Kirtland Air Force Base
Fuel Leak Cleanup

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Rotary Club of Albuquerque
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A Partnership for Success

A collaborative technical team is solving the complex hydrogeologic and engineering challenges posed by the fuel leak with support from Albuquerque's neighborhood groups

US Army Corps of Engineers

Elder Homestead Neighborhood Assoc.

Siesta Hills Neighborhood Assoc.

ABQ City Council District 6 Coalition of Neighborhood Assocs.

Christ United Methodist Church

HAWLEY GEOMATTERS

Thomson and Associates

Potential Exposure Pathway	Risk Level	Explanation
Drinking Water		**Drinking water provided by the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) continues to be free of any detectable fuel contamination and is safe for all uses.** Public drinking water wells near the groundwater contamination plume are tested monthly, and show no detections of any fuel compounds. Sentinel wells, which are monitoring wells located between the drinking water wells and the contamination plume, are tested quarterly and show no detections.
Surface Soil		**Surface soil contamination never migrated off of Kirtland.** Surface soil contamination has only occurred at the Kirtland Air Force Base Bulk Fuels Facility (BFF) industrial area which is not accessible to the general public. Contaminated soil has been excavated and removed for off-site disposal.
Surface Water		**There is no pathway for contaminants to enter surface water.**
Vapor Intrusion		**Homes and businesses are not at risk for vapor contamination.** There is no off-Base surface or near-surface soil contamination, and groundwater contaminants are too deep, to allow vapors to enter homes and buildings.
Garden Vegetables		**There is no risk of contamination to garden vegetables.** ABCWUA water is safe for irrigation. There is no off-Base surface soil contamination, and vapors from groundwater are too deep, for fuel to contaminate garden vegetables.
Recreational Activities		**There is no risk of contamination to people enjoying recreational activities in Bullhead Park or in the Dog Park.** Reclaimed ABCWUA water is used to irrigate the parks. There is no off-Base surface soil contamination, and vapors from groundwater are too deep, to pose a risk to people in the park areas.

(June 2016)

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 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

Hole in bottom of Transfer Pipe

Pipe connect into the Pump House Building

~ 8 feet

Bent pipe 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 (SDWA)
  - 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)

Current RCRA Timeline

2015 | we are here | 2016 | 2017

Site Assessment and Characterization

RFI

Corrective Measures Evaluation

Drilling

Drilling

Drilling

Site Soil and Groundwater Monitoring Program

INTERIM CLEANUP MEASURES

SVE Operation

CSI

Bioventing Pilot Test

EDB Plume Collapse (Groundwater Treatment System)

LNAPL Lab Tests

CSI

LNAPL Enhanced Bioremediation Pilot Test

Site Permitting

Public Meetings, Field Trips, and Outreach

CSI - Complex Site Initiative • EDB - Ethylene Dibromide • LNAPL - Light Non-Aqueous Phase Liquid • RFI - RCRA Facility Investigation Report • SVE - Soil Vapor Extraction

2016 Strategic Plan & Summary

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. Characterize and remediate Light Non-Aqueous Phase Liquid (LNAPL), impacted soil, and associated dissolved phases in the source area
3. Collapse the dissolved ethylene dibromide (EDB) plume
4. Meet or exceed all requirements for providing public comment information and involvement

New Mexico Environment Department (NMED) Final 2016 Strategic Plan is available online: **http://www.nmenv.state.nm.us**

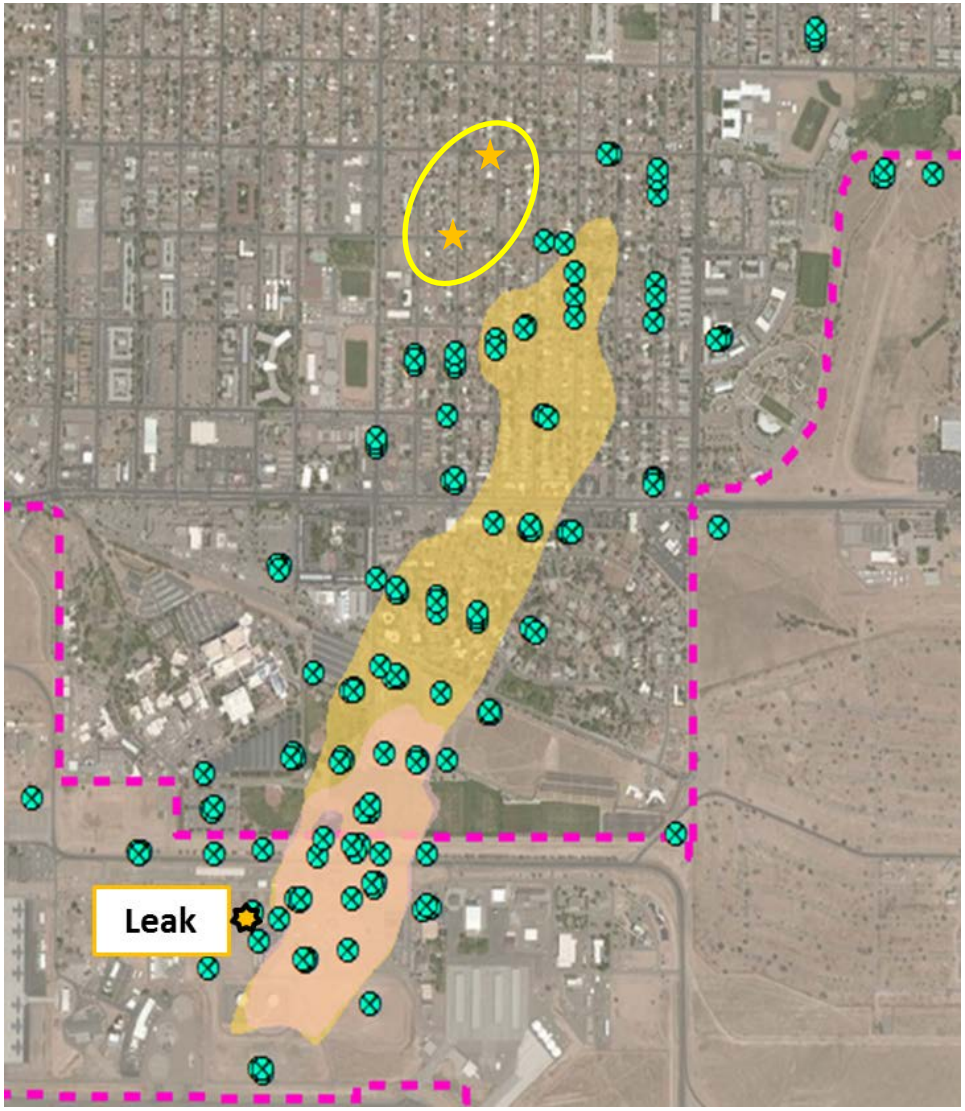
Conceptual Site Model Animation

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

Monitoring & Wellhead Protection

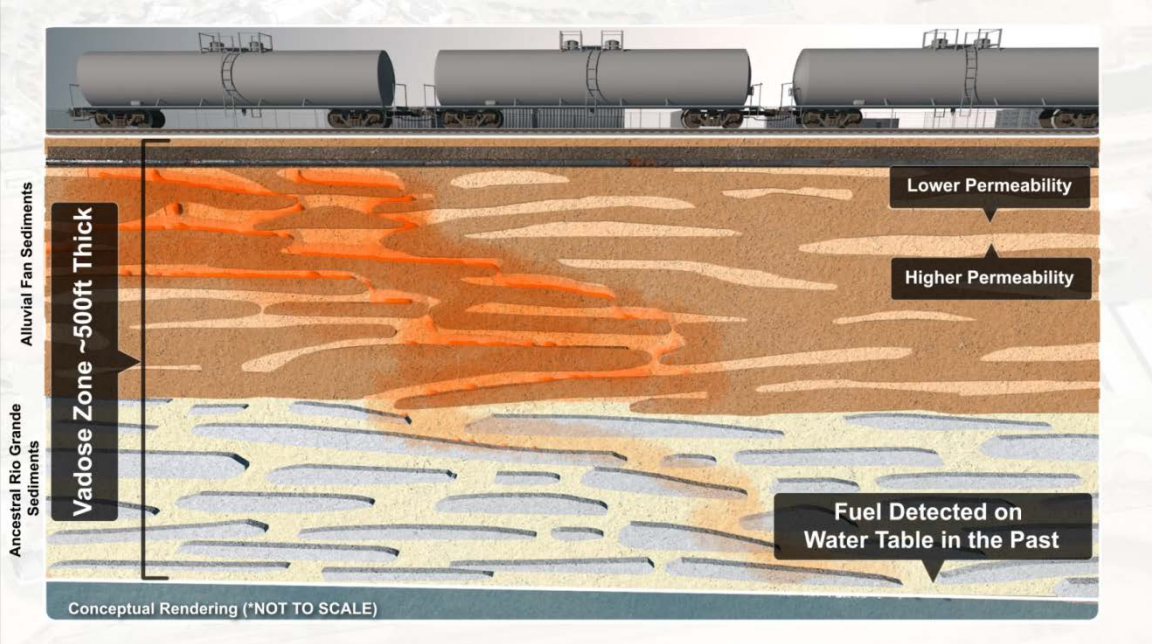
- Drinking water supply wells are sampled on a monthly basis
- Sentinel wells are sampled on a quarterly basis
- Continue to have no detections of fuel contaminants in drinking water or sentinel wells
- Data gap exists in the northwestern area of EDB plume

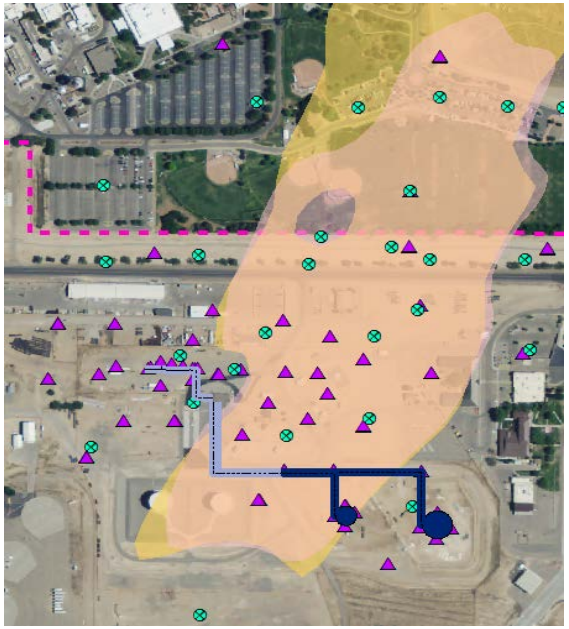
Monitoring & Wellhead Protection



- Two new data gap wells will be installed in Fall 2016
- These wells will define the NW edge of plume
- Will utilize technical working groups and data to determine if additional wells are needed

Source Area Characterization & Remediation





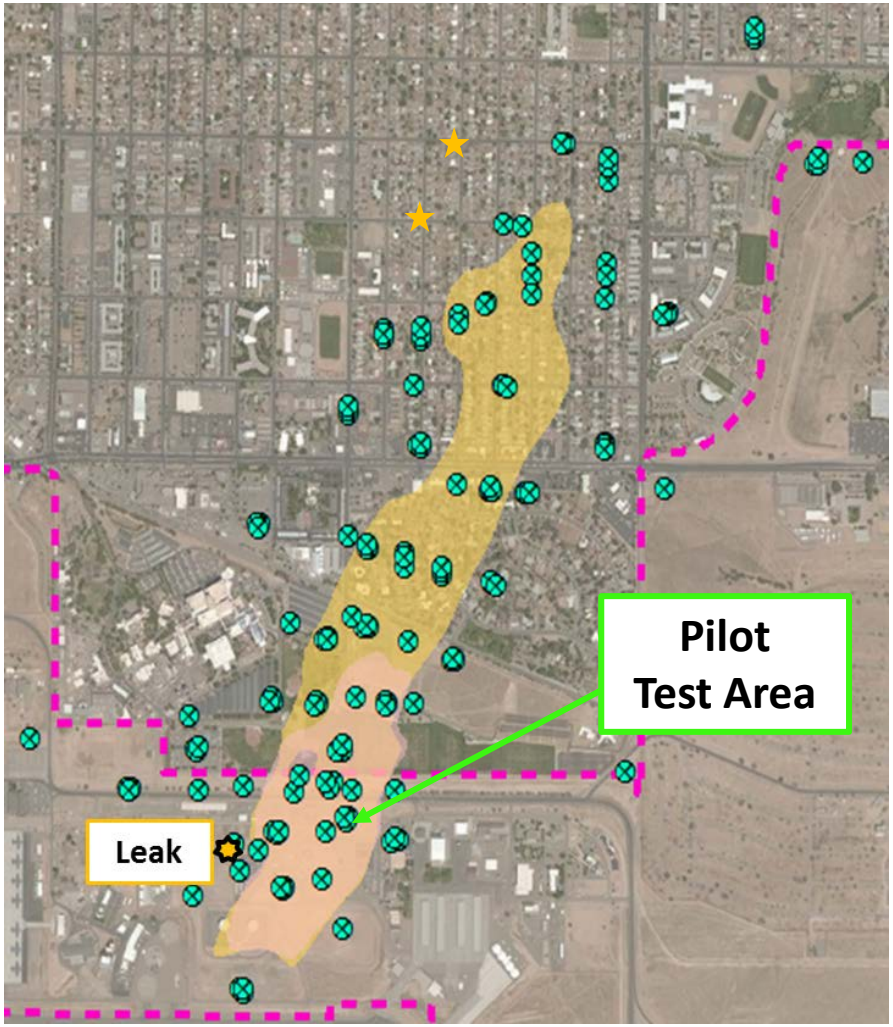
- Nearly 5,000 tons of soil have been removed from the site since 1999
- Roughly 780,000 gallons of vapor and fuel compounds removed from 12 years of soil vapor extraction (SVE)
- Residual fuel smeared and is a source of EDB in the groundwater

Source Area Characterization & Remediation

In Situ Bioremediation Pilot Test

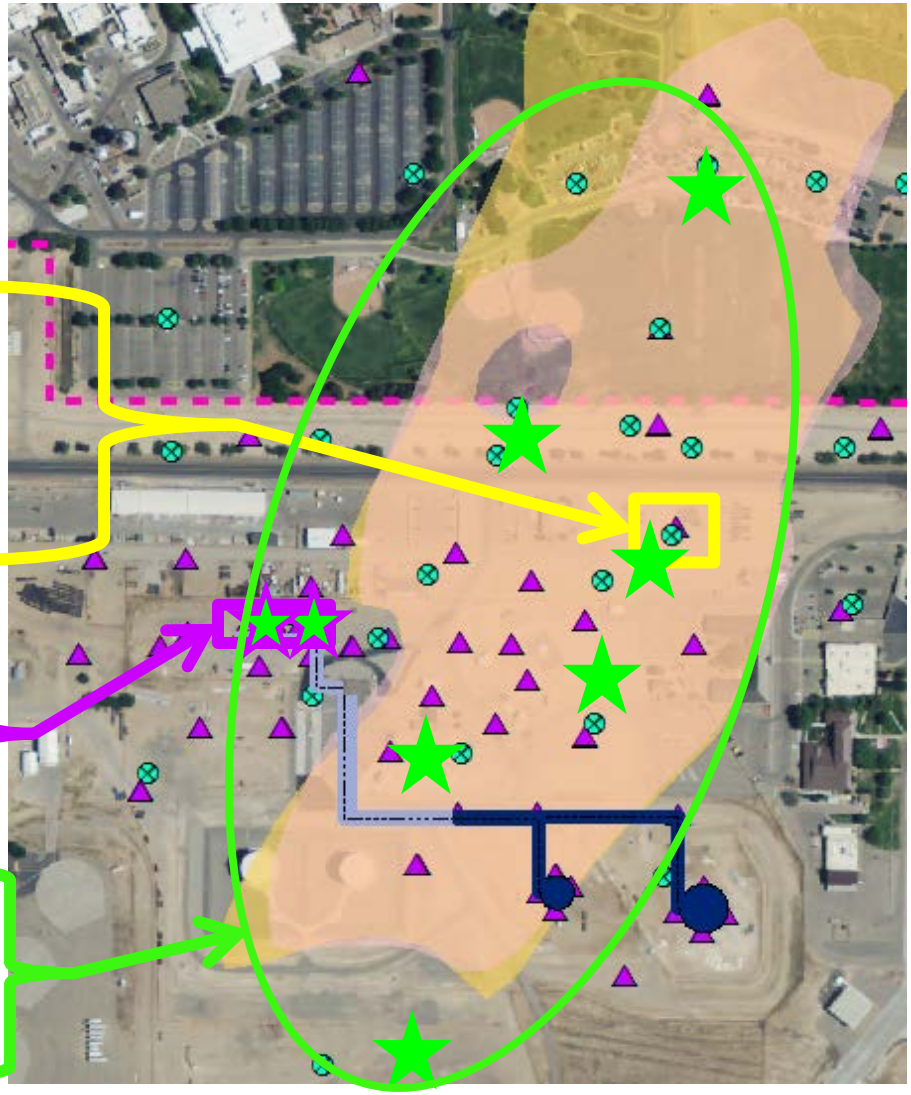
Objective: To demonstrate in situ EDB biodegradation under oxygen-rich conditions using a phased approach

- Based on laboratory testing
- Located near on-base groundwater wells with increasing EDB concentrations
- Work plan to be submitted for NMED review and approval
- Work to begin in Fall 2016

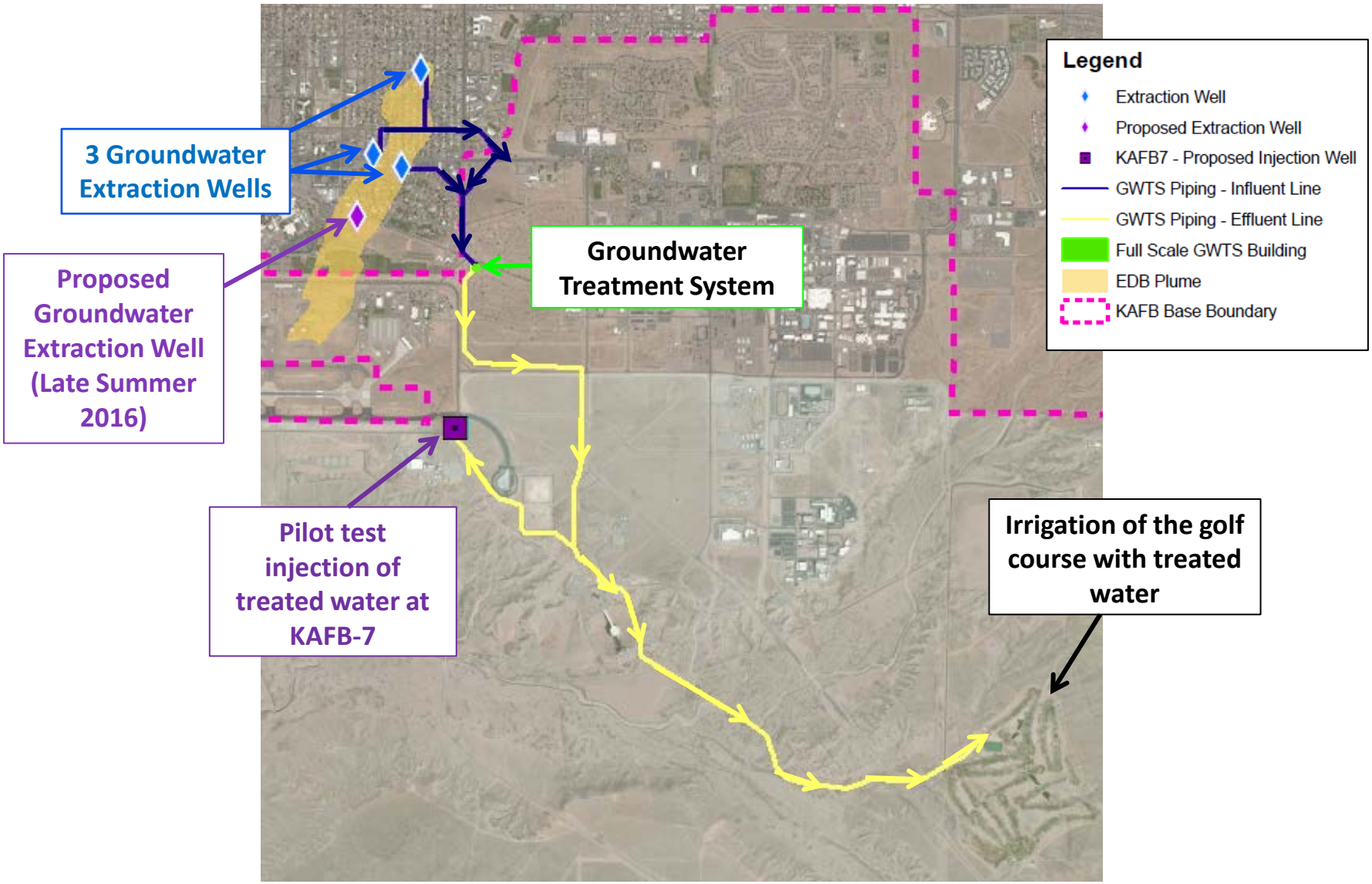


Source Area Characterization & Remediation

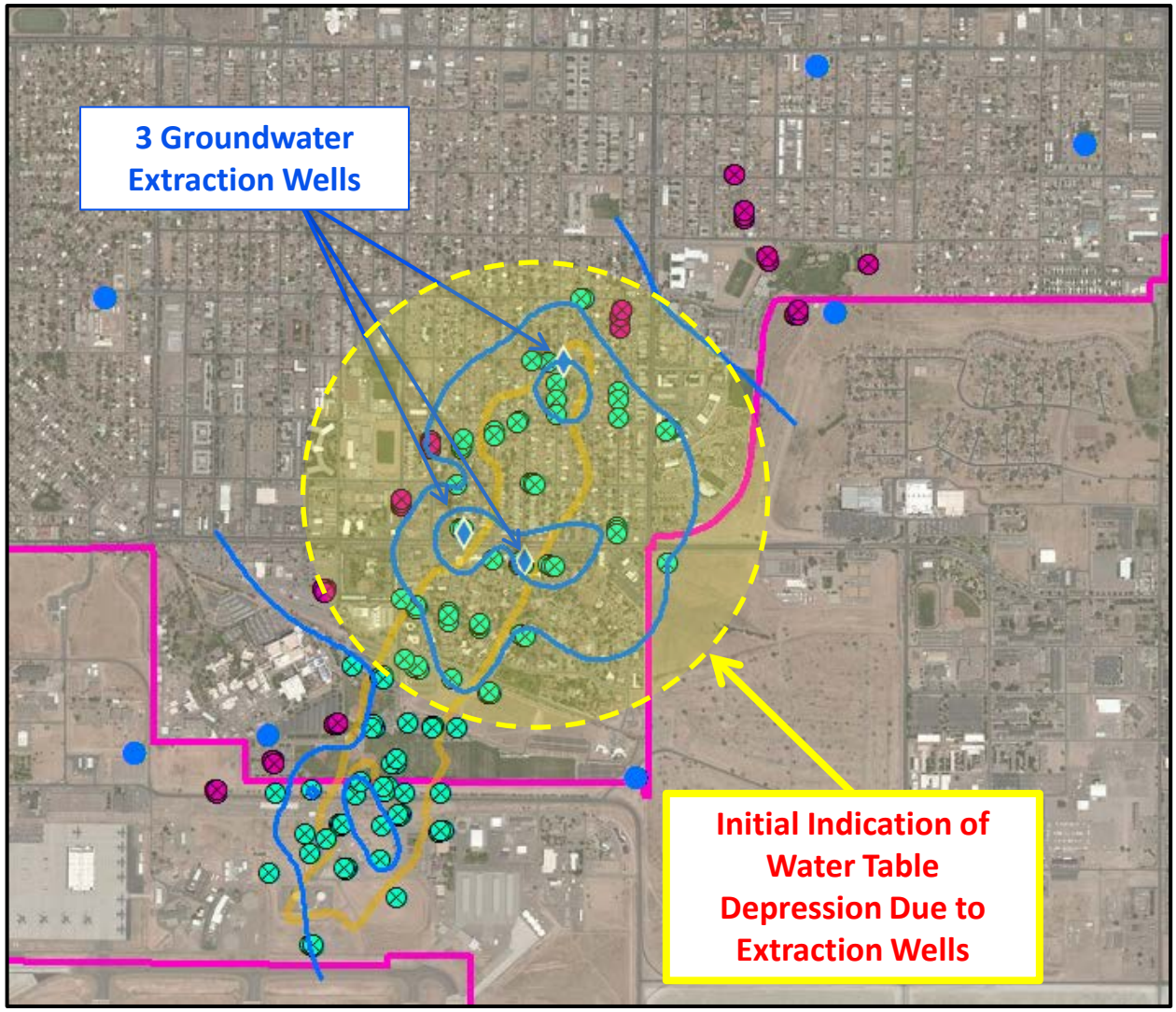
- On-going in situ respiration and rebound data collection and analysis
- Implement in situ biodegradation of EDB pilot test
- Bioventing pilot test scoping and work plan
- Soil coring in source area scoping and work plan



EDB Plume Collapse



EDB Plume Collapse

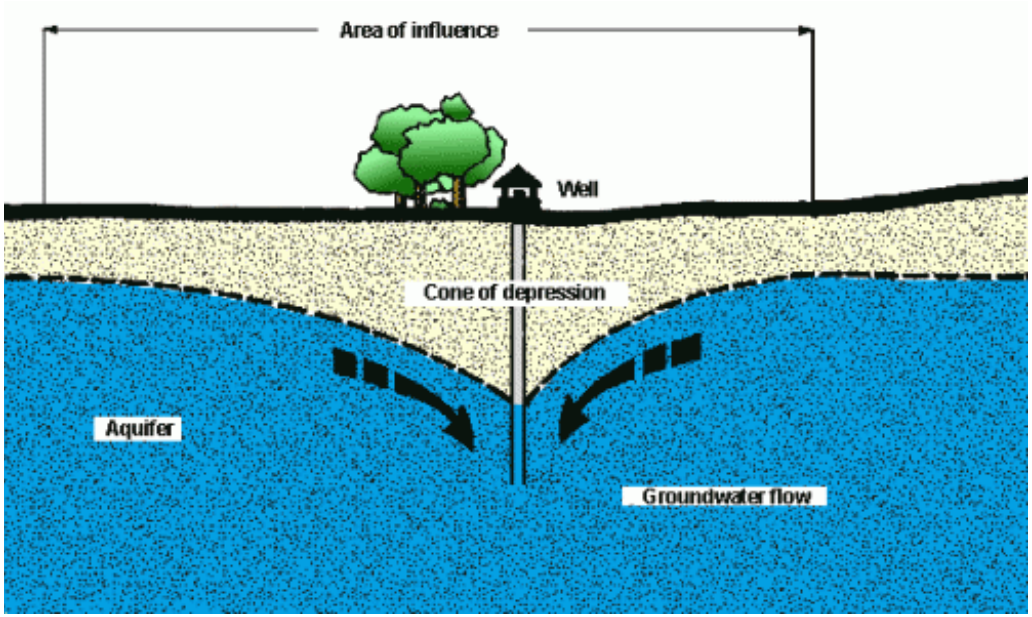


- The “cone of depression” from the first three extraction wells indicates successful removal of EDB-contaminated groundwater
- Plume collapse will be confirmed with EDB concentration trends

Legend

- Extraction Well
- Groundwater Monitoring Well
- Sentinel Well or Well Nest
- Drinking Water Well
- Q2 2016 Shallow GW Contours (04-20-16)
- Q4 2015 EDB Plume
- KAFB Base Boundary

What is a “Cone of Depression”?



- Forms in the water table when groundwater is extracted in all directions by a pumping well
- Measured water levels in groundwater monitoring wells near the extraction well define the area of influence and capture zone
- One method used to determine if an extraction well is capturing the EDB plume

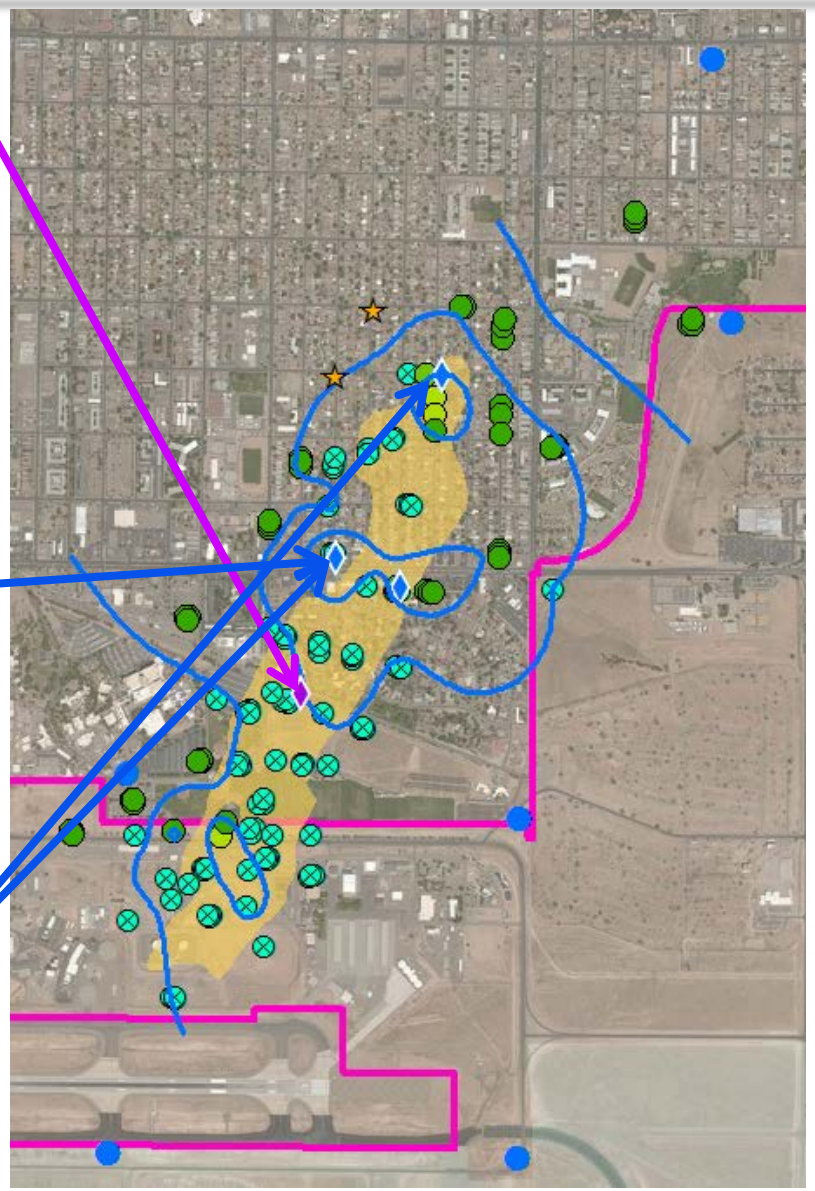
EDB Plume Collapse

Extracted and treated 86 million gallons of EDB-contaminated groundwater and removed 28.6 grams of EDB

- Average plume concentration is 0.11 parts per billion (ppb) off-Base
- Drinking water standard for EDB is 0.05 ppb

EDB Plume Collapse

- Drill and install 4th extraction well south of Ridgecrest
- Design expansion of GWTS for increased treatment capacity
- Redevelop KAFB-106233
- Install sand filters to address GWTS fouling
- Conduct aquifer testing of extraction wells



2016 Public Outreach To-Date

Date	Description
Jan 12, 2016	**Kirtland Partnership Committee:** Provided project update
Feb 10, 2016	**District 6 Neighborhood Coalition Meeting:** Provided project update
Feb 24, 2016	**Highland High School Advanced Placement Chemistry and Environmental Science:** Worked with chemistry students to design lab experiments and presented results to April public meeting participates
Apr 8, 2016	**New Mexico Geological Society Spring Meeting:** Presented on site stratigraphy and migration of the EDB plume at the BFF site
Apr 13, 2016	**New Mexico Tech Engineering Club:** Presented undergraduate and graduate engineering students on the BFF site

Date	Description
Apr 19, 2016	**Regular Public Meeting with Poster Session**
Apr 23, 2016	**Public Field Trip:** Toured groundwater treatment facility and discharge points
May 26, 2016	**International District Healthy Communities Coalition Meeting:** Provided project information
June 22, 2016	**Water Utility Authority Governing Board:** Provided project update
July 12, 2016	**New Mexico Legislature, Radioactive and Hazardous Materials Committee:** Provided project update
July 14, 2016	**Regular Public Meeting with Poster Session and Technical Deep Dive**
Aug 3, 2016	**Westside Coalition Presentation:** Provided project update
Aug 13, 2016	**Community Conversation About the Kirtland Air Force Base Jet Fuel Spill**

Currently Scheduled Public Outreach

Date	Description	Location
August 15, 2016	**Rotary Club of Albuquerque** 12:00 – 1:00 p.m.	Hotel Albuquerque, 800 Rio Grande Blvd. NW
August 30, 2016	**Kirtland Partnership Committee** 7:30 a.m.	African American Performing Arts Center 310 San Pedro Dr. NE
September 12, 2016	**American Institute of Petroleum Geologists**	Santa Fe, NM
September 15-16, 2016	**New Mexico Water Law Conference** TBD	Santa Fe, NM
September 24, 2016	**Albuquerque International District Fair** 10:00 – 5:00 p.m.	Veterans Memorial Park 1100 Louisiana Blvd SE
November 10, 2016	**Regular Public Meeting with Poster Session** 5:00 – 8:30 p.m.	African American Performing Arts Center 310 San Pedro Dr. NE
November 2016	**Public Technical Workshop** TBD	Location TBD

Recap

- Drinking water supply wells continue to show no contamination
- 2nd Quarter 2016 groundwater data indicate first major milestone in plume collapse → lowering of water table at extraction well locations, or cone of depression
- On-going extraction and treatment of EDB-contaminated groundwater with a 4th extraction well coming soon
- Work plans submittals; begin implementation of two interim measures/pilot tests in source area
- Continued public outreach

About Kate

- Grew up in an industrial town in West Michigan
- Received a Bachelor's of Science in Civil Engineering from Michigan Tech in 1979
- Received a Juris Doctor from the University of Oregon School of Law in 1984
- Worked as an environmental consultant for industrial and municipal clients for 20 years
- Since moving to NM in 2004, I have worked for NMED, Freeport McMoRan, Los Alamos National Laboratory, and the Pentagon

About Diane

- Grew up in rural northeastern Colorado
- Received Bachelor's of Science in Geology from New Mexico Tech in 2003
- Received Master's in Hydrology from New Mexico Tech in 2006
- Internship at Sandia National Labs
- Started my career in environmental consulting in 2005, working for private and federal clients
- Started working for the NMED in August 2015

How do I get more information?

Contact NMED:

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

Contact the Air Force:

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

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