Kirtland Air Force Base
Citizen’s Advisory Board (CAB)

Cesar Chavez Community Center
7505 Kathryn Avenue SE
Albuquerque, New Mexico 87108

February 19, 2013
5:30 – 7:30 p.m.
Meeting Format

- Introduction
- 3rd Quarter 2012 Report Highlights
- EDB Plume Update
- Jet Fuel Spill Remediation 101
- BFF SVE Treatment System
- Public Questions/Discussion

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Meeting Guidelines

- Hard copies of presentation are available near the sign-in sheet and will be posted online
- One question/comment per turn at the microphone
- Each question/comment will be allotted 3 minutes
- In addition, comment cards have been made available
  - Return completed comment cards to Kirtland Air Force Base (AFB) Public Affairs Office staff
  - Questions will be answered at the end of the presentation
  - Questions will also be incorporated into the FAQ portion of the new Kirtland AFB Bulk Fuels Facility (BFF) Spill project website:

www.kirtlandjetfuelremediation.com

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Acronyms

- ATSDR – Agency for Toxic Substances and Disease Registry
- BFF – Bulk Fuels Facility
- BTEX – Benzene, toluene, ethylbenzene, xylene
- CAB – Citizen’s Advisory Board
- CME – Corrective Measures Evaluation
- DPT – Direct Push Technology
- EDB – Ethylene dibromide
- EPA – Environmental Protection Agency
- FFOR – Former Fuel Offloading Rack
- ICE – Internal combustion engine
- IM – Interim Measure

Acronyms Continued

- NAPL – Non-Aqueous Phase Liquid
- NMED – New Mexico Environment Department
- O & M – Operation and Maintenance
- RCRA – Resource Conservation and Recovery Act
- RFI – RCRA Facility Investigation
- ROI – Radius of influence
- SVE – Soil vapor extraction
- µg/L – microgram per liter
Kirtland AFB BFF Site History

- Kirtland AFB BFF operated from 1953 through 1999, when the receiving facility was removed from service due to discovery of an underground leak.
- Three types of fuel were processed by the BFF: aviation fuel (AvGas) or high-octane gasoline, Jet Propellant Fuel-4 (JP-4), and JP-8.
- AvGas and JP-4 was phased out in 1975 and 1993, respectively. JP-8 use continued until the leak was discovered in 1999.
- A Soil vapor extraction (SVE) unit was installed in 2003 to begin remediation of soil contamination; three additional SVE units were added in 2004.
- Investigation activities identified jet fuel on the groundwater table in February 2007 in an on-installation groundwater monitoring well.
3rd Quarter 2012 Highlights
3rd Quarter 2012 Highlights

- Third Quarter 2012 Report submitted to the New Mexico Environment Department (NMED) on December 20, 2012; covers sampling and site activities conducted July – September 2012
- Data for this quarter, relative to previous quarters, indicate total VOC concentration reduction in the 1000 parts per million by volume range
  - First and only quarter where this reduction has been observed; previous quarters show consistent vapor concentrations
  - Additional data is needed in order to determine the cause for the apparent reduction in soil vapor concentration
- Well KAFB-10615 detected ethylene dibromide (EDB) in 3rd Quarter 2012 sampling at a concentration of 0.075 micrograms per liter (µg/L)
  - This is the first quarter of an EDB detection in this well
  - Future sampling will confirm this detection

EDB Plume Update
4th Quarter 2012
EDB Results

- Fourth Quarter 2012 sampling data indicate that the northeastern extent of the EDB plume is defined.

- Groundwater monitoring data for this quarter were collected October through November 2012.

- Nine additional groundwater monitoring wells were sampled during the 4th Quarter 2012 and are now incorporated into the quarterly monitoring program.

- Data from 9 additional groundwater monitoring wells show that no fuel-related contaminants are present; these results have been confirmed with NMED sample data.

- Contours are calculated using a robust interpolation method that uses sample results from the groundwater monitoring well network; same method as previous quarters.
Remediation of Jet Fuel Spill

Environmental Protection Agency's (EPA) Six Basic Steps for Remediation of an Aquifer

1. Discovery and Source Determination
   - What contaminant(s) are in the aquifer?
   - What is the spatial extent?
   - What is the contaminant(s) concentration at various locations?

2. Removal of the source

3. Site Characterization (RCRA Facility Investigation [RFI])
   - What is the extent of the aquifer?
   - What are the physical properties of the aquifer?
   - What are the chemical properties of the rock and sediment in the aquifer?
Remediation of Jet Fuel Spills

The Six Basic Steps for Remediation of an Aquifer (cont’d)

4. Impact Evaluation (RFI and Corrective Measures Evaluation [CME])
   - How far has the contaminant spread?
   - Has the composition changed due to natural remediation?

5. Modeling (CME)

6. Remediation (Corrective Measures Implementation/Remedy-in-Place)

Fuel spills have happened from sites as small as local gas stations to large sites at other military installations

Technologies used for remediation can be new and innovative or an established, well-tested technology

Common Remediation Techniques:

1. Pump and treat
2. Hydraulic containment
3. Air Sparging/Soil Vapor Extraction (SVE)
4. In-situ oxidation
5. Permeable reactive barriers
6. Phytoremediation
7. Natural Attenuation
8. Intrinsic and enhanced bioremediation

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Remediation of Jet Fuel Spills

Soil Vapor Extraction System (conceptual)

Pros:
• Proven performance; available equipment
• Short treatment times
• Can be combined with other technologies

Cons:
• Only treats unsaturated-zone soils; other methods needed to treat saturated soils and groundwater

Remediation of Jet Fuel Spills

Soil Vapor Extraction
• Radius of influence (ROI) is a key parameter in SVE system design
  • ROI is defined as the greatest distance from an extraction well at which a sufficient vacuum and vapor flow can be induced to enhance volatilization (vaporization) and extraction of the contaminants in the soil
• Vapor concentration, vapor extraction rate, and vacuum data are used in system effectiveness evaluation
• Mass extraction data (pounds per day) and mass removal quantity data is used to determine reduction in contaminant quantities over the course of remediation
  • For example: "Approximately 3,250 lbs of the four target VOC compounds and 176,000 lbs of total VOCs were extracted from the treatment area."
• Final measure of remediation defined by groundwater concentrations

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Remediation of Jet Fuel Spills
Kirtland AFB BFF Specific

• Since 2003, soil vapor extraction has been in use at Kirtland AFB to remediate contamination in the vadose zone.
  - Soil vapor extraction units consist of two internal combustion engines, each.

• A total of four SVE units have been operating at the site:
  - Units 335, 344, and 345 have been at single wells.
  - Unit 249 is at a manifold consisting of six shallow soil vapor monitoring wells.

• In April 2012, Units 335, 344, and 345 were moved to optimized locations based on quarterly soil vapor concentration data (per the SVE Optimization Plan submitted to the NMED).

Remediation of Jet Fuel Spills
Kirtland AFB BFF Specific

![Graph showing pounds removed by SVE Unit 249 from 1-Dec-10 to 1-Dec-12.](image)
Remediation of Jet Fuel Spills
Kirtland AFB BFF Specific

SVE Unit 335

Unit 335 was moved to an optimized location

Remediation of Jet Fuel Spills
Kirtland AFB BFF Specific

SVE Unit 344

Unit 344 was moved to an optimized location
Remediation of Jet Fuel Spills
Kirtland AFB BFF Specific

SVE Unit 345

Unit 345 was moved to an optimized location

For more information:

- Environmental Science in the 21st Century – An Online Textbook (http://oceanworld.tamu.edu/don)
  - Reference provides an overview of groundwater remediation approaches and technologies

- EPA Remediation Technologies for Fuel (http://www.epa.gov/oust/cat/remedial.htm)
  - Reference provides detailed information on various new and existing technologies for fuel remediation

- USGS Toxic Substances Hydrology Program (http://toxics.usgs.gov/topics/remediation.html)
  - Reference provides additional information on fuel remediation in groundwater systems

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Kirtland AFB BFF
Soil Vapor Extraction Remediation

Kirtland AFB Bulk Fuels Spill Remediation

- A new SVE system was brought online on January 22, 2013
- Representatives from NMED and Albuquerque Environmental Health Department were present to observe system startup/operation
- The new system has more capacity than the four previously used units and will be able to treat a larger footprint
- ROI testing on the new system is ongoing and will define optimized operating conditions and the footprint of remediation
- Mass extraction data (pounds per day) and mass removal quantity data will be reported in the BFF quarterly reports
Looking Forward

Up and Coming

- A website specific to the BFF spill has been developed: www.kirtlandjetfuelremediation.com

- Fourth Quarter 2012 Report is being written and will be delivered to NMED by 29 March 2013

- Design and construction of an in-well treatment system that uses air sparging and air stripping is in process – will be online in late Spring 2013

- Submittal of Groundwater and Vadose Zone RFI anticipated Summer 2013

- Agency for Toxic Substances and Disease Registry Report due out Spring 2013
Points of Contact

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Discussion
# Meeting Dates

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## Request for Agenda Topics

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