KAFB Fuel Spill History

- **1951-53** – Kirtland Air Force Base (KAFB) Bulk Fuels Facility (BFF) constructed
- **1975** – Handling of aviation gasoline containing the additive ethylene dibromide (EDB) discontinued
- **1999** – KAFB notified NMED of soil contamination from underground piping leak, and ceased use of piping
- **2001** – KAFB notified NMED of groundwater contamination with dissolved fuel constituents
- **2003** – Soil vapor extraction (SVE) begins to vacuum contaminants from soil
- **2007** – Fuel (light non-aqueous phase liquid, LNAPL) discovered floating on groundwater
- **2009** – Water level rise begins to submerge LNAPL within aquifer
- **2014-15** – Inter-agency partnership, additional interim measures
- **2015** – Dissolved EDB groundwater cleanup begins

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Regulatory Basis

The New Mexico Environment Department (NMED) has been granted primacy by the U.S. Environmental Protection Agency to administer:

- The Safe Drinking Water Act (SDWA) program; and
- The Resource Conservation and Recovery Act (RCRA) program

Public water systems, such as the ABC Water Utility Authority, Kirtland AFB and the VA Hospital, must deliver water to consumers that meets SDWA standards.

Kirtland AFB must comply with their RCRA Hazardous Waste Permit, including the Corrective Action Process.

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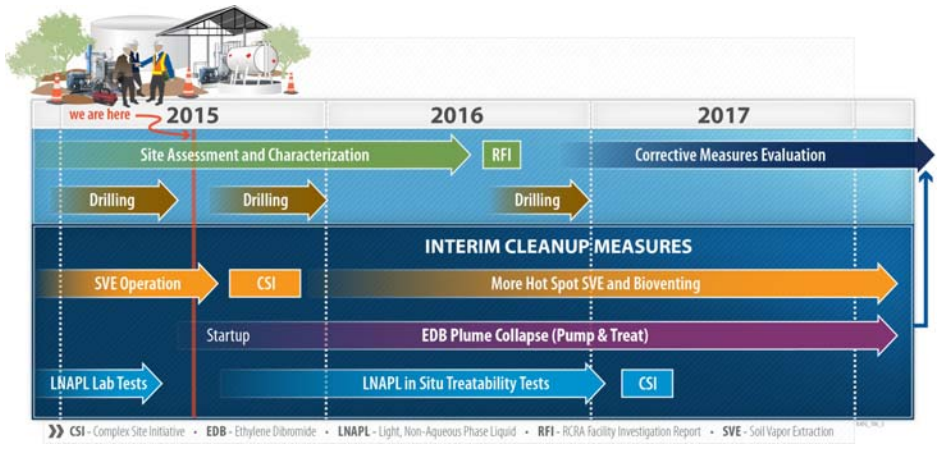
RCRA Corrective Action Timeline 2015-17



4

Monthly Testing of Drinking Water Shows No Contamination

5

A Partnership for Success

A collaborative technical team is solving the complex hydrogeologic and engineering challenges posed by fuel leak

Albuquerque Bernalillo County Water Utility Authority

USGS science for a changing world

US Army Corps of Engineers

INTERA GEOSCIENCE & ENGINEERING SOLUTIONS

PORTAGE

AECOM

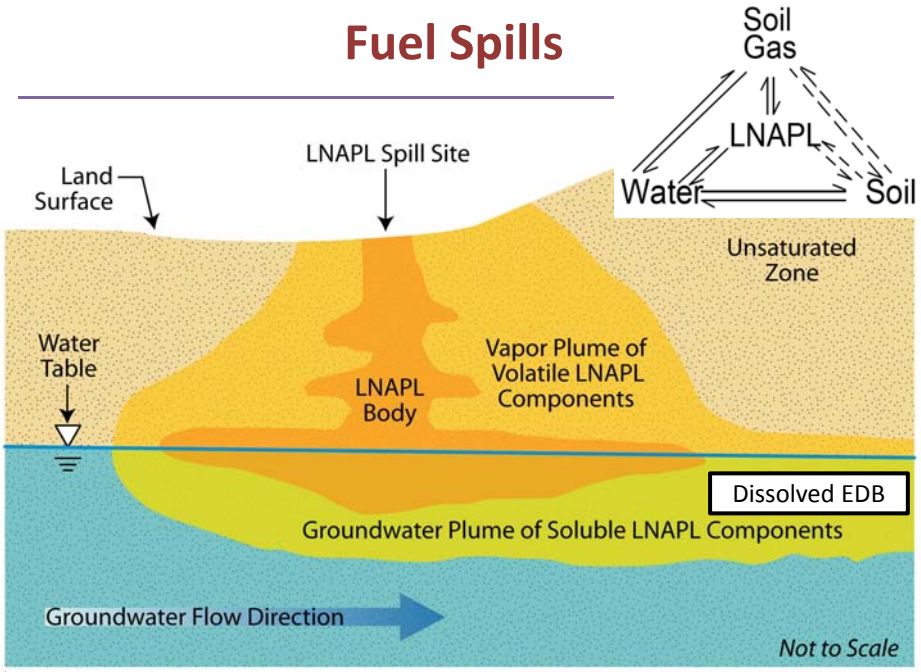
Colorado State University

NewFields Government Services, LLC

noblis For the best of reasons

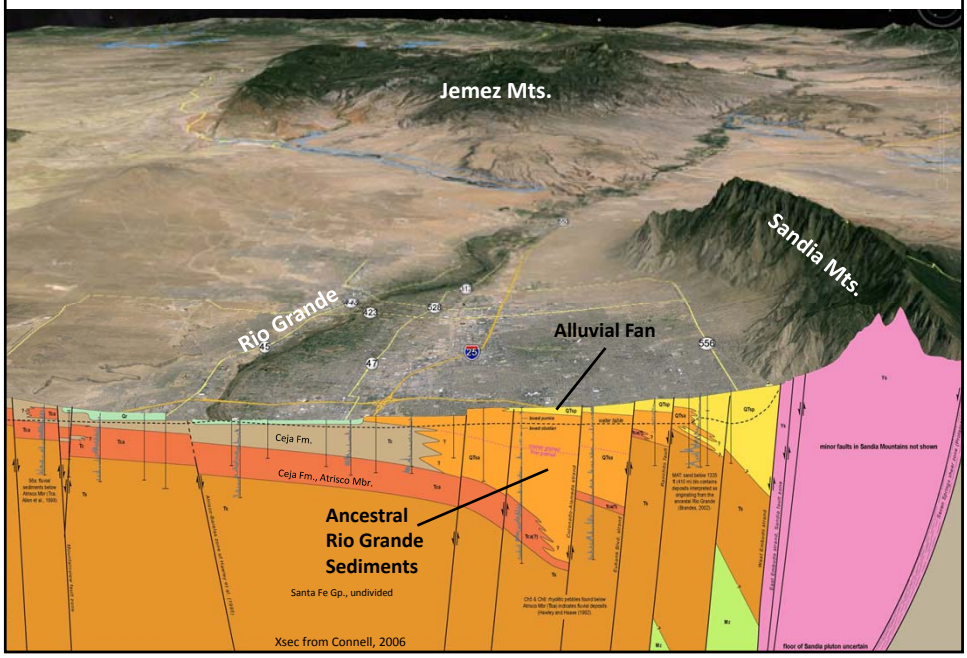
6

Fuel Spills



Adapted from Delin et al., 1998, USGS Fact Sheet FS-084-98

Middle Rio Grande Basin

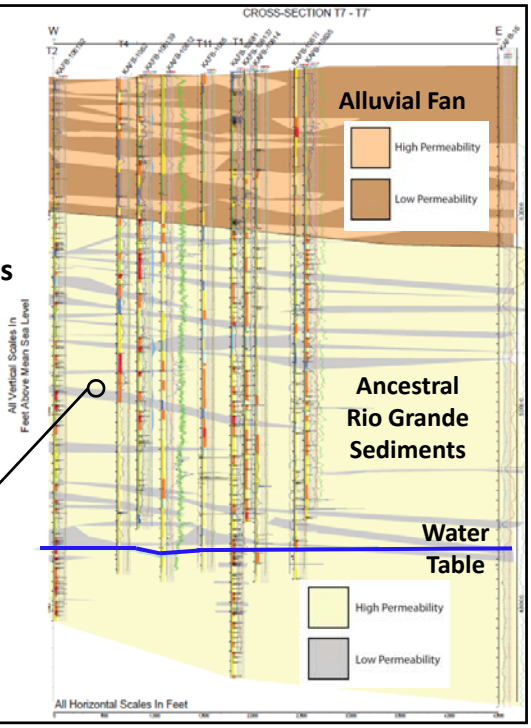


Site Geology

Interbedded Coarse and Finer Grained Sediments

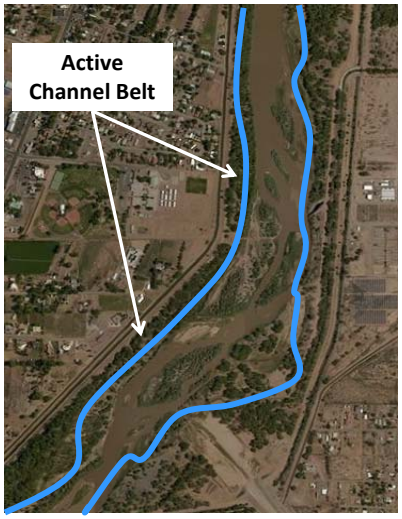
Anisotropy – Physical Properties Vary with Direction

Outcrop of sediment similar to what is at fuel spill site

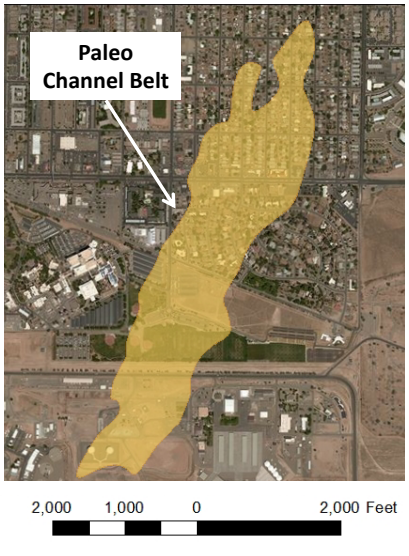


Rio Grande Braided Stream Channel Belt

Rio Grande Braided Stream In Albuquerque South Valley



Shallow EDB Plume



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Major Progress to Report

- Better understanding of geology influence on contaminant migration
- 16 new groundwater monitoring wells drilled
  - Ethylene dibromide (EDB) not migrating towards drinking water wells KAFB-3 and Ridgecrest-3
- EDB plume collapse; first extraction well and treatment system are operating
- Soil vapor extraction (SVE) rebound and bio-respiration testing completed; evaluating data to drive decisions on continued use of SVE and suitable areas to bioventing
- Laboratory microcosm testing completed; anaerobic in-situ bioremediation pilot test is proposed

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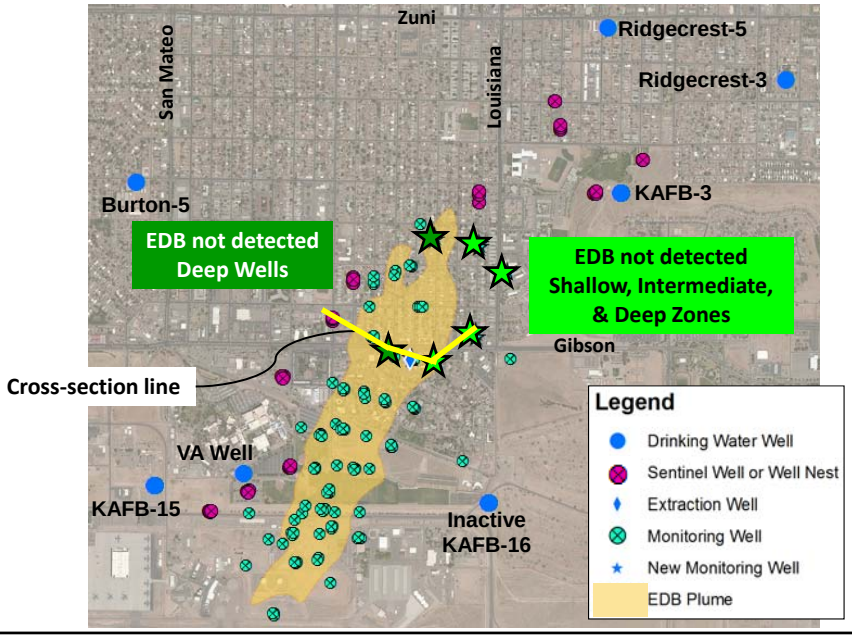
Drilling Results - Plume Definition



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Cross Section ~ West-East Along Gibson

Alluvial Fan Sediments

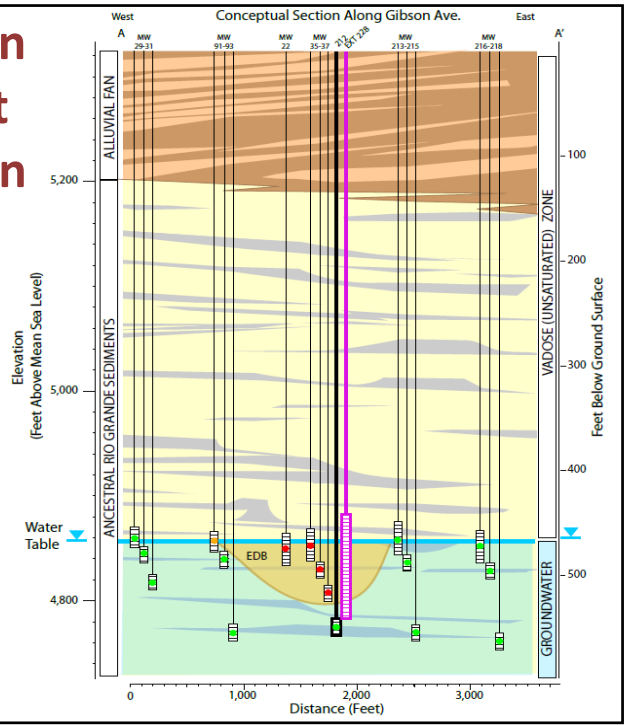
- High Permeability
- Low Permeability

Ancestral Rio Grande Sediments

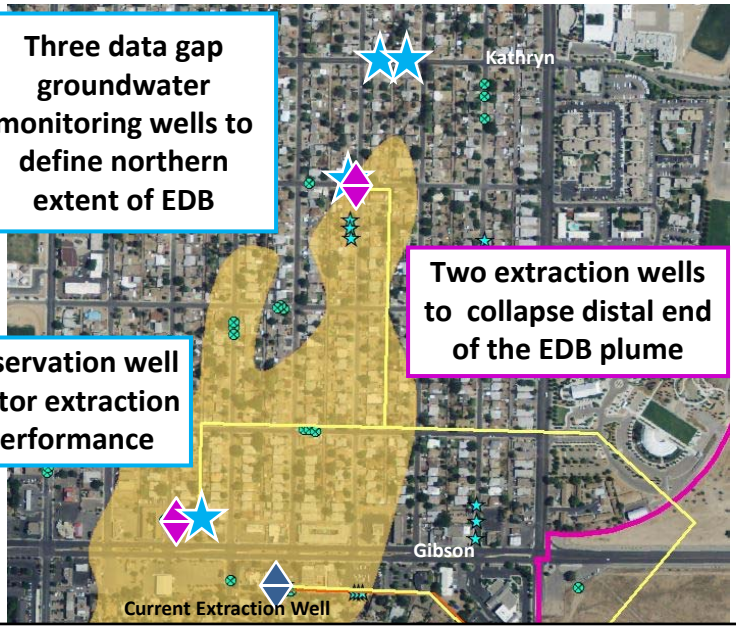
- High Permeability
- Low Permeability

EDB

- Non-Detect
- Detection, Below MCL
- Detection Above MCL



Additional Well Drilling (Fall 2015)



Three data gap groundwater monitoring wells to define northern extent of EDB

Two extraction wells to collapse distal end of the EDB plume

One observation well to monitor extraction well performance

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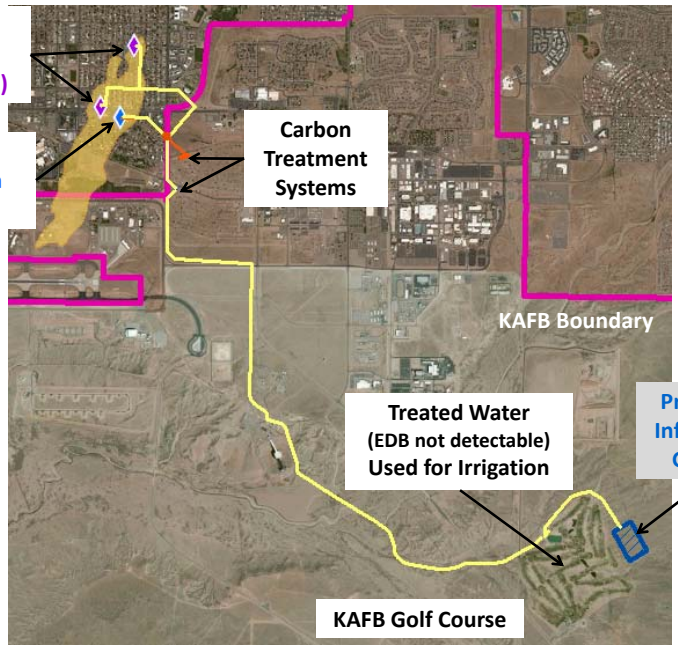
Collapsing the EDB Plume



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Groundwater Pump-and-Treat System Construction

Fusing Double-Walled Groundwater Pipeline

Control Wire Installation

Extraction Wellhead

Treatment Process Tanks

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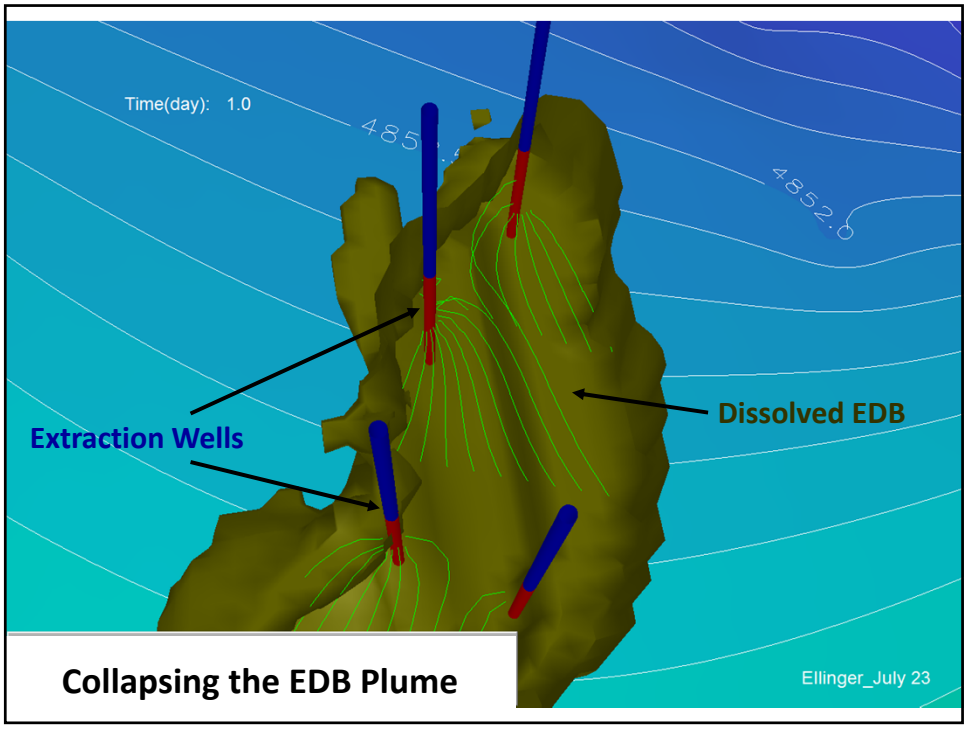
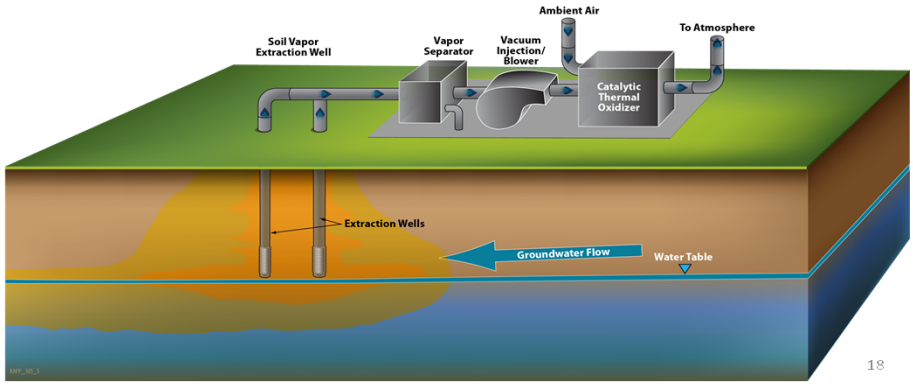


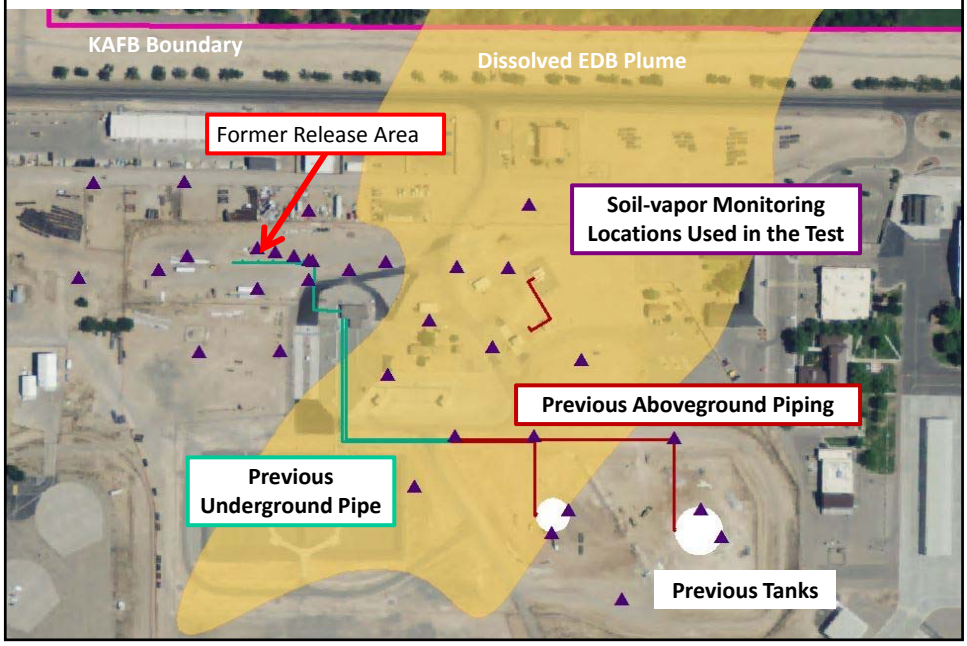
Collapsing the EDB Plume

Soil Vapor Extraction

- More than 560,000 gallons of fuel recovered by SVE
- Vapor is treated in accordance with City of Albuquerque Air Quality Permit requirements
- SVE rebound and bio-respiration testing recently completed

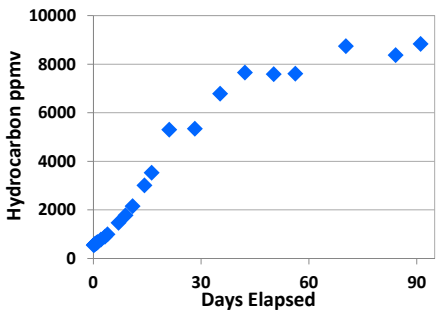


Source Area – Interim Measures



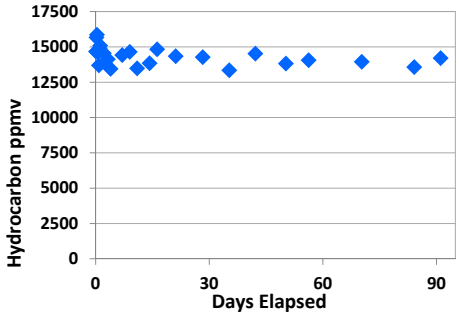
SVE Shutdown Rebounding Testing

SVMW-03 at 250 ft below ground surface



Hydrocarbon concentrations increased (rebounded)

SVMW-03 at 300 ft below ground surface

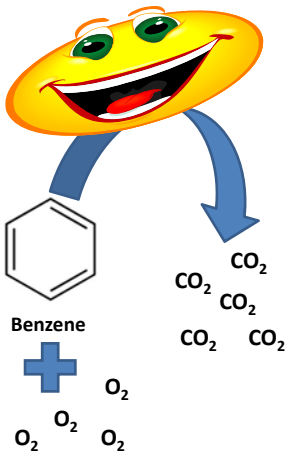


Hydrocarbon concentrations remained stable

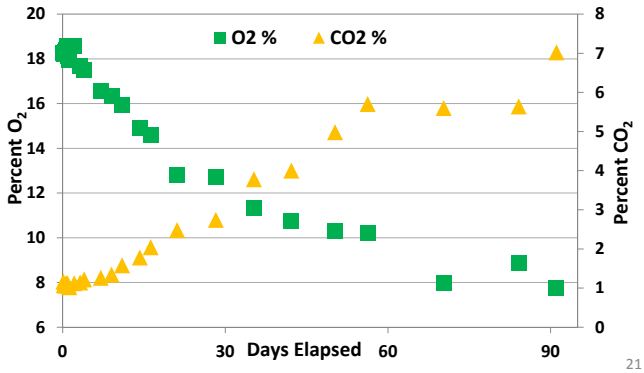
Soil Bio-Respiration Testing

Naturally occurring soil bacteria are present throughout subsurface

Bacteria consume O_2, produce CO_2 as they biodegrade or "eat" fuel



SVMW-03 at 250 ft below ground surface



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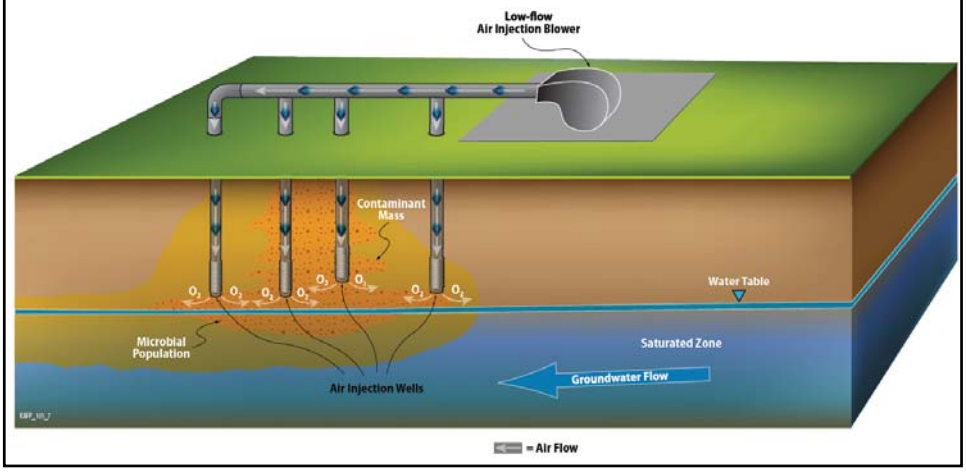
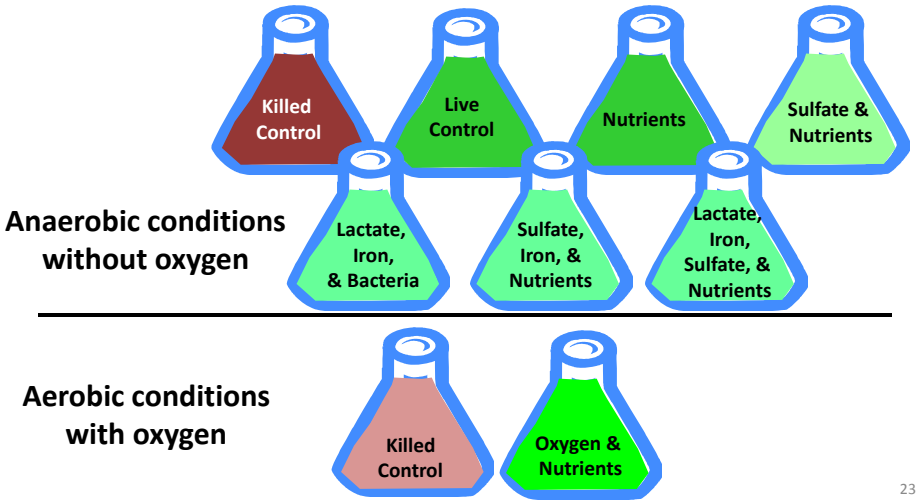
Bio-Venting

- **Air is injected into the vadose zone to deliver oxygen to soil bacteria to help them biodegrade contaminants**



Laboratory Microcosm Testing

Identify potential technologies to degrade EDB



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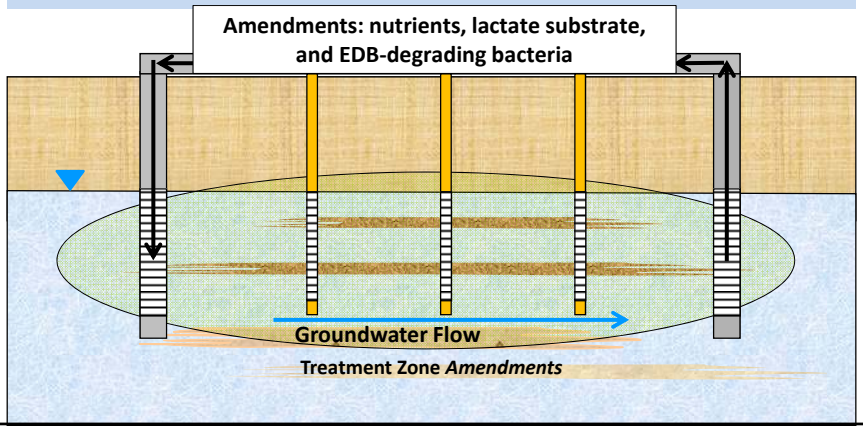
Anaerobic Biodegradation Pilot Test

Groundwater Recirculation

- Pump groundwater - Add amendments
- Inject amended water up-gradient to create recirculation cell to support anaerobic biodegradation EDB



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Recap

- Drinking water supply wells show no contamination
- EDB groundwater plume not migrating towards KAFB-3 and Ridgecrest-3
- Over 2 M gallons of EDB contaminated water has been treated from the first extraction well
- Evaluating SVE rebounding testing data to identify suitable path forward for SVE and/or bioventing to cleanup the vadose
- Designing an in-situ anaerobic pilot test to clean up LNAPL

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Upcoming Events

- Public Field Trip – October 2015
- Public Meeting – November 17, 2015

How do I get more information?

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505-827-2140

Jill Turner,
KAFB project communications lead
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505-222-9548

NMED Website and Listserv: http://www.nmenv.state.nm.us/

Contact the Air Force:

Air Force Civil Engineer Center
Office of Public Affairs
2261 Hughes Ave, Ste 155
Joint Base San Antonio-Lackland TX 78236-9853
(210) 925-0956 or (866) 725-7617
Email: afcec.pa@us.af.mil

Air Force BFF-specific spill website: www.kirtlandjetfuelremediation.com

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

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