



Kirtland Air Force Base Fuel Spill Cleanup

August 6, 2015



KAFB Fuel Spill History

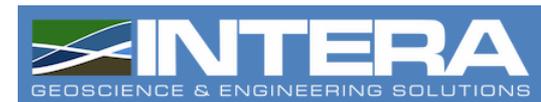
- **1951-53** – Kirtland Air Force Base (KAFB) Bulk Fuels Facility (BFF) constructed
- **1975** – Handling of aviation gasoline containing the additive ethylene dibromide (EDB) discontinued
- **1999** – KAFB notified NMED of soil contamination from underground piping leak, and ceased use of piping
- **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** – Groundwater cleanup begins

A Partnership for Success

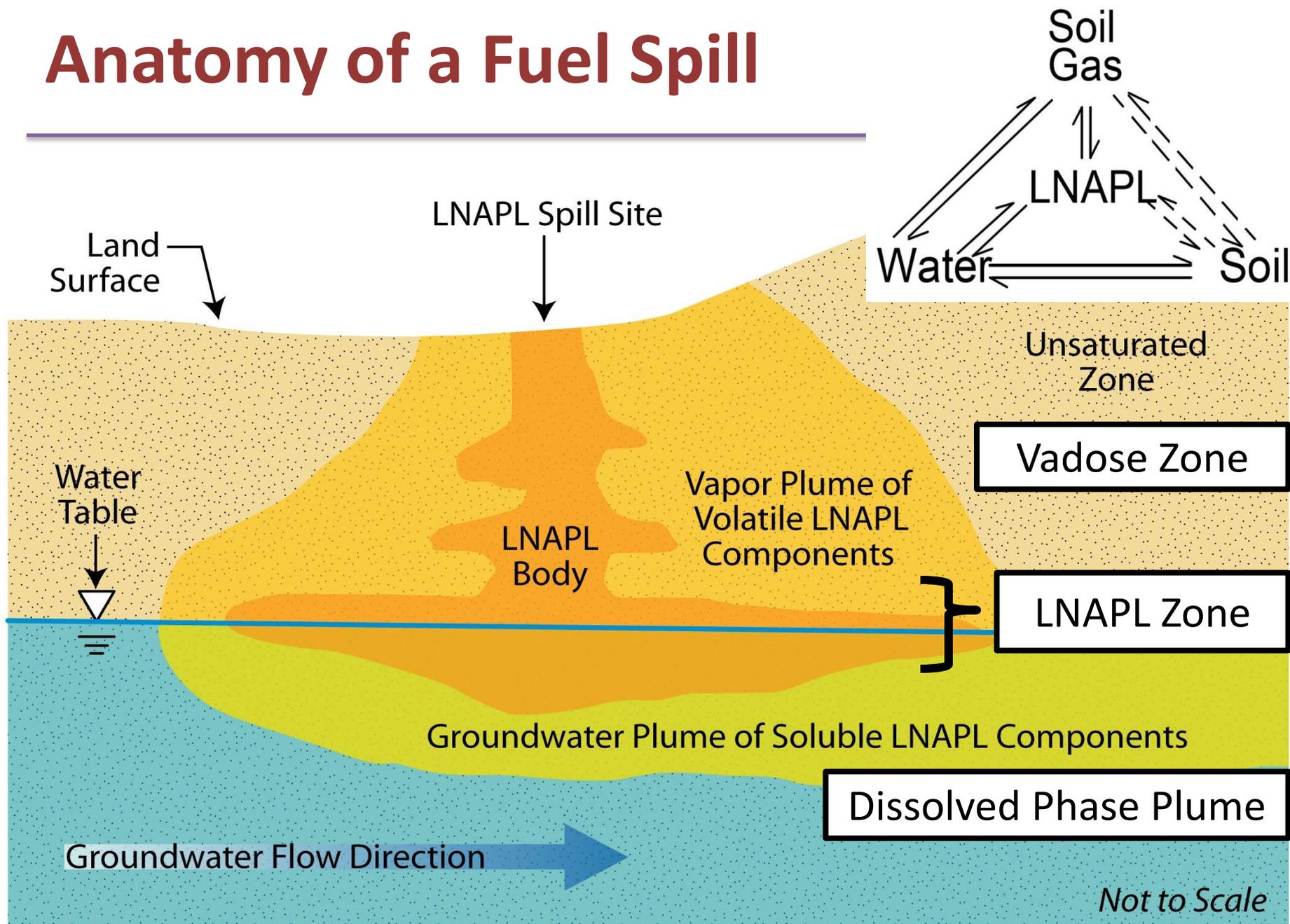
A collaborative technical team is solving the complex hydrogeologic and engineering challenges posed by fuel spill



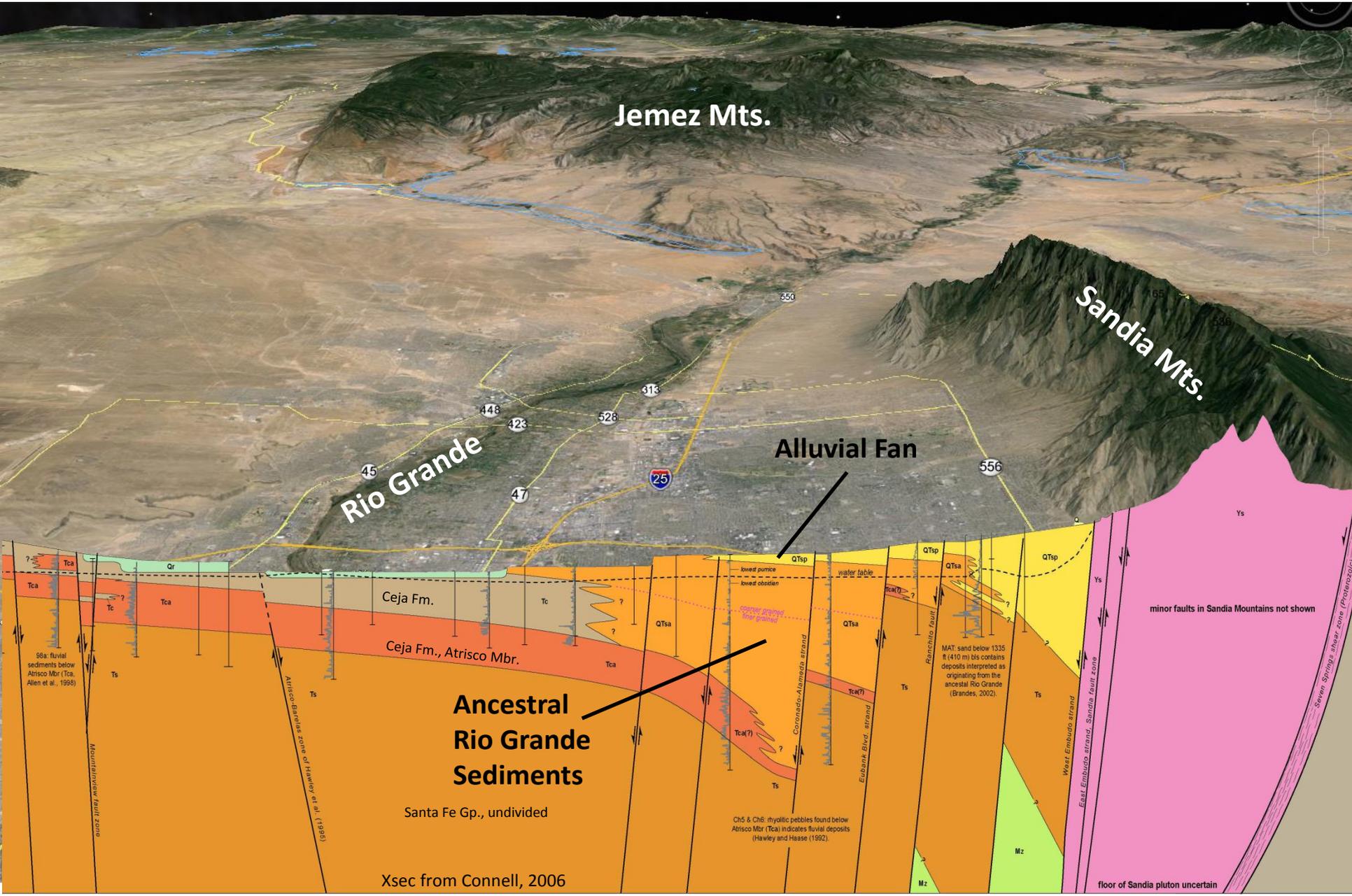
US Army Corps of Engineers



Anatomy of a Fuel Spill

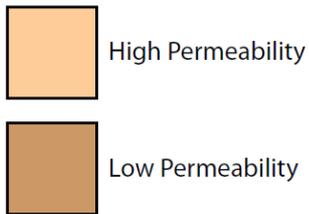


Middle Rio Grande Basin

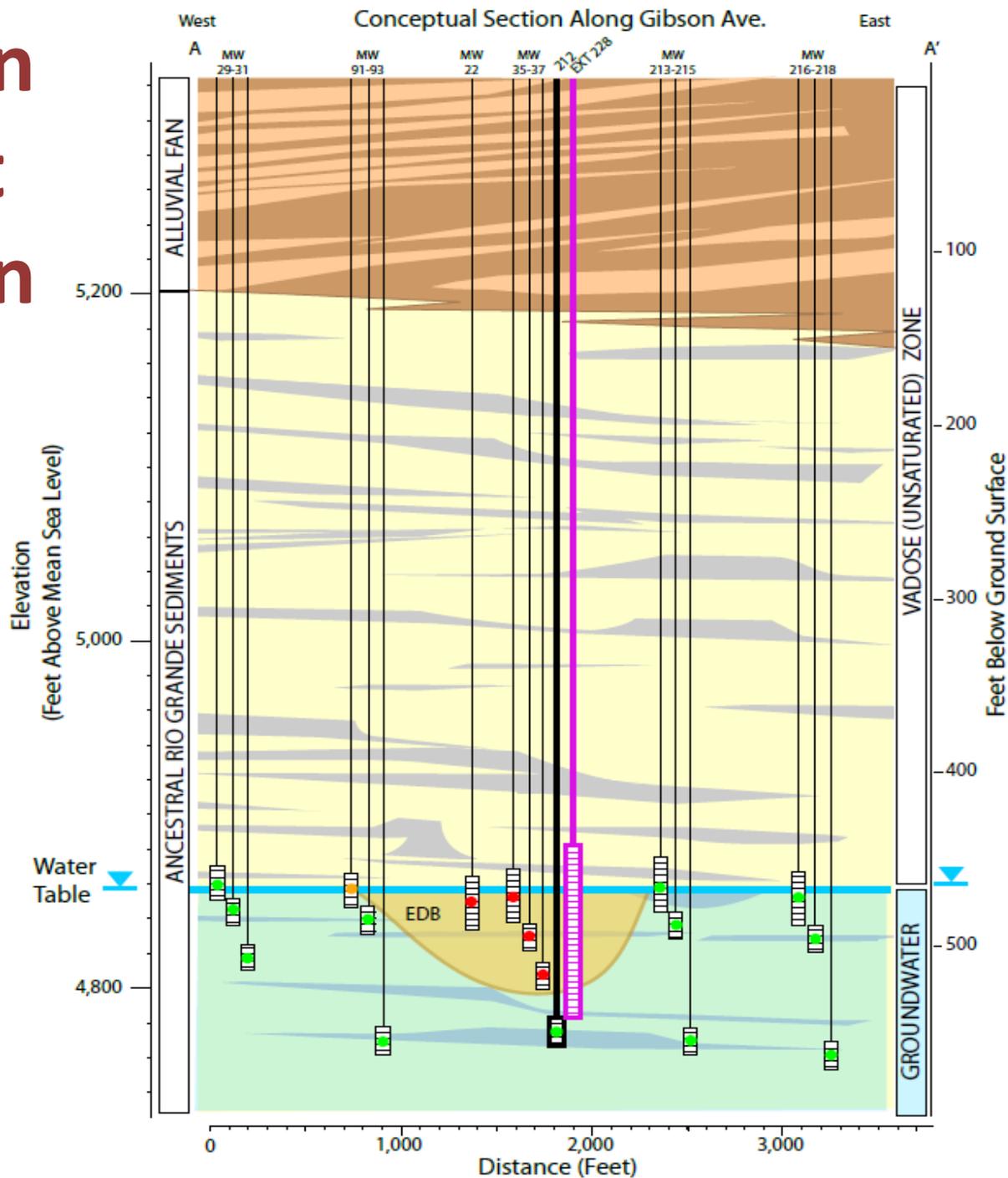
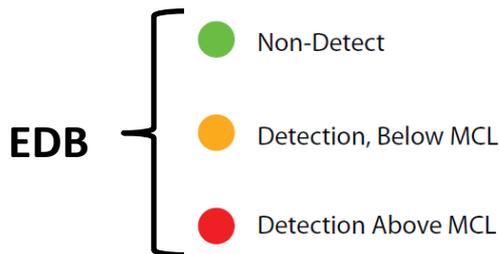
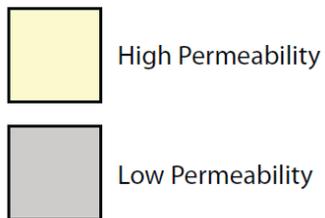


Cross Section ~ West-East Along Gibson

Alluvial Fan Sediments



Ancestral Rio Grande Sediments



NMED Strategic Plan Summary

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

Strategies to Achieve the Goal:

- 1) Continue robust groundwater and wellhead monitoring**
- 2) Collapse the dissolved EDB Plume Away from the Albuquerque Bernalillo County Water Utility Aquifer Wells**
- 3) Clean up soil in the spill area**
- 4) Remediate Light Non-Aqueous Phase Liquid (LNAPL) and associated dissolved phases in the LNAPL area**
- 5) Meet or exceed all requirements for providing public information and involvement**

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

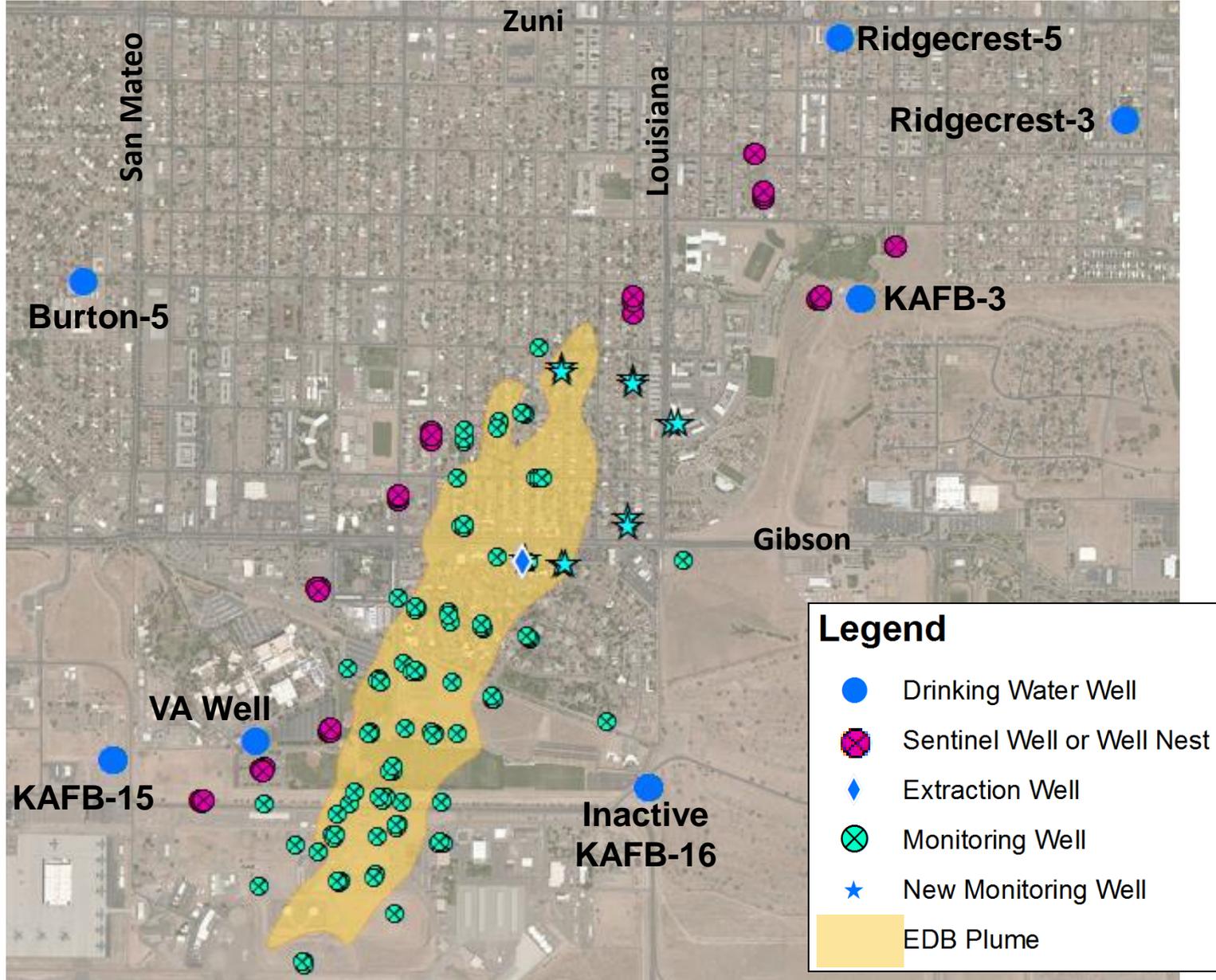
Public water systems, the ABC Water Utility Authority, Kirtland AFB and the VA Hospital, must deliver water to consumers that meets SDWA standards.

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

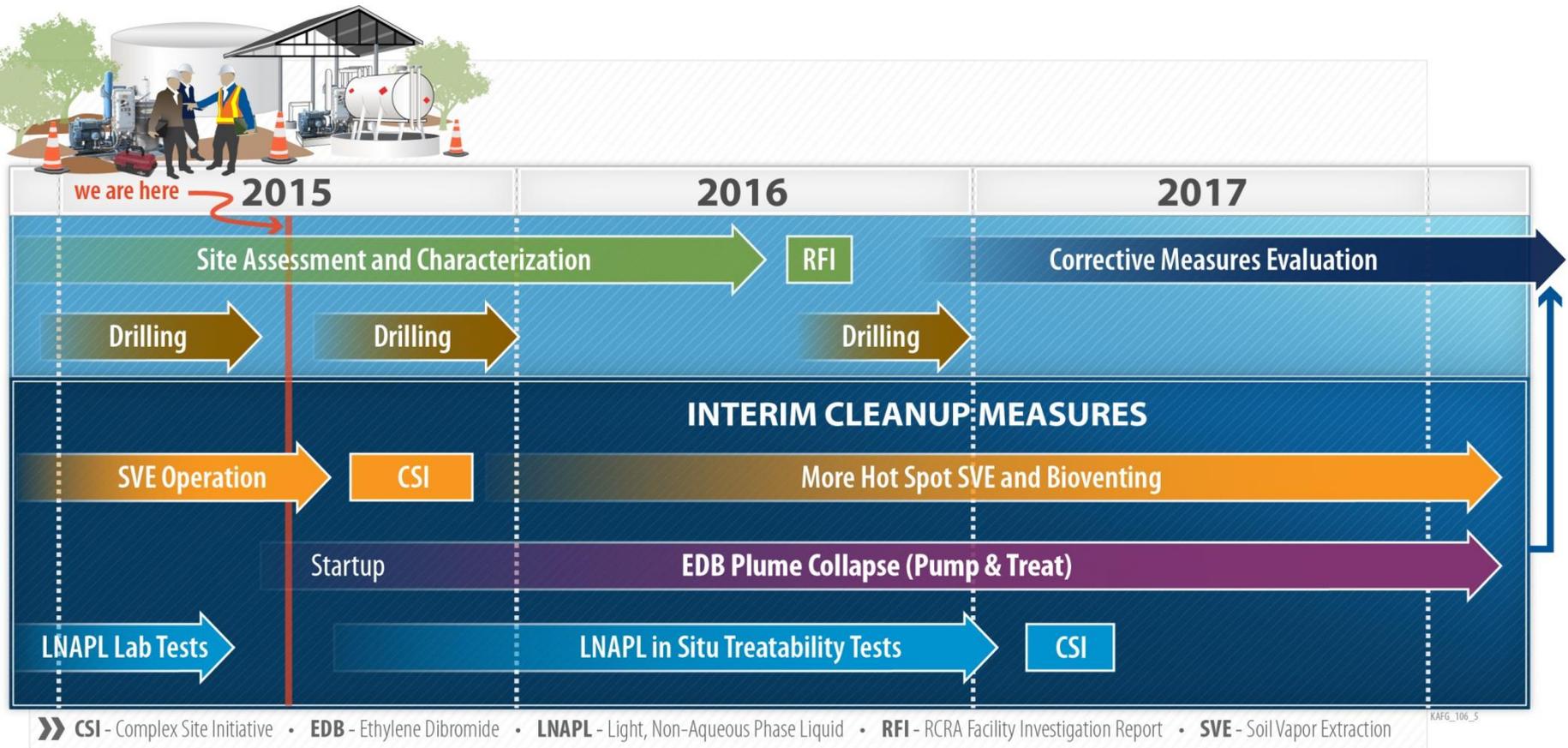
Monthly Wellhead Testing Shows No Drinking Water Contamination



Protecting Drinking Water Wells



RCRA Corrective Action Timeline 2015-17



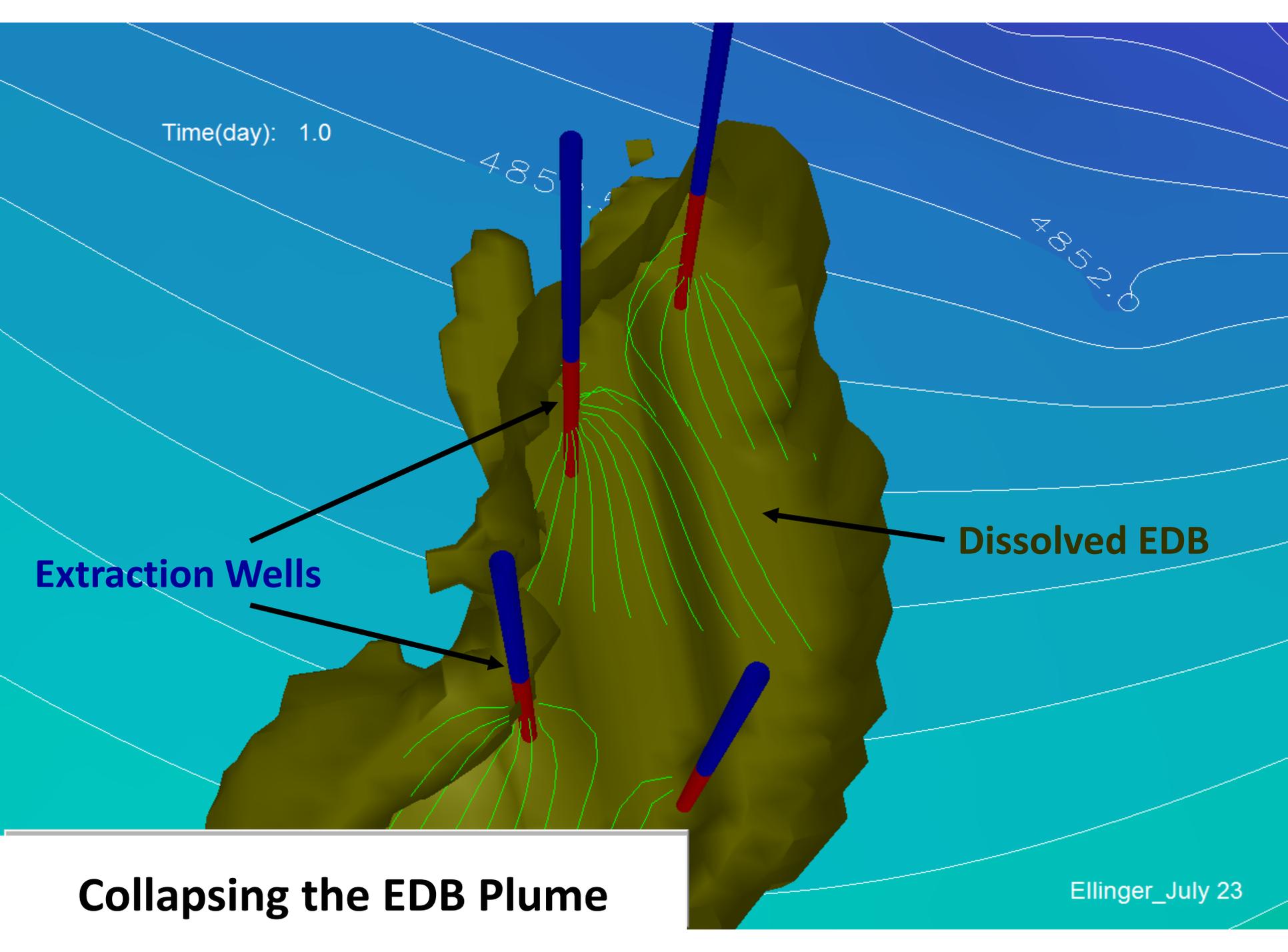
Time(day): 1.0

Extraction Wells

Dissolved EDB

Collapsing the EDB Plume

Ellinger_July 23



Collapsing the EDB Plume

2nd and 3rd
Extraction
Wells (2015)

First
Extraction
Well

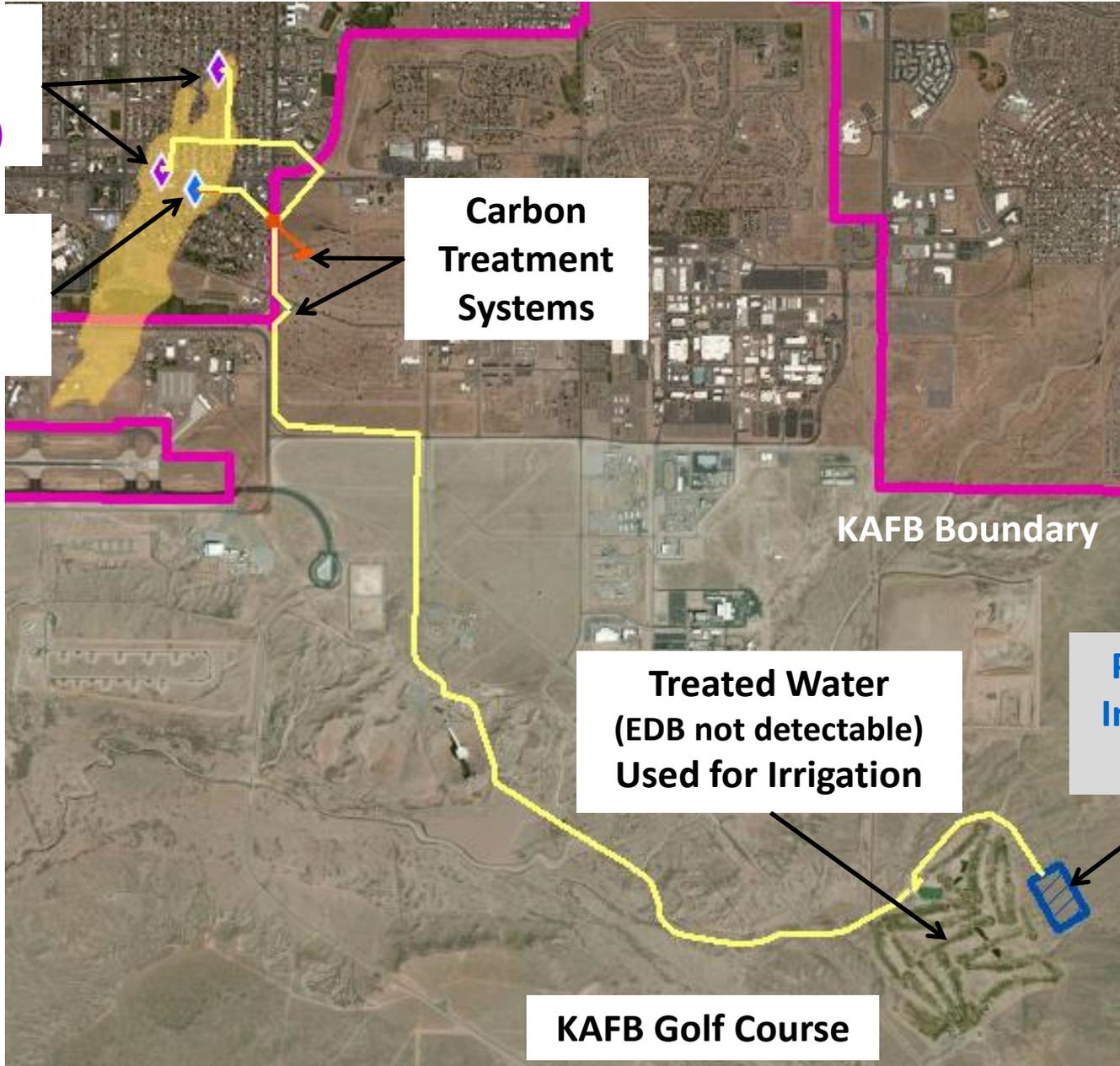
Carbon
Treatment
Systems

KAFB Boundary

Treated Water
(EDB not detectable)
Used for Irrigation

Proposed
Infiltration
Gallery

KAFB Golf Course

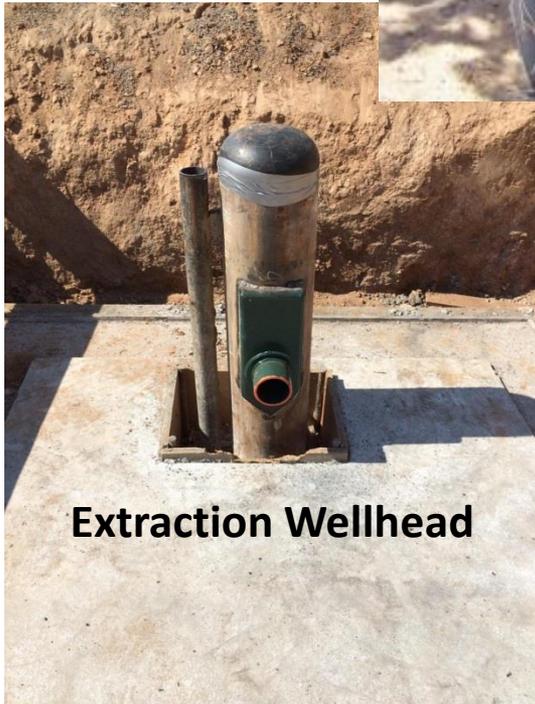


Groundwater Pump-and-Treat System Construction

Fusing Double-Walled Groundwater Pipeline



Control Wire Installation



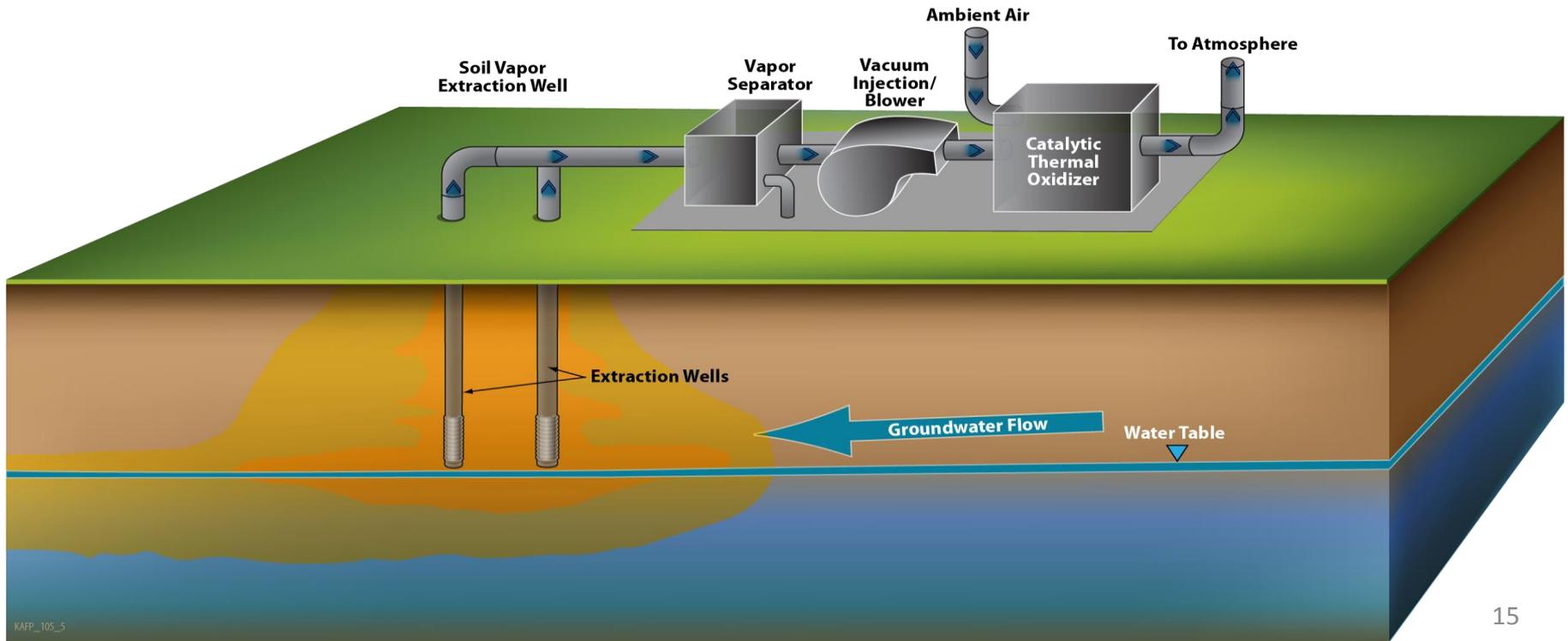
Extraction Wellhead



Treatment Process Tanks

Soil Vapor Extraction

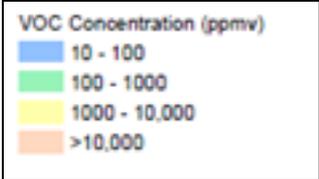
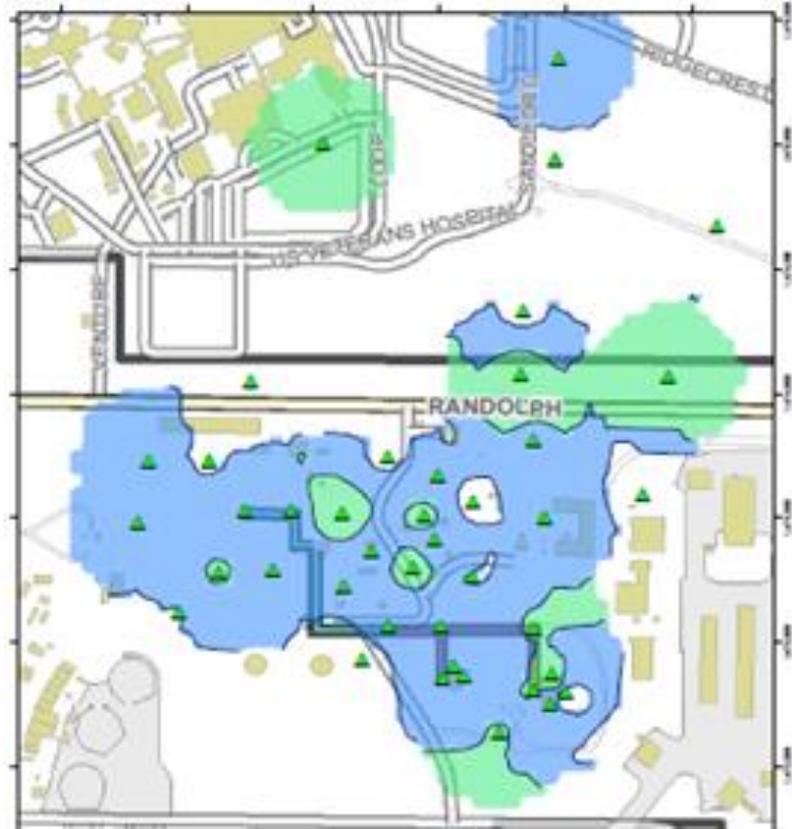
- More than 560,000 gallons of fuel recovered by SVE
- After 12 years of SVE, soil vapor concentrations are decreasing
- Vapor is treated in accordance with City of Albuquerque Air Quality Permit requirements
- SVE rebound and bio-respiration testing recently completed



Reduction in Soil Vapor Contamination

Q4-2011

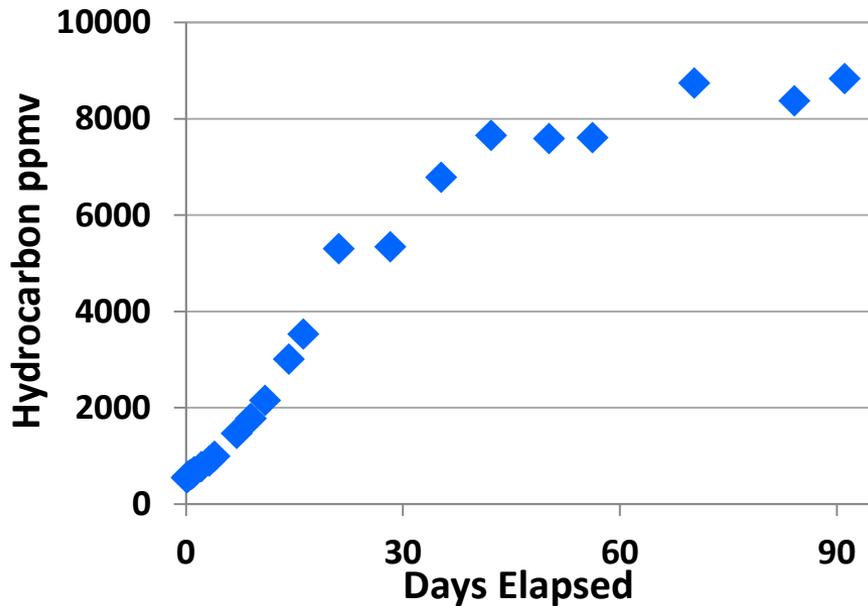
Q4-2014



450 feet below ground surface

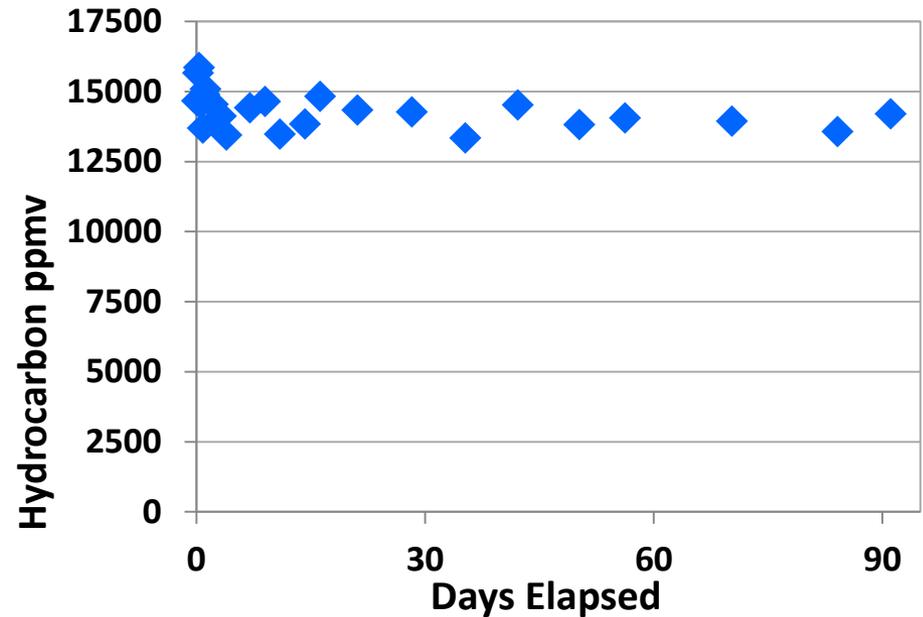
SVE Shutdown Rebounding Testing

**SVMW-03 at
250 ft below ground surface**



**Hydrocarbon concentrations
increased (rebounded)**

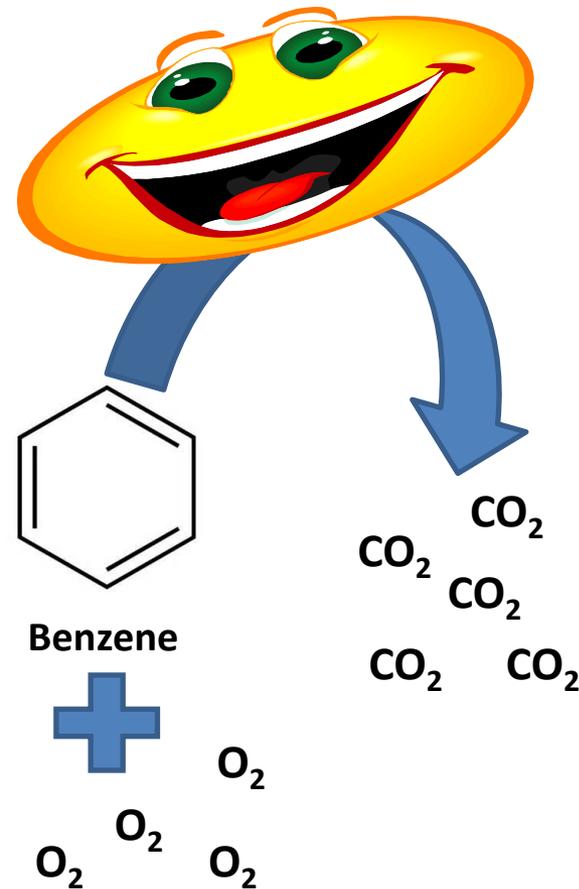
**SVMW-03 at
300 ft below ground surface**



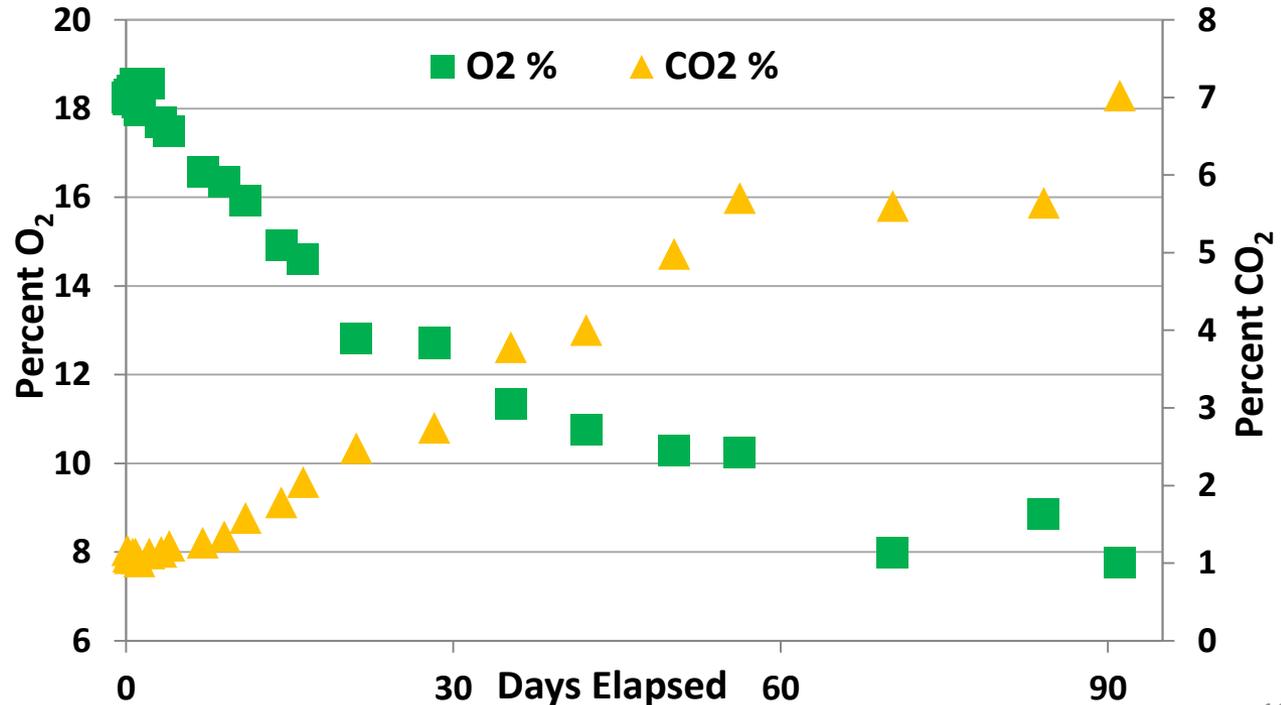
**Hydrocarbon concentrations
remained stable**

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

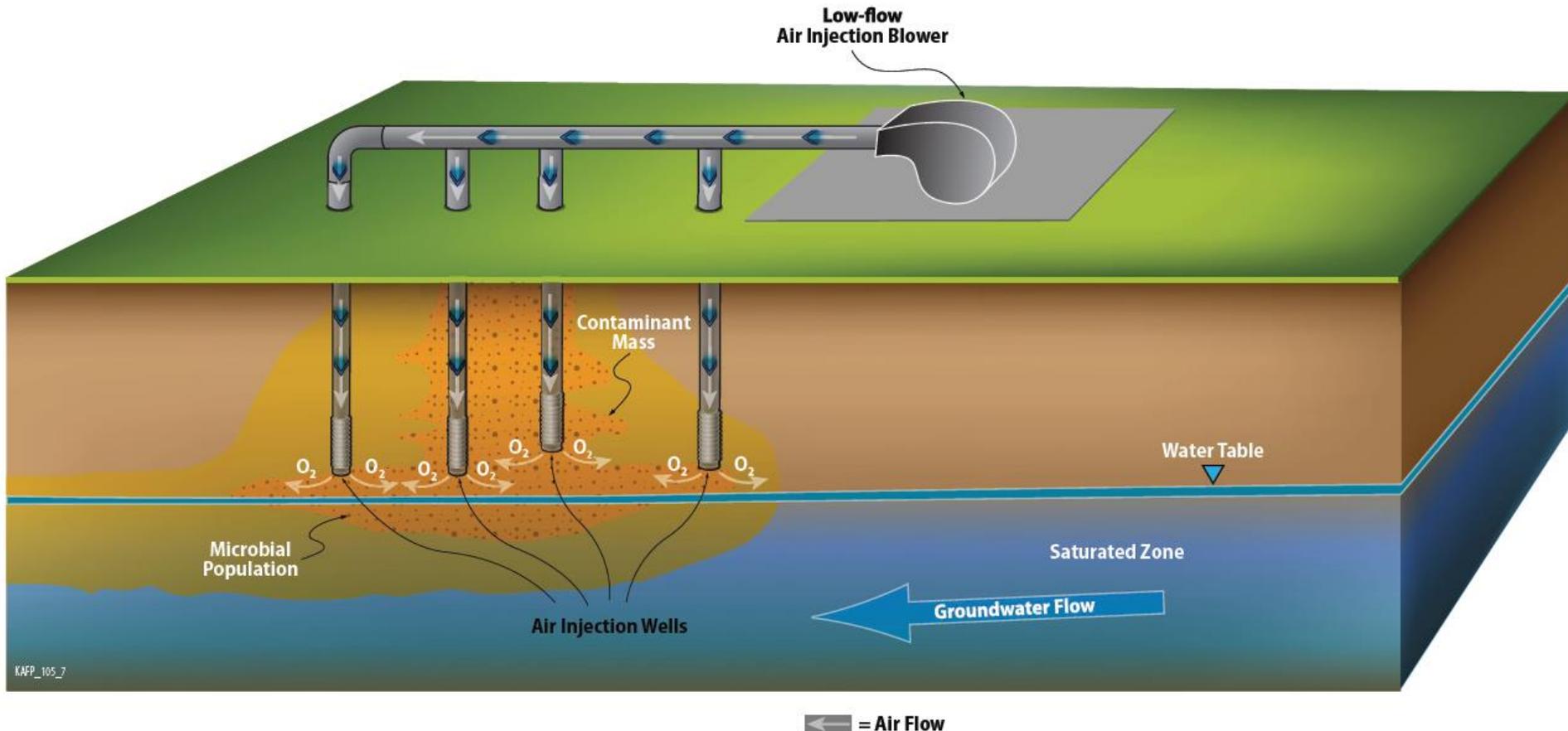


SVMW-03 at 250 ft below ground surface



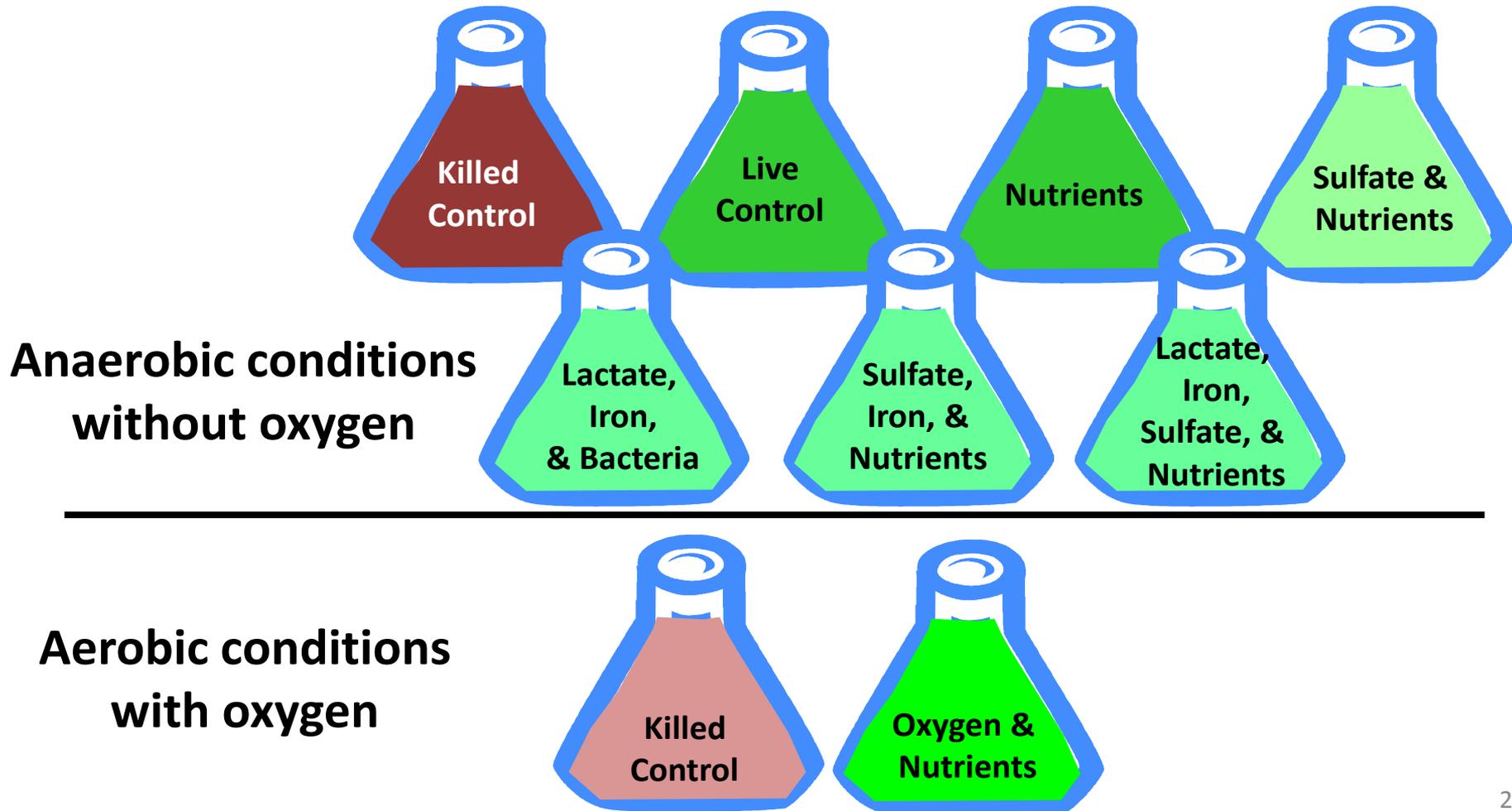
Bio-Venting

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



Laboratory Microcosm Testing

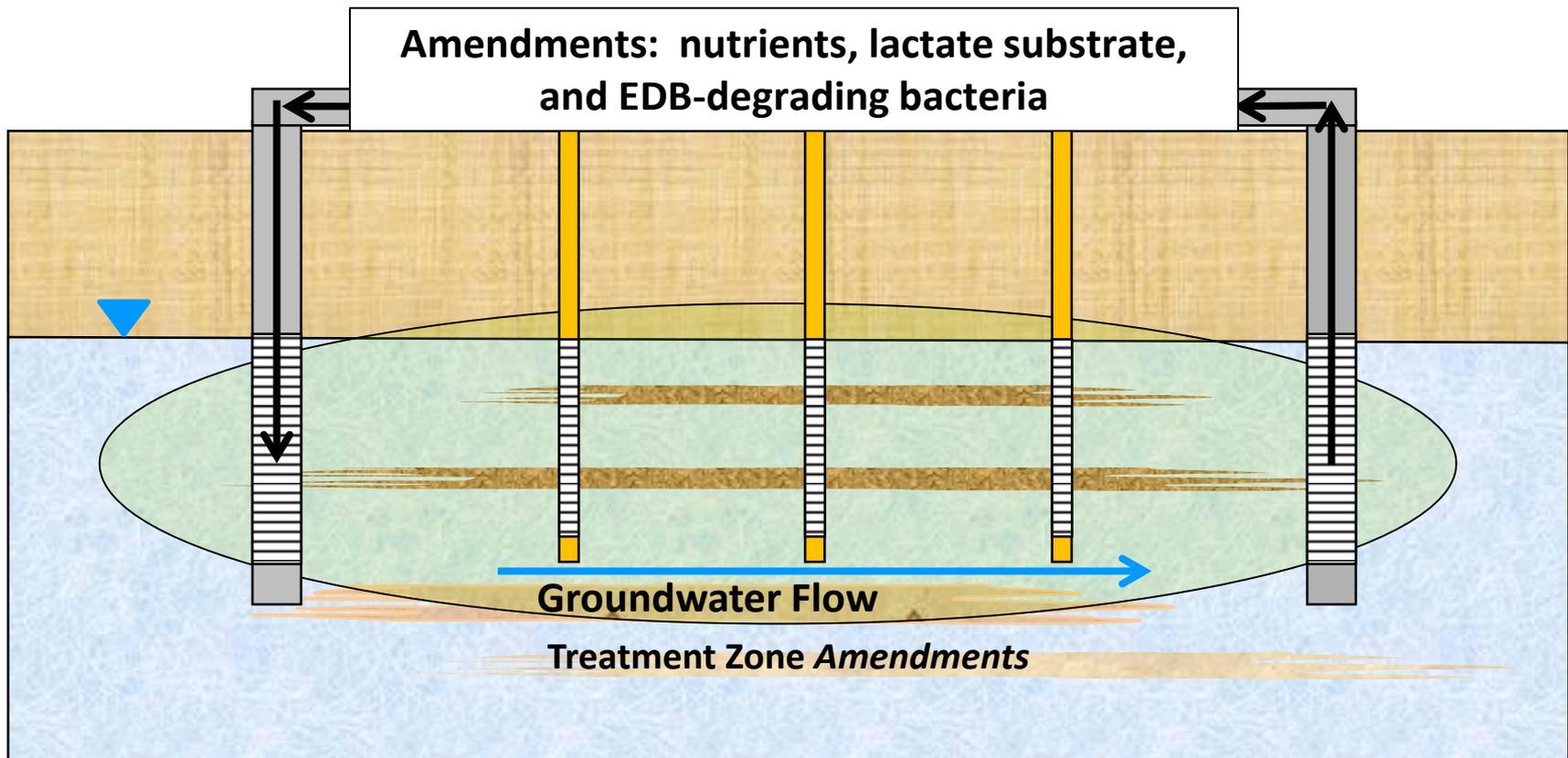
Identify potential technologies to biodegrade EDB



Anaerobic Biodegradation Pilot Test

Groundwater Recirculation

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



Recap

- **Drinking water supply wells show no contamination**
- **EDB groundwater plume not migrating towards KAFB-3 and Ridgecrest-3**
- **Groundwater cleanup began June 2015**
- **Soil vapor extraction (SVE) has recovered 560,000 gallons of fuel and significantly reduced soil vapor concentrations**
- **Evaluating SVE test data to identify areas needing further SVE, and areas suitable for transitioning to bio-venting**
- **Designing an in-situ anaerobic pilot test to clean up LNAPL**

Thank You Neighborhoods!



The Air Force, NMED, and all the collaborating organizations sincerely thank the neighborhoods for putting up with the temporary road blocks and noise from the well drilling rigs

Upcoming Events

- Well Drilling Resumes – today
- Public Field Trip – October 2015
- Public Meeting – November 17, 2015



How do I get more information?

Contact NMED:

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KAFB project technical lead
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505-827-2140

Jill Turner,
KAFB project communications lead
jill.turner@state.nm.us
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.