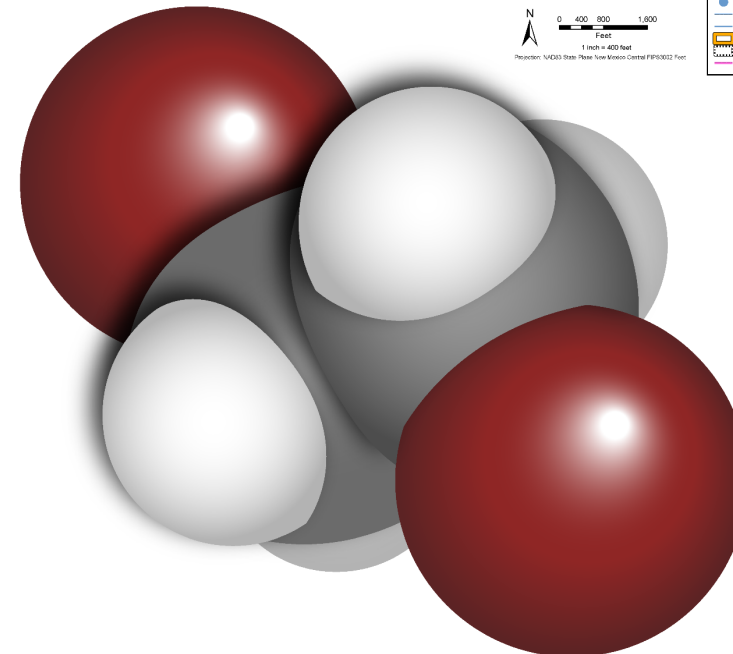
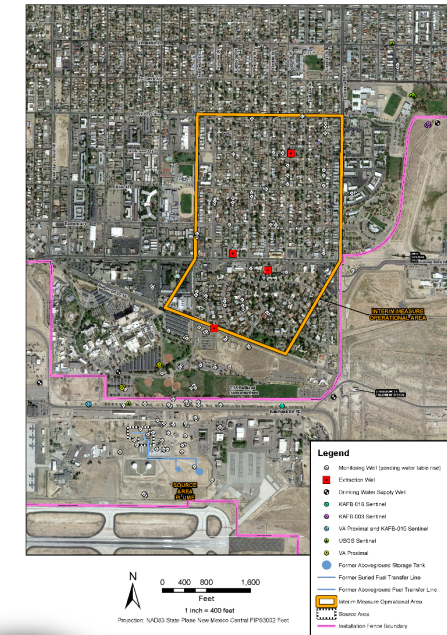
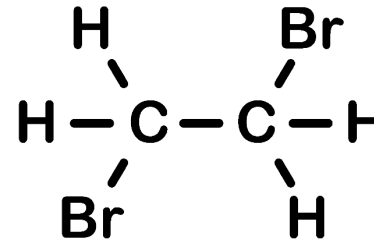


What is Ethylene Dibromide (EDB)?



- EDB, also known as 1,2-dibromoethane and ethylene dibromide, is a synthetic chemical that was used as a lead scavenger in aviation gasoline and leaded gasoline. EDB was also used as a fumigant in agriculture.
- EDB was present in aviation gasoline that was stored and used at Kirtland Air Force Base until the 1970s.
- Fuel leaked into the ground and contaminated groundwater.
- EDB is regulated at 0.05 µg/L (parts per billion) by the U.S. Environmental Protection Agency and the New Mexico Environment Department.
- EDB has not been detected in Albuquerque drinking water supply wells.
- The EDB plume north of Ridgecrest Drive SE has been contained. There is currently no potential impact to Albuquerque drinking water supply wells.

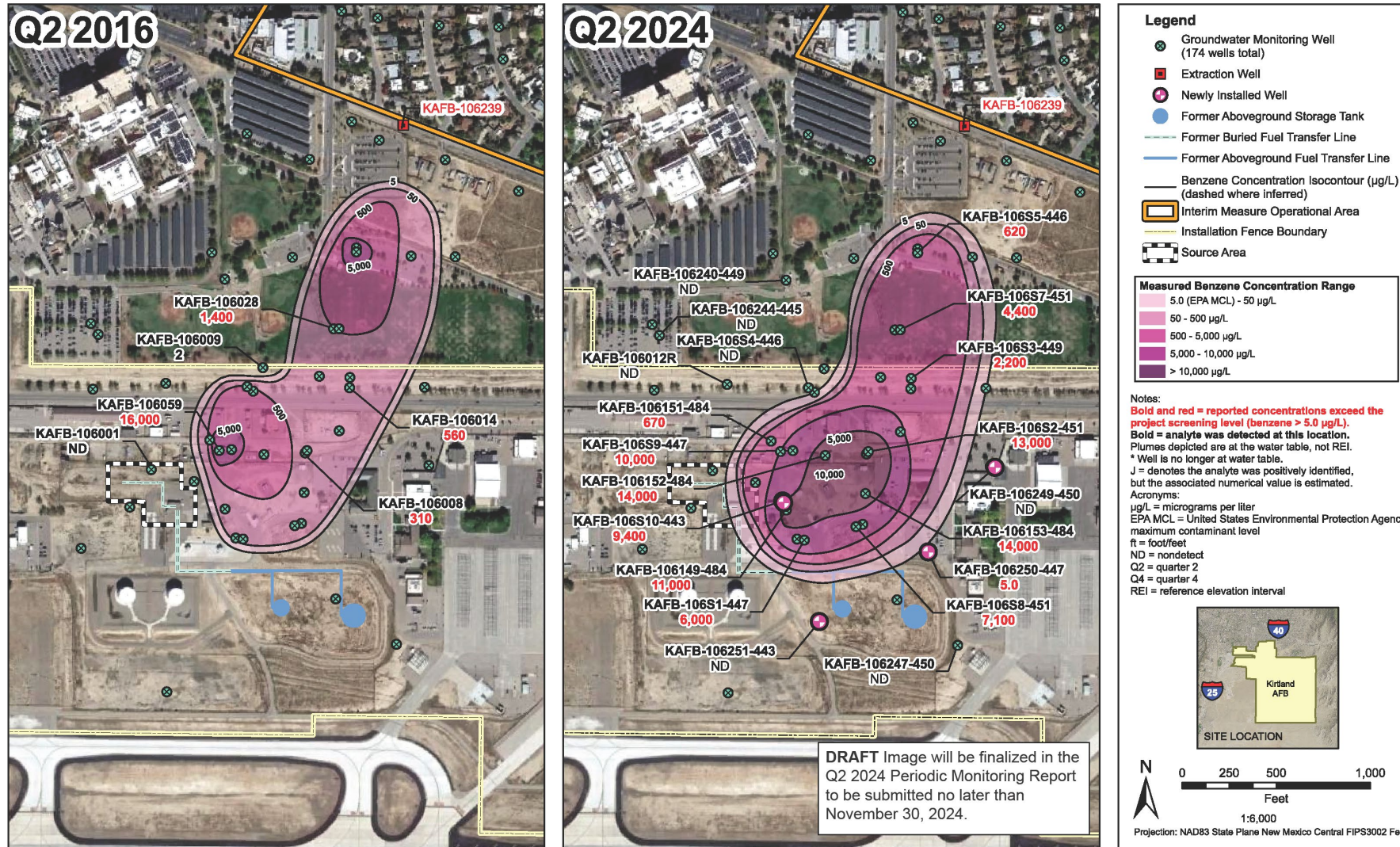




Benzene Plume Footprint (over time)



Comparison of Benzene in the Interim Measure Operational Area Between Q2 2015 and Q2 2024



References:

EPA. 1998. Low Flow (Minimum Drawdown) Ground Water Sampling Procedures, Paul, Robert W. and Baroncorta, Michael. Ground Water Sampling Guidelines EPA/600/R-98/044. April.

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USACE. 2011. Groundwater Investigation Work Plan for Bulk Fuel Facility (BFF) SPCL, Solid Waste Management Units LSI-106 SS-118. Kirtland Air Force Base, Albuquerque, New Mexico. Prepared by Shaw Environmental & Infrastructure, Inc. for the USACE Albuquerque District under USACE Contract No. W9120X-12-2-0006, Delivery Order 0001, September.

USACE. 2012a. Groundwater Investigation Work Plan for Bulk Fuel Facility Expansion of the Deshoved-Phase Plume Groundwater Treatment System Design Solid Waste Management Unit LSI-106SS-111. Kirtland Air Force Base, Albuquerque, New Mexico. Prepared by Shaw Environmental & Infrastructure, Inc. for the USACE Albuquerque District under USACE Contract No. W9120X-12-2-0006, Delivery Order 0001, January.

USACE. 2012b. Groundwater Investigation Work Plan for Bulk Fuel Facility Expansion of the Deshoved-Phase Plume Groundwater Treatment System Design Solid Waste Management Unit LSI-106SS-111. Revision R1. Kirtland Air Force Base, Albuquerque, New Mexico. Prepared by Shaw Environmental & Infrastructure, Inc. for the USACE Albuquerque District under USACE Contract No. W9120X-12-2-0006, Delivery Order 0001, September.

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USACE. 2017. Work Plan for Bulk Fuel Facility Expansion of the Deshoved-Phase Plume Groundwater Treatment System Design Solid Waste Management Unit LSI-106SS-111. Revision R2. Kirtland Air Force Base, Albuquerque, New Mexico. Prepared by Shaw Environmental & Infrastructure, Inc. for the USACE Albuquerque District under USACE Contract No. W9120X-12-2-0006, Delivery Order 0001, September.

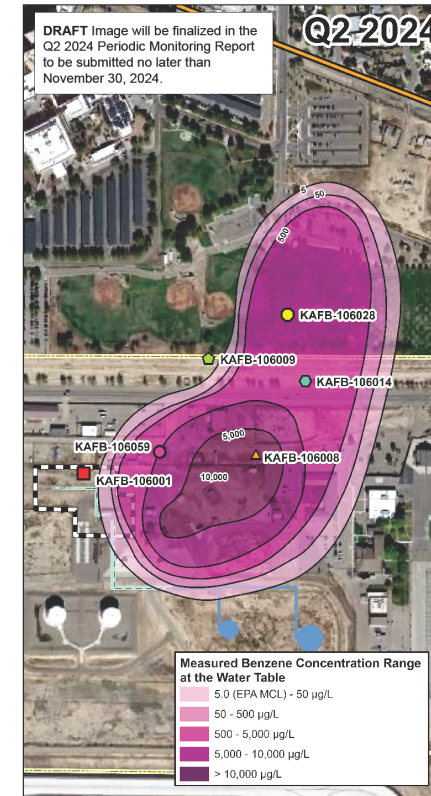
NMCD. 2010. Hazardous Waste Management Unit Located at Kirtland Air Force Base, Bernalillo County, New Mexico, by the NMED. Hazardous Waste Remedial Study.

- [illegible]

Acronyms

µg/L = micrograms per liter	Q2 = quarter 2
AFB = Air Force Base	Q4 = quarter 4
EPA = U.S. Environmental Protection Agency	REI = reference elevation interval
ITRC = Interstate Technology and Regulatory Council	USGS = U.S. Geological Survey
MCL = maximum contaminant level	USACE = U.S. Army Corps of Engineers
NMED = New Mexico Environment Department	

Wells with time-series graphs



Q2 2015:
 -Before Interim Measure
 -Extraction well KAFB-106228 online (June 2015)

Q2 2024:
 -Interim Measure in progress
 -All extraction wells online
 -Plume depicted is at 4857 REI.

DRAFT Image will be finalized in the Q2 2024 Periodic Monitoring Report to be submitted no later than November 30, 2024.

Legend:

- Groundwater Monitoring Well
- Extraction Well
- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Ridgecrest Drive SE
- Interim Measure Operational Area
- Installation Fence Boundary
- Source Area
- Dissolved-Phase EDB ≥ 0.05 $\mu\text{g/L}$ (EPA MCL)

General Notes:
 Aerial Imagery provided by ESRI Online service.
 EDB plume contour generated with ESRI Spatial Analyst and adjusted with professional judgement.
 Plumes depicted are at the water table, not REI.
 * Well is no longer at water table.
 Bold and red = reported concentrations exceeded the project screening level (EDB > 0.05 $\mu\text{g/L}$).
 Bold = analyte was detected at this location.

Acronym(s):
 AFB = Air Force Base
 EDB = 1,2-dibromoethane (ethylene dibromide)
 EPA MCL = Environmental Protection Agency maximum contaminant level
 ND = nondetect
 NS = not sampled
 REI = reference elevation interval
 $\mu\text{g/L}$ = microgram(s) per liter
 Q2 = quarter 2
 Q4 = quarter 4

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EDB Sampling Methods (over time)

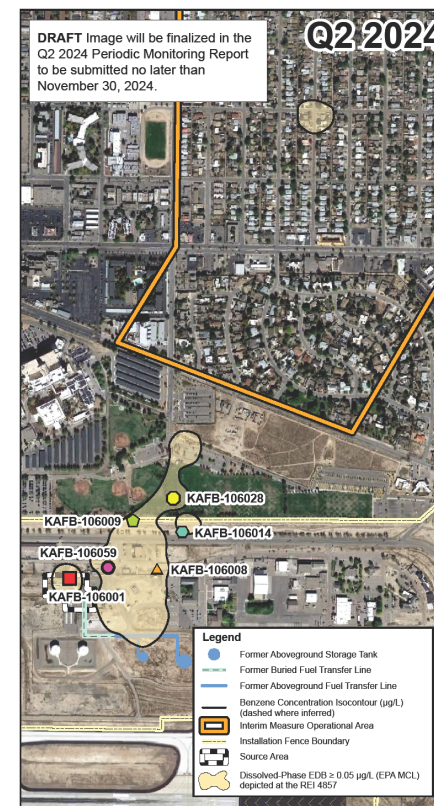
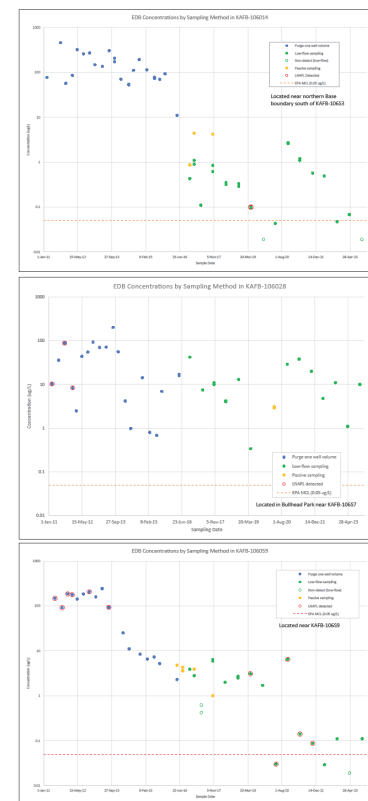
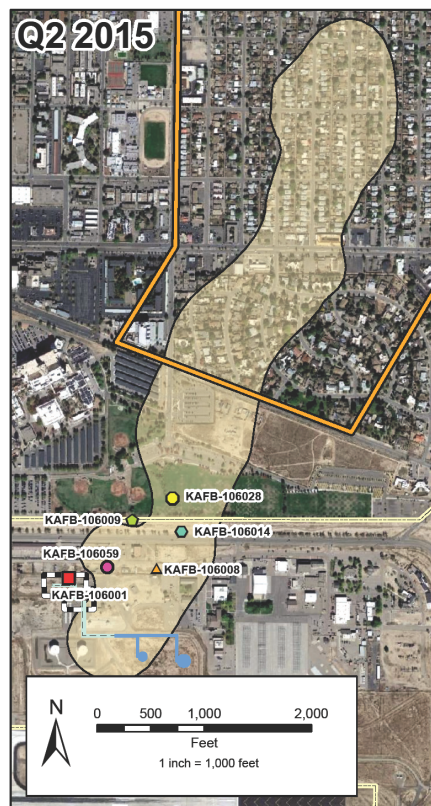


Since 2011, groundwater samples have been collected from the groundwater monitoring network using three industry standard practices. Sampling methods have been performed with approval from NMED. The graphs provided on this poster show the consistency in analytical results between the following three sampling methods:

- 1. Purge one well-volume:** From 2011 through Q3 2016, one well-bore volume was purged from each well followed by low-flow sampling, as approved by NMED in June 2011 (Kirtland AFB, 2011; NMED, 2011) and March 2016 (Kirtland AFB, 2016a; NMED, 2016a). The volume purge was conducted to meet the requirements of RCRA Permit Part 6.5.17.4 and low-flow sampling was conducted according to industry standard practices (EPA, 1996; EPA, 2002).
- 2. Low-flow sampling:** During Q4 2016 and Q1 2017, only low-flow sampling was conducted without an initial volume purge, as approved by NMED in November 2016 (Kirtland AFB, 2016b; NMED, 2016b). This sampling was conducted according to industry standard practices (EPA, 1996; EPA, 2002).
- 3. Passive Sampling:** Following the recommendation of the Hydrogeology Working Group in July 2016, passive sampling was conducted for comparison studies in select wells during 2016 and Q1 2017. The results of these studies were used to justify the transition to passive sampling as approved by NMED in May 2017 (Kirtland AFB, 2017; NMED, 2017) at a select set of wells beginning in Q2 2017, while low-flow sampling was continued at the remaining GWM wells. Passive sampling was conducted according to industry standard practices (USGS, 2001; ITRC, 2004).

Graphs on this poster show consistent analytical results from wells selected that include all three sampling methods.

Wells with time-series graphs



References:
EPA. 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures. Pulte, Robert W. and Barcelona, Michael J. Ground Water Issue EPA/540/S-95/004. April.
EPA. 2002. Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers. Yee, Douglas and Zavala, Bernard. Ground Water Forum Issue Paper. May.
ITRC. 2004. Technical and Regulatory Guidance for Using Polyethylene Diffusion Bag Samplers to Monitor Volatile Organic Compounds in Groundwater. Prepared by The Interstate Technology and Regulatory Council Diffusion Sampler Team. February.
Kirtland AFB. 2011. Groundwater Investigation Work Plan, Bulk Fuels Facility (BFF) Spill, Solid Waste Management Units ST-106 and SS-111, Kirtland Air Force Base, Albuquerque, New Mexico.
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Kirtland AFB. 2017. Work Plan for Bulk Fuels Facility Expansion of the Dissolved-Phase Plume Groundwater Treatment System Design Revision 2, Solid Waste Management Unit ST-106/SS-111. Prepared by EA Engineering, Science, and Technology, Inc. PBC for Kirtland AFB under USACE-Albuquerque District Contract No. W912DY-12-D-0006, January.
NMED. 2016. Hazardous Waste Treatment Facility Operating Permit. EPA ID No. NM657024423, issued to U.S. Air Force for the Open Detonation Unit Located at Kirtland Air Force Base, Bernalillo County, New Mexico, by the NMED Hazardous Waste Bureau. July.

NMED. 2011. Correspondence from Mr. John E. Keeling, Acting Chief, Hazardous Waste Bureau, NMED to Colonel Robert L. Maness, Base Commander and Mr. John Pike, Director, Environmental Management Section, Kirtland AFB, New Mexico. Re: Conditional Approval, Interim Measures, Vadose Zone, and Groundwater Investigation Work Plans, Bulk Fuels Facility Spill, Solid Waste Management Units ST-106 and SS-111, Revisions of March 31, 2011, Kirtland Air Force Base. EPA ID NM657024423, HWB-KAFB-10-015, HWB-KAFB-10-016, and HWB-KAFB-10-018, June 30.
NMED. 2016a. Correspondence from Ms. Kathryn Roberts, Director, Resource Protection Division, NMED to Colonel Eric H. Froehlich, Base Commander and Mr. John Pike, Director, Environmental Management Services, Kirtland AFB, New Mexico. Re: Bulk Fuels Facility Expansion of the Dissolved-Phase Plume Groundwater Treatment System Design, Solid Waste Management Units ST-106 and SS-111, Kirtland Air Force Base, EPA ID NM657024423, HWB-KAFB-13-MISC, March 25.
NMED. 2016b. Correspondence from Ms. Kathryn Roberts, Director, Resource Protection Division, NMED to Colonel Eric H. Froehlich, Base Commander and Mr. John Pike, Director, Environmental Management Services, Kirtland AFB, New Mexico. Re: Bulk Fuels Facility Expansion of the Dissolved-Phase Plume Groundwater Treatment System Design, Revision 1, Solid Waste Management Units ST-106 and SS-111, Kirtland Air Force Base, EPA ID NM657024423, HWB-KAFB-13-MISC, November 16.
NMED. 2017. Correspondence from Juan Carlos Borrego, Deputy Secretary, NMED to Colonel Eric H. Froehlich, Base Commander, Kirtland AFB, New Mexico, and Lieutenant Colonel Wayne J. Acosta, Civil Engineer Office, Kirtland AFB, New Mexico. Re: Work Plan for Bulk Fuels Facility Expansion of the Dissolved-Phase Plume Groundwater Treatment System Design Revision 2, Bulk Fuels Facility SWMUs ST-106/SS-111, Kirtland AFB, EPA ID NM657024423, HWB-KAFB-13-MISC, May 31.
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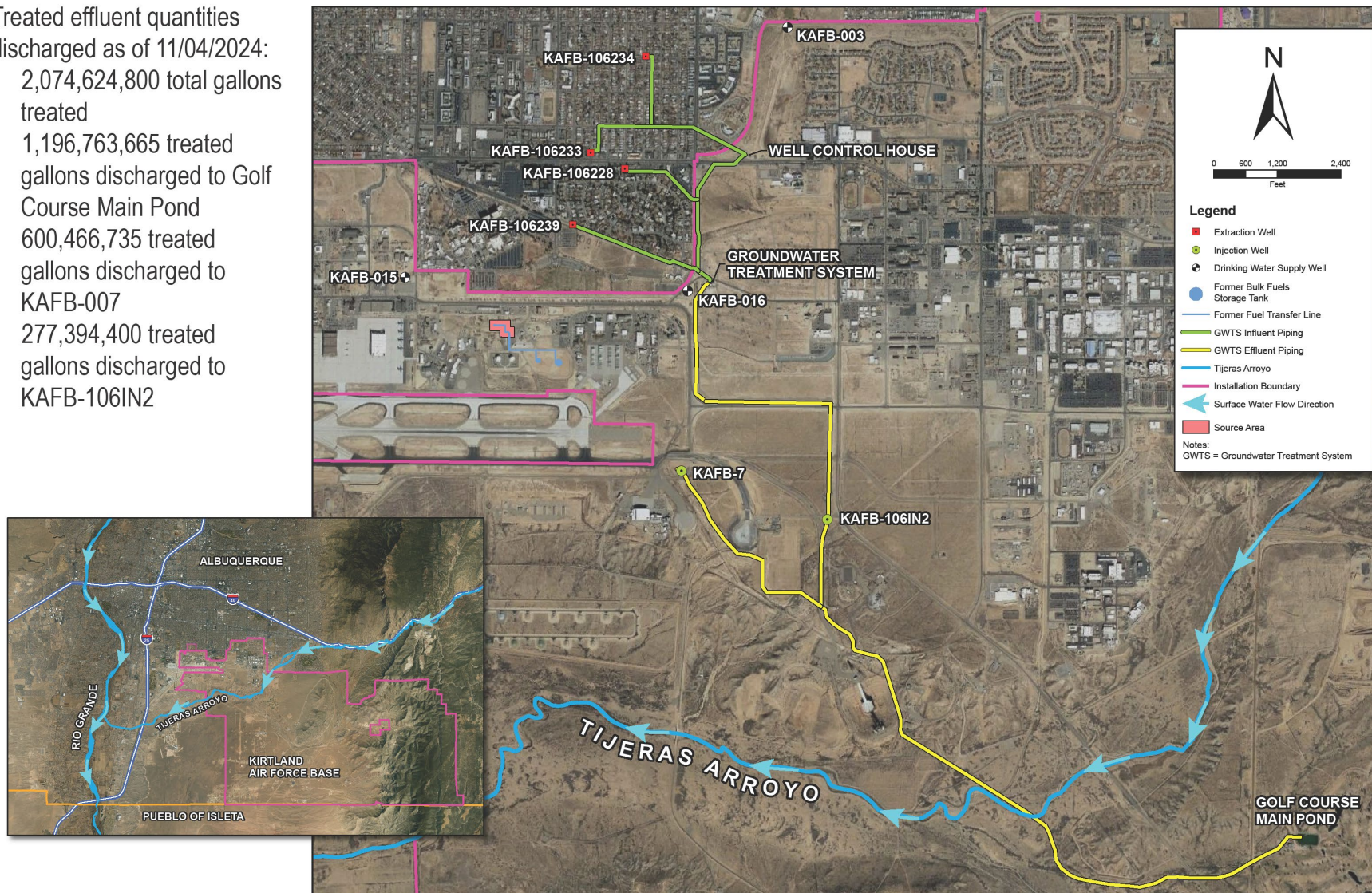
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Treated Effluent Disposition Locations

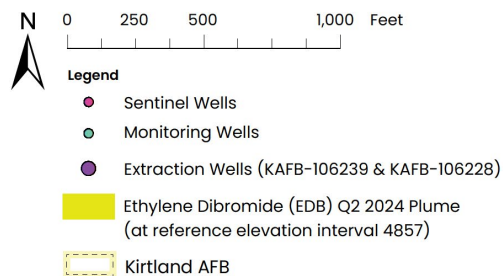


Treated effluent quantities discharged as of 11/04/2024:

- 2,074,624,800 total gallons treated
- 1,196,763,665 treated gallons discharged to Golf Course Main Pond
- 600,466,735 treated gallons discharged to KAFB-007
- 277,394,400 treated gallons discharged to KAFB-106IN2



The Kirtland Bulk Fuels Facility Leak: A Conceptual Model



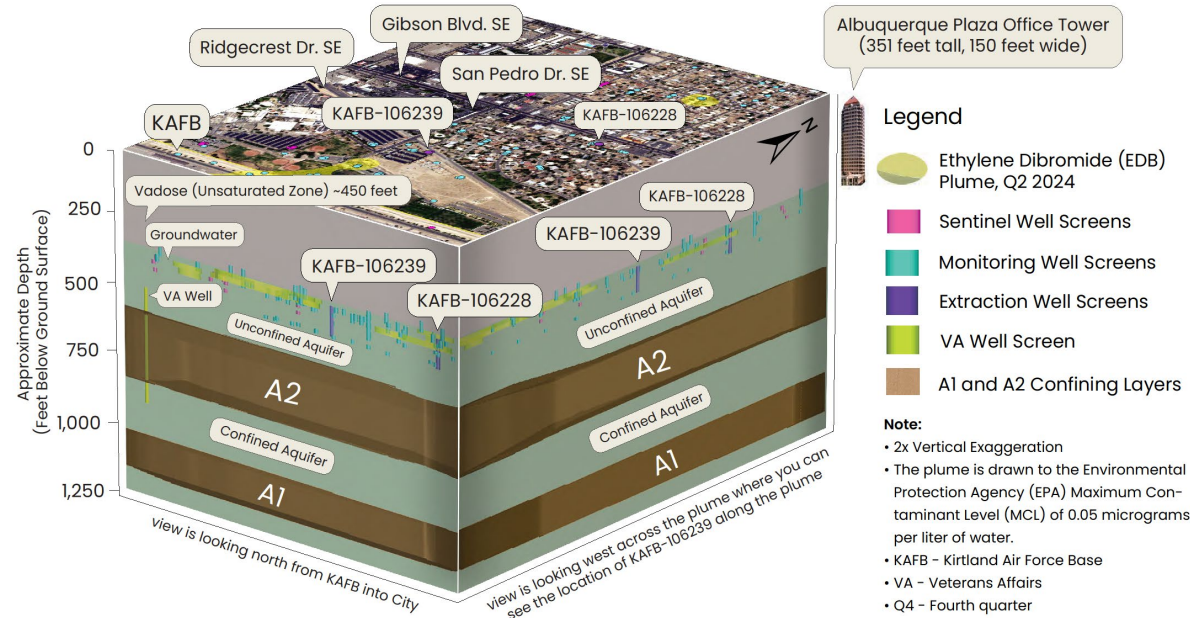
Note:

- VA Well location not shown.
- The plume is drawn to the Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) of 0.05 micrograms per liter of water. Plume data from Q2 2024

Key Elements to Monitor and Protect Our Water Supply

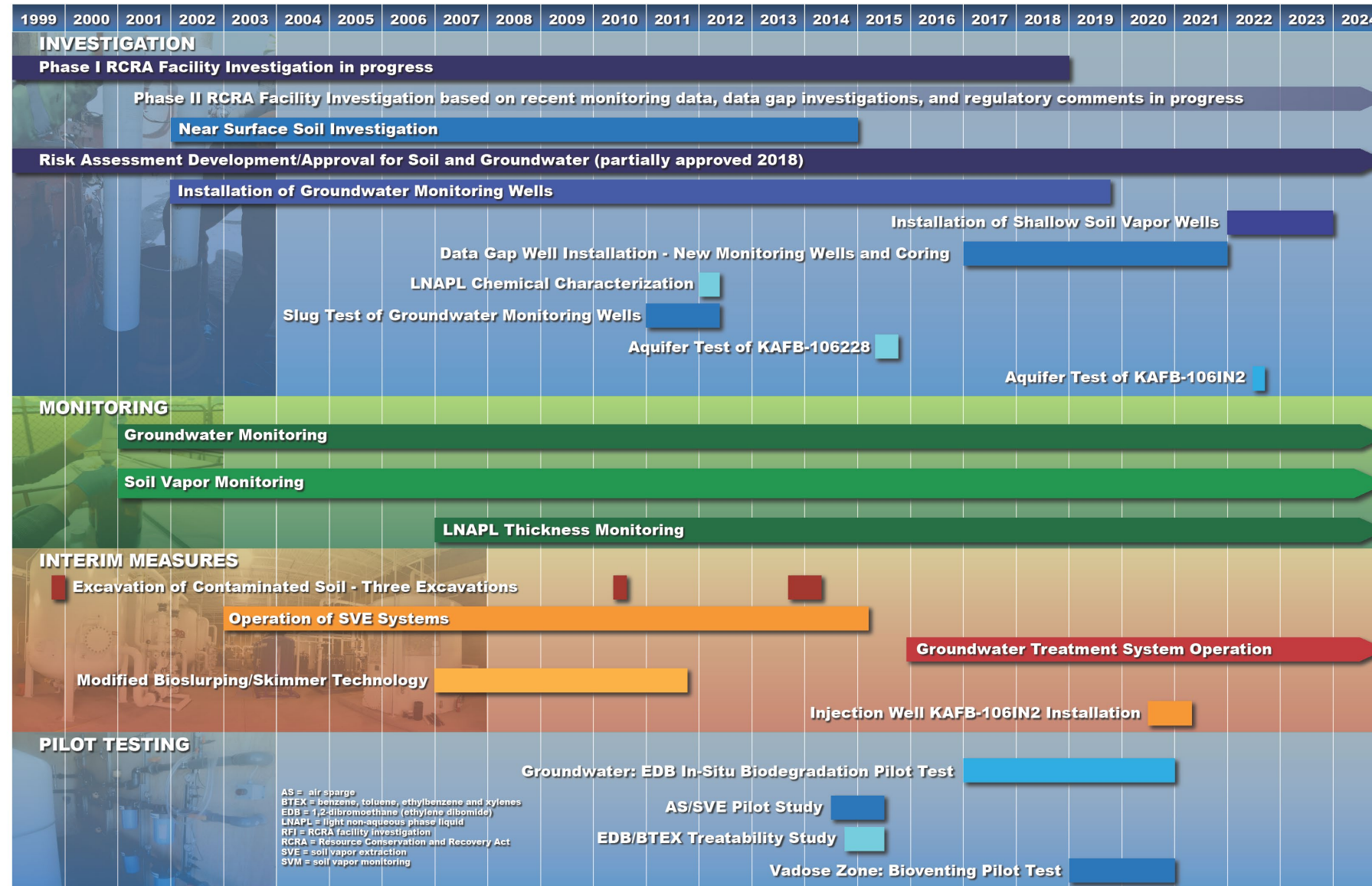
- VA drinking water is sampled on a monthly basis since March 2006 to present. No EDB contamination has been detected in any monthly drinking water sample. All sample results have met drinking water standards.
- Sentinel wells, installed between 2014 – 2016, are located between the plume and the VA drinking water well to provide an “early warning system.” No EDB contamination has been detected in any quarterly water sample. All sample results have met drinking water standards.
- Monitoring wells between the plume and the VA drinking water well are sampled multiple times each year and are used to identify horizontal and vertical plume boundaries.
- Groundwater flow is generally to the east, away from the VA drinking water well.
- A2 and A1 are “confining layers” of soil in deep groundwater. These layers provide a natural barrier for drinking water wells that are screened below these non-permeable layers.

Note: Block diagram (below) is represented in 2x exaggeration to help show plume thickness.



• Draft image will be finalized in the Q2 2024 Periodic Monitoring Report to be submitted no later than November 30, 2024

Site Activity Timeline



Recent Field Work



Performing pump
stinger installation



KAFB-106239 well rehabilitation



KAFB-106239 well rehabilitation



Soil vapor sampling apparatus



10-foot stinger attached to
groundwater monitoring
pump



Collecting a soil vapor sample



Passive
sampling
apparatus



Collecting a groundwater
sample with passive sampling



KAFB-106228
pump repair

Preparation for carbon change out at the
groundwater treatment system



Well Maintenance Activities



KAFB-106228 pump repair

Performing pump stinger installation



KAFB-106239 well rehabilitation



KAFB-106239 well rehabilitation



10-foot stinger
attached to
groundwater
monitoring pump

Extraction well
KAFB-106234
pump replacement



Extraction well
KAFB-106234
pump replacement