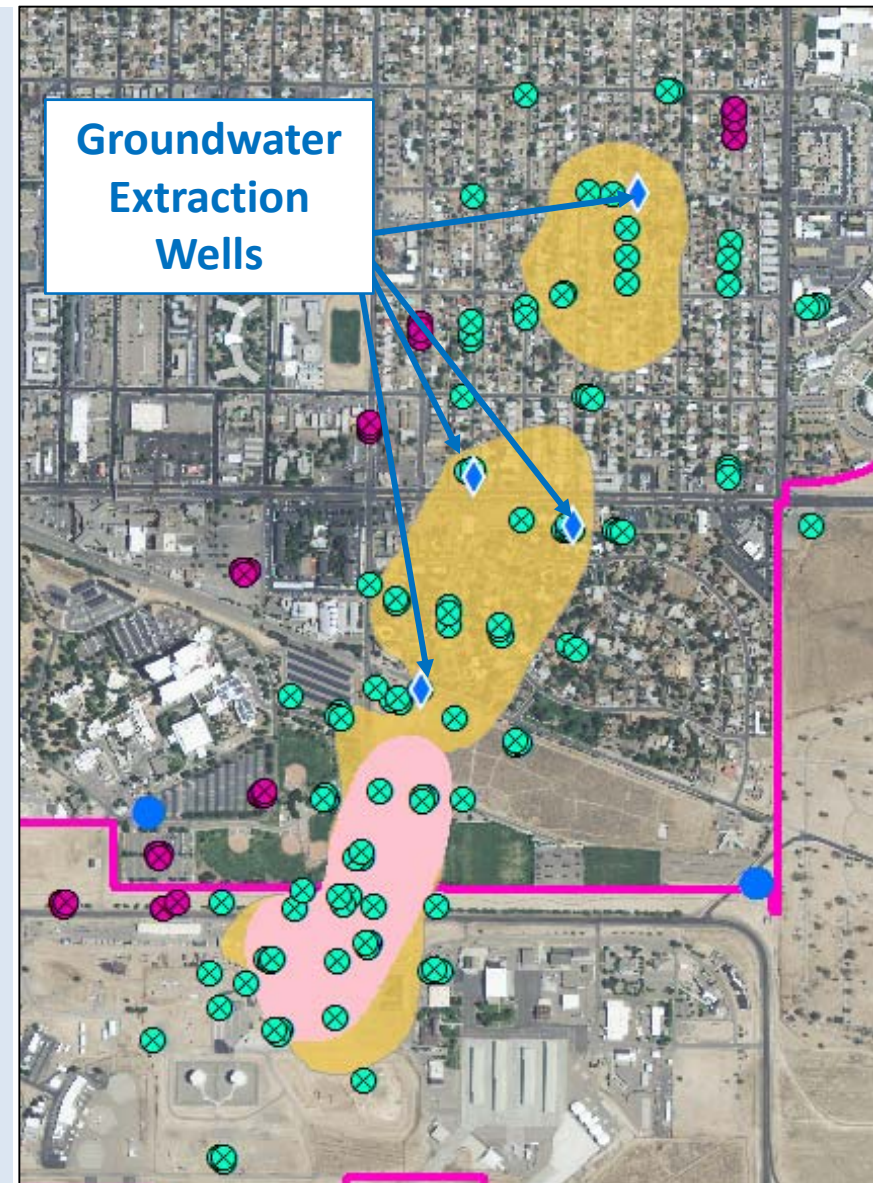
Interim Measure Strategies at BFF

Source Removal

- Soil excavation down to 20 feet below ground surface at leak location (primary source)
- Soil vapor extraction (SVE) in vadose zone (secondary source)

EDB Plume Collapse

- Contain the dissolved EDB mass (secondary source)
- Prevent EDB from reaching drinking water supply wells near the dissolved plumes



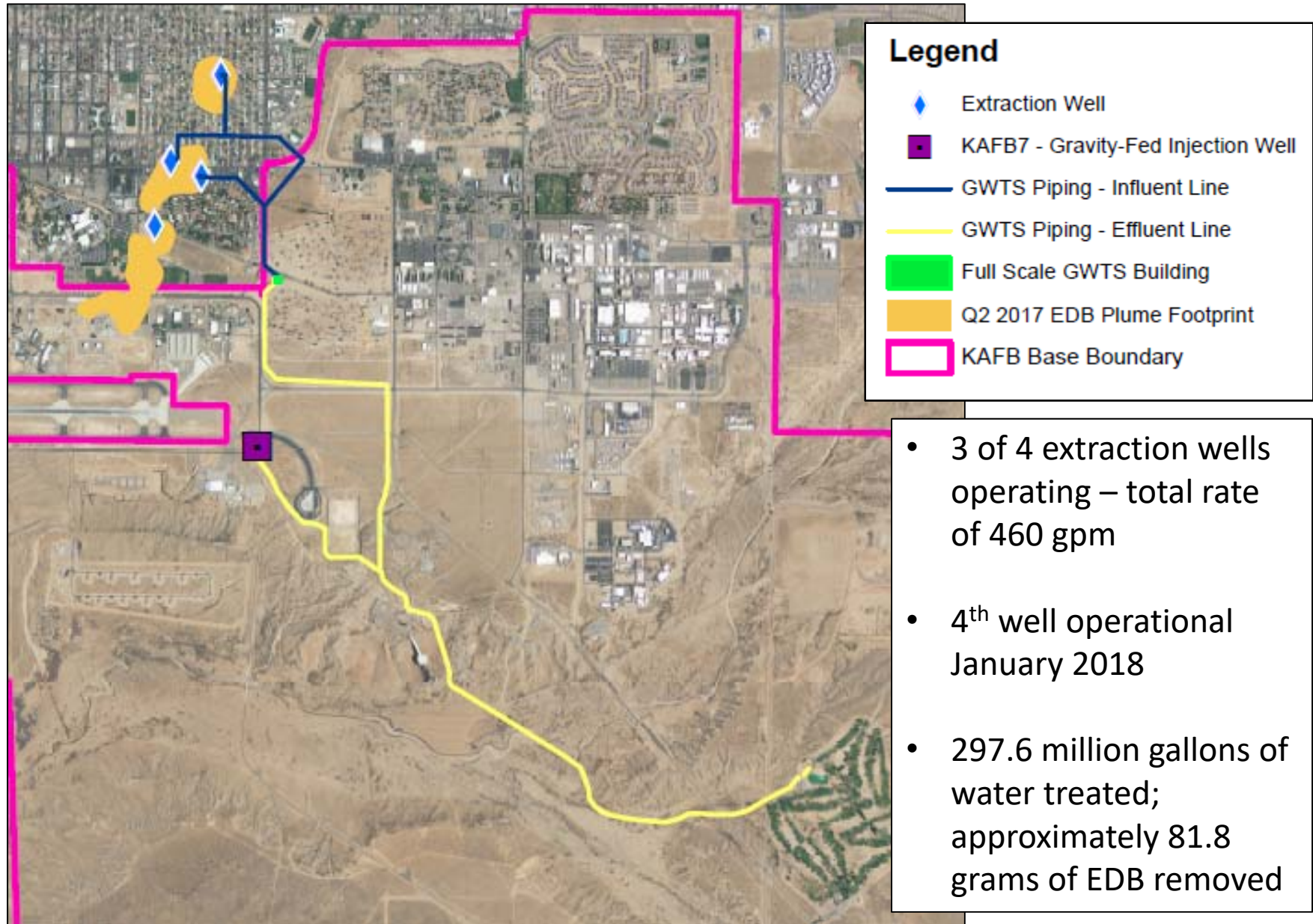
Groundwater Remediation

- Technical working groups met to resolve two issues:
 - Source control (primary and secondary)
 - Protection of human health and the environment through cleanup to regulatory standards
- Technologies evaluated include:
 - Pump and treat
 - Air sparging
 - Permeable reactive barriers
 - Monitored natural attenuation
 - Enhanced bioremediation - recirculation

Remediation is **NOT** one-size fits all. Key factors include:

- Site geology and hydrology
- Depth of contamination
- Infrastructure requirements
- Cost

EDB Plume Collapse



Groundwater Treatment System



What's next for EDB Plume Collapse?

- Construction of conveyance pipeline from new extraction well KAFB-106239 on Ridgecrest Dr. to GWTS
- Complete installation of pre-treatment sand filters
- Operate GWTS with all 4 extraction wells
- Refinement of plume capture evaluation through tracking multiple lines of evidence

Source Area Remediation

- A technical working group specific to the LNAPL and vadose zone was tasked with addressing:
 - Source removal
 - Protection of human health and the environment
- Currently evaluating multiple technologies:
 - Bioventing
 - Air-lift biodegradation

Remediation is **NOT** one-size fits all and evolves as the contaminant is cleanup overtime. Key factors include:

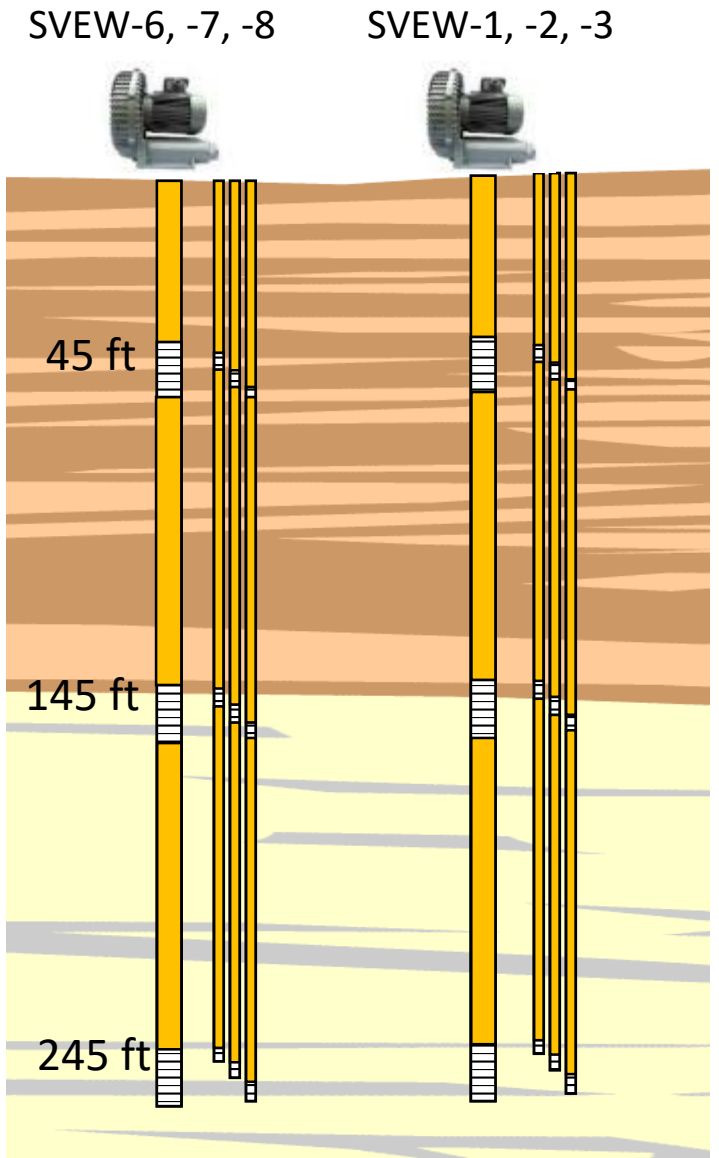
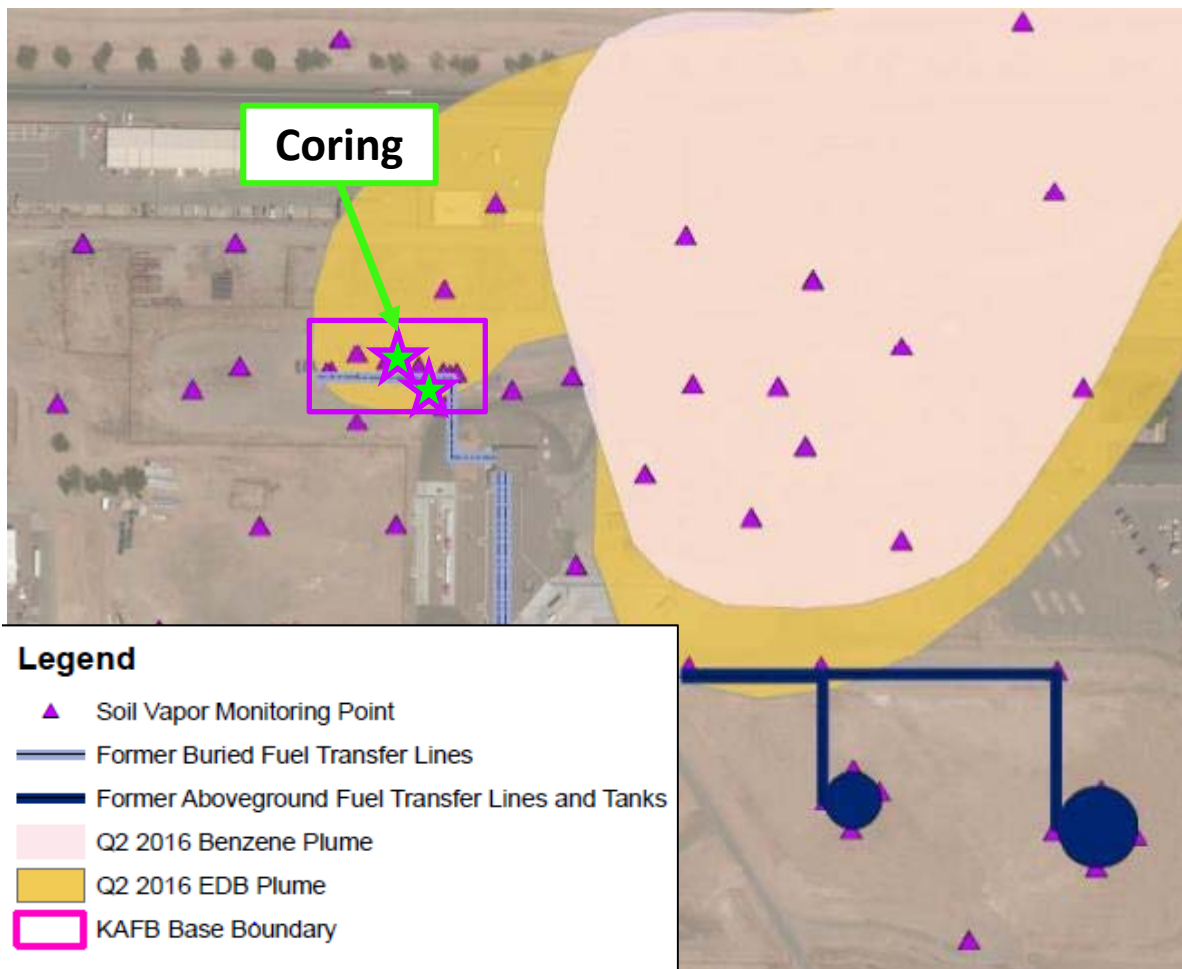
- Natural Conditions (aerobic vs anaerobic)
- Effectiveness and Efficiency
- Sustainability and Cost

Source Area Interim Measures

- Phase I of EDB Biodegradation Pilot Test began in October 2017
 - *Goal:* Treatment of EDB trapped in smeared LNAPL through anaerobic biodegradation
- Air-Lift Enhanced Bioremediation Pilot Test planned for mid-2018
 - *Goal:* Treatment of smeared LNAPL through aerobic biodegradation
 - Continuous core data required to complete design
- Bioventing Pilot Test planned for mid-2018
 - *Goal:* Aerobic degradation of fuel and cometabolism of EDB
 - Continuous core data required to complete design

2017 Vadose Zone Interim Measure

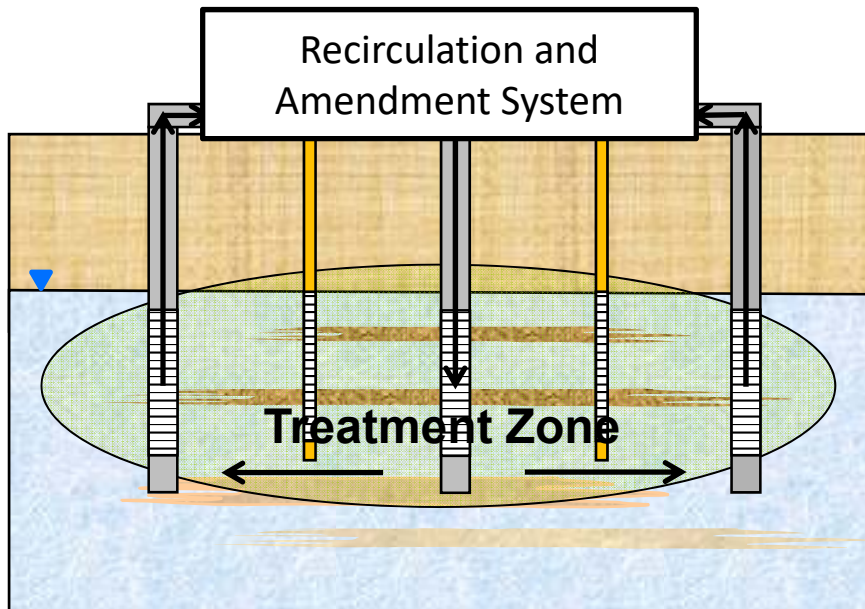
- Bioventing area targeting rebound zone 50 – 300 feet below ground surface
- Aerobic degradation fuel and cometabolism EDB



2017 LNAPL Interim Measures

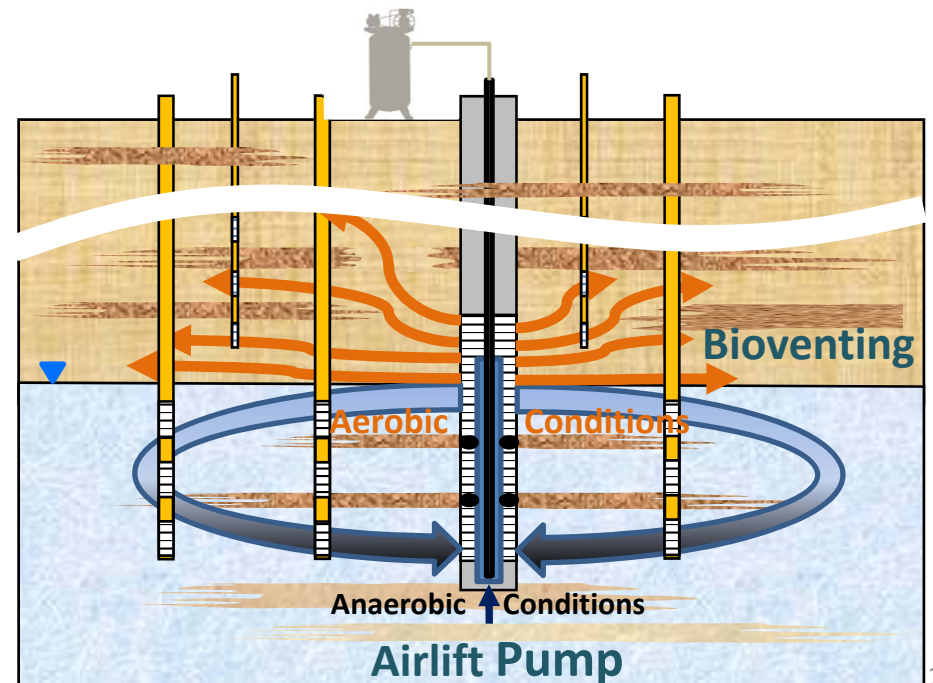
EDB In Situ Biodegradation

- Treating EDB trapped in smeared LNAPL through anaerobic biodegradation



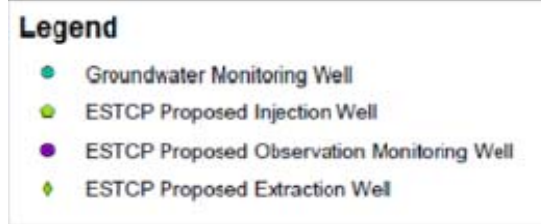
Air-lift Enhanced Bioremediation

- Treating smeared LNAPL through aerobic biodegradation



EDB In Situ Biodegradation Pilot Test

- Field activities began in January 2017
- Wells have been drilled and installed
- Baseline testing completed September 5-8, 2017
- Phase I underway – tracer plus recirculation, no amendments
- Up to 3 phases planned



NMED 2018 Strategic Plan

NMED Draft 2018 Strategic Plan will be posted by the end of December 2017 for public review and comment (www.env.nm.gov/kafbfuelplume)

Goal: Protect Albuquerque's aquifer and drinking water supply wells in the area of the fuel leak.

Strategies to Achieve the Goal:

1. Implement a robust site monitoring & wellhead protection program.
2. Deploy multiple cleanup strategies, both simultaneously and sequentially, to cleanup soil and groundwater.
3. Meet or exceed all requirements for providing public comment, information, and involvement.

Looking Forward

- Formal NMED comments on RFI and Risk Assessment Reports (Fall 2017)
- Drill, install, and sample water table groundwater monitoring wells (Winter 2018)
- Drill and sample continuous cores to delineate LNAPL extent (Winter/Spring 2018)
- Continued operation of EDB plume collapse interim measure
- Begin operation of 4th groundwater extraction well (Winter 2018)
- Complete installation of pre-treatment sand filters at Groundwater Treatment System

Looking Forward

- Continued operation of EDB biodegradation pilot test
- Prepare Bioventing Pilot Test Work Plan (Summer 2018)
- Prepare Air-Lift Biodegradation Pilot Test Work Plan (Summer 2018)
- Conduct technical working group meetings to continue to evaluate rising water table, LNAPL mass estimates, and advance interim measures using current data
- Continue quarterly public meetings and outreach to neighborhoods and community groups

Next Public Meeting

Project Update Public Meeting with Technical Deep Dive

November 14, 2017

African American Performing Arts Center

5:00 – 6:00 p.m. Technical Deep Dive, BFF Risk Assessment

6:00 – 7:30 p.m. Project Update Presentation

If interested in attending the technical deep dive, please register at the link below so that adequate resources and materials are available:

<https://www.portageinc.com/apps/kafb>

How do I get more information?

Contact NMED:

Allison Majure	Communications Lead	(505) 827-2855	Allison.majure@state.nm.us
Diane Agnew	Technical Lead	(505) 222-9555	diane.agnew@state.nm.us

NMED Website and Listserv: www.env.nm.gov/kafbfuelplume

Contact the Air Force:

Kathryn Lynnes	Senior Advisor	(505) 846-8707	kathryn.lynnes@us.af.mil
AFCEC Public Affairs		(866) 725-7617	afcec.pa@us.af.mil
Kirtland AFB Public Affairs		(505) 846-5991	377ABW.PA@us.af.mil

Air Force Bulk Fuels Facility website: www.kirtlandjetfuelremediation.com

Kirtland AFB website: www.kirtland.af.mil in the Environmental Issues section for Public Records

Discussion

