

Kirtland Air Force Base Fuel Leak Cleanup

Presenters: Kathryn Lynnes, Air Force
Diane Agnew, New Mexico Environment Department
Adria Bodour, Air Force Civil Engineer Center



Project Status Update
March 9, 2017



Welcome



Kate Lynnes
Air Force Senior Advisor

Public Workshop

March 11, 2017

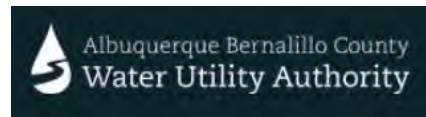
9 am to 12:00 pm

**Christ United Methodist Church
6200 Gibson Blvd. SE**

9 - 9:15 am	Meet and Greet along with Poster Session
9:15 - 11:30 am	Workshop Topic Sessions
11:30 - 12:00 pm	Final Discussions and Wrap-up

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



Sundance Consulting Inc.

Westside Coalition
Neighborhood Assoc.

Siesta Hills
Neighborhood Assoc.



ABQ City Council
District 6 Coalition of
Neighborhood Assocs.



Elder Homestead
Neighborhood Assoc.

Christ United Methodist Church

HAWLEY GEOMATTERS

Thomson and Associates

Citizen Action
New Mexico



Col Froehlich
Air Base Wing Commander

RAB Decision

Based on community and stakeholder response a RAB will not be formed:

- Response to RAB interest survey
 - Less than 10% of the people surveyed responded
 - Only 46 people indicated they would be willing to serve by provided their contact information
 - Only 5 people out of the 46 attended the Town Hall meeting
- Citizen petition and Town Hall meeting comments were BFF focused and there was little indication of interest in the Environmental Restoration Program
- Some key community stakeholders were not in support of establishing a RAB because would eliminate the on-going BFF outreach which the community has come to value and rely upon
- Federal Regulations prohibit using federal funds to support duplicative outreach activities

Project Progress



Diane Agnew

New Mexico Environment Department (NMED)

Hydrologist

2017 Strategic Plan

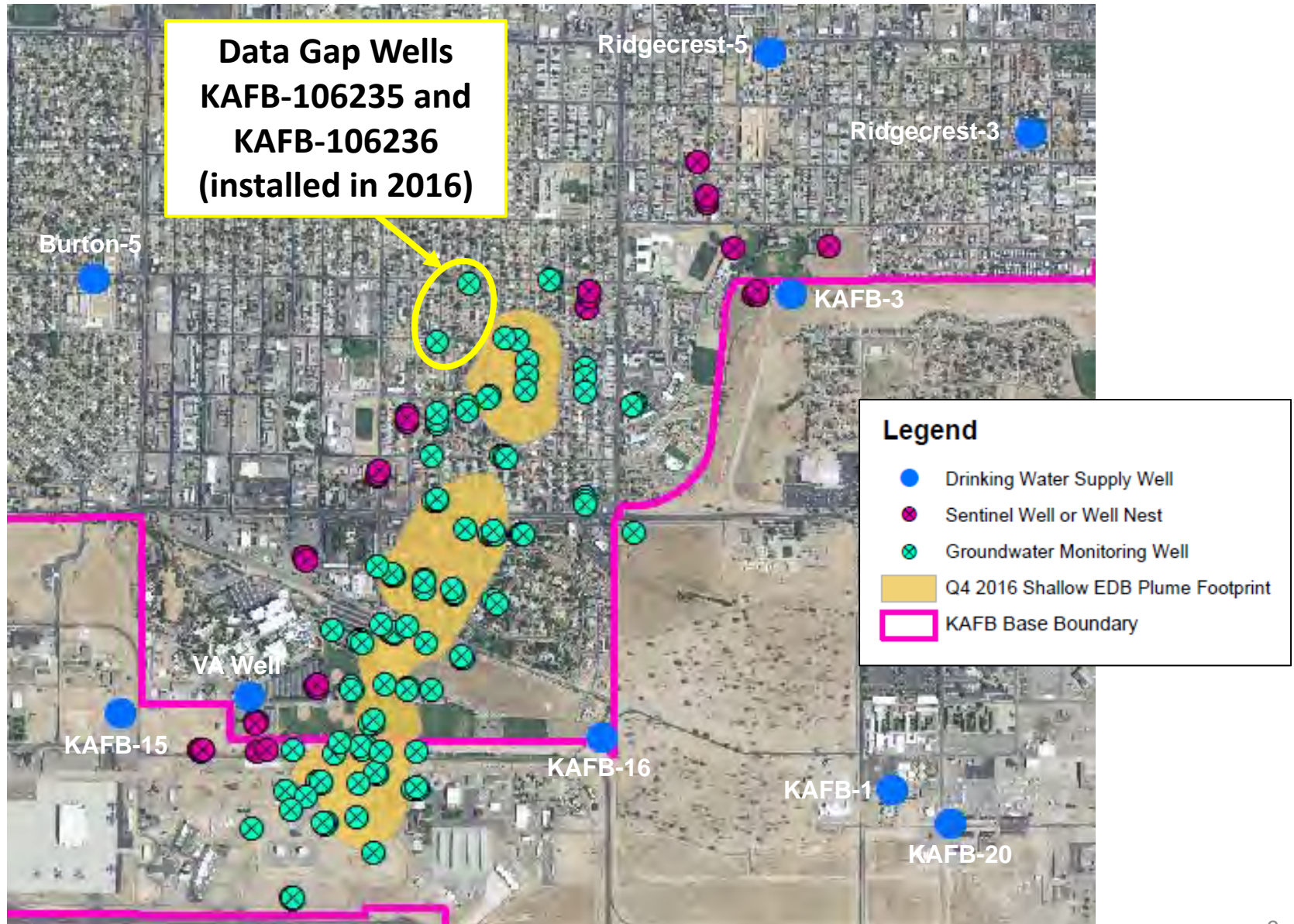
NMED Final 2017 Strategic Plan will be posted by the end March 2017 with comments received (www.env.nm.gov/kafbfuelplume)

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. Deploy multiple cleanup strategies, both simultaneously and sequentially, to cleanup soil and groundwater
3. Meet or exceed all requirements for providing public comment, information and involvement

Site Monitoring & Wellhead Protection



EDB Plume Data Gap Wells

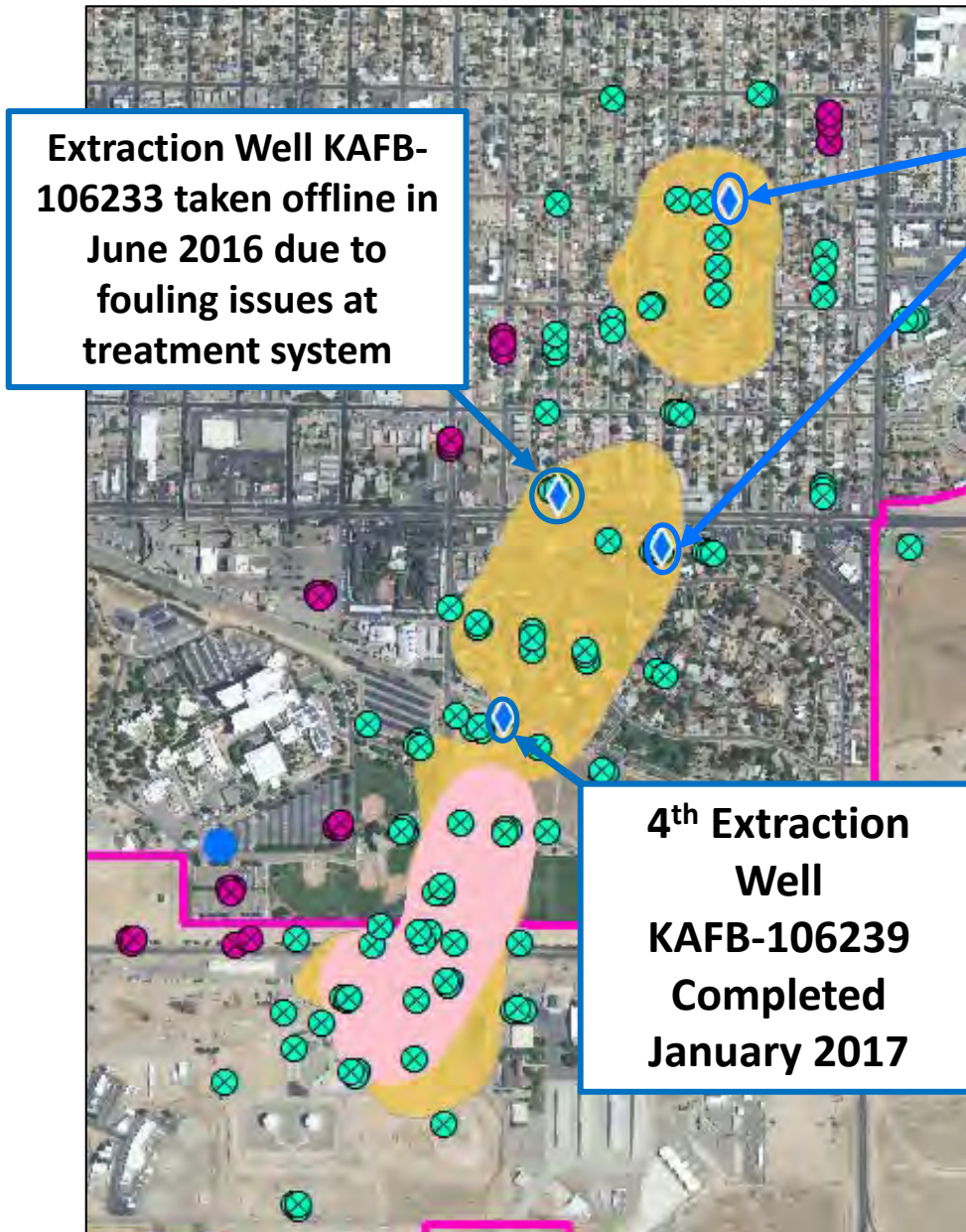
- Installed two data gap groundwater monitoring wells nests
- Nested well design provides:
 - Better vertical definition
 - Reduced impact to neighborhoods
 - Installation of “contingency well” to account for continued rising water table
- 1st samples collected January 2017; no EDB was detected



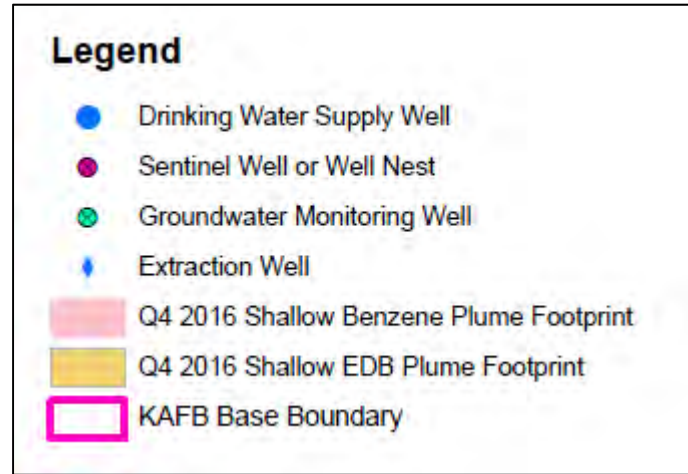
Groundwater Sampling Optimization

- Collect high quality data while reducing cost, minimizing neighborhood impacts, and increasing worker health and safety
- Data-based iterative process to optimize monitoring program
- Changing to passive diffusion bag (PDB) sampling at 75 residential groundwater monitoring wells
 - Pilot test results demonstrated PDB sampling was similar to mechanical pump sampling

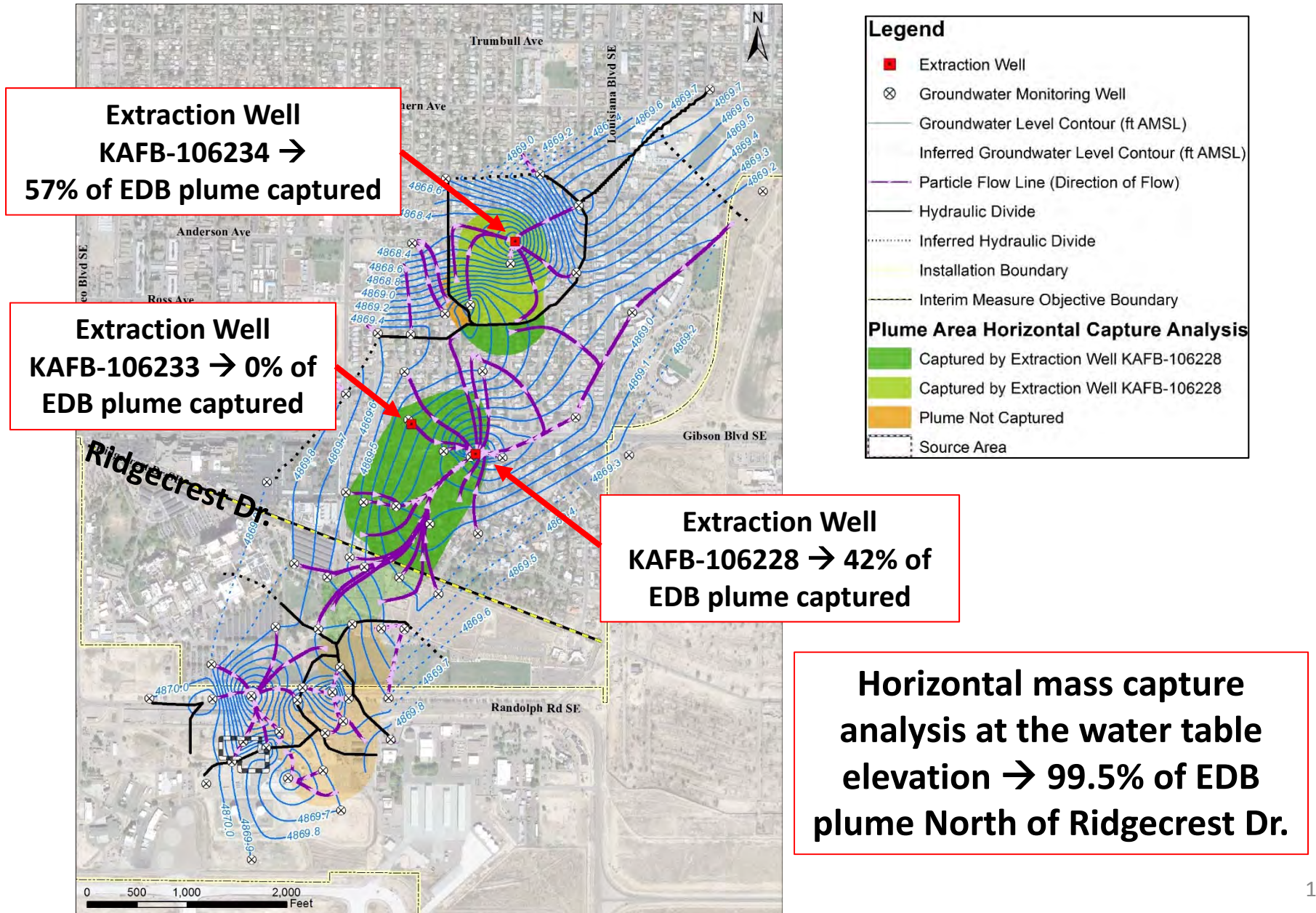
EDB Plume Collapse



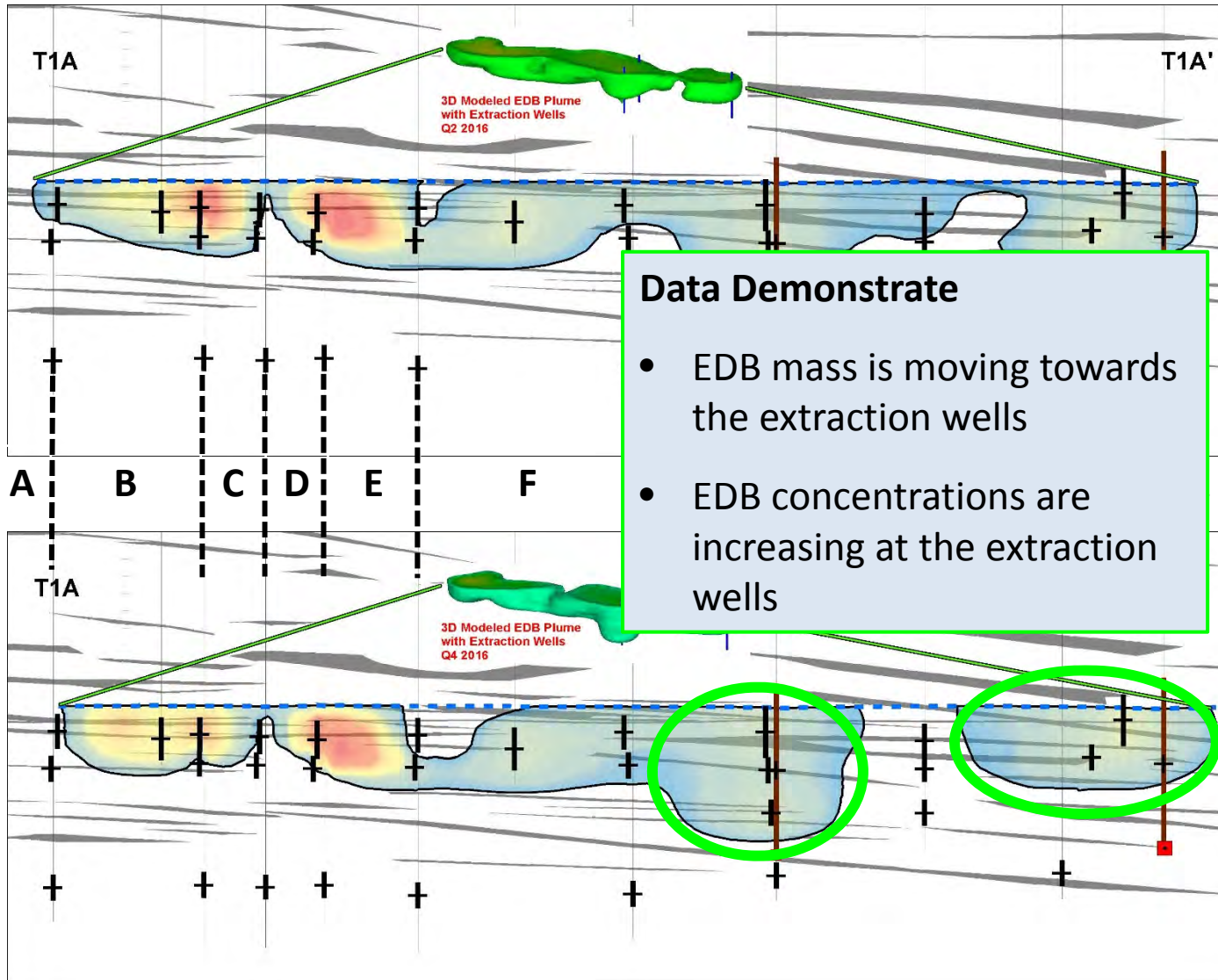
- 2 extraction wells operational – total rate of 300 gpm
- 151.7 million gallons of groundwater has been treated, with 48.4 grams of EDB removed



Plume Capture Update

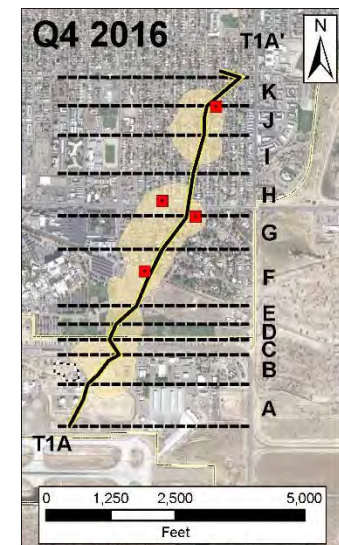
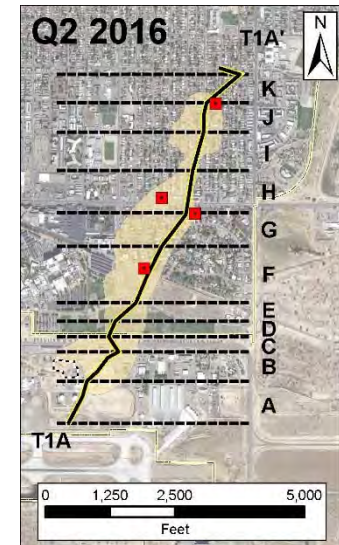


Plume Reduction Analysis



Data Demonstrate

- EDB mass is moving towards the extraction wells
- EDB concentrations are increasing at the extraction wells



Groundwater Treatment System (GWTS) Operation

- Continued operation; system maintenance and repair activities
 - New control panel for easier “at a glance” review of system operations
 - 2-new granular activated carbon (GAC) tanks and associated infrastructure are fully operational
- Discharge of treated water (effluent) via gravity-fed injection at KAFB-7 due to lower winter demand at Kirtland golf course



UIC Discharge Permit

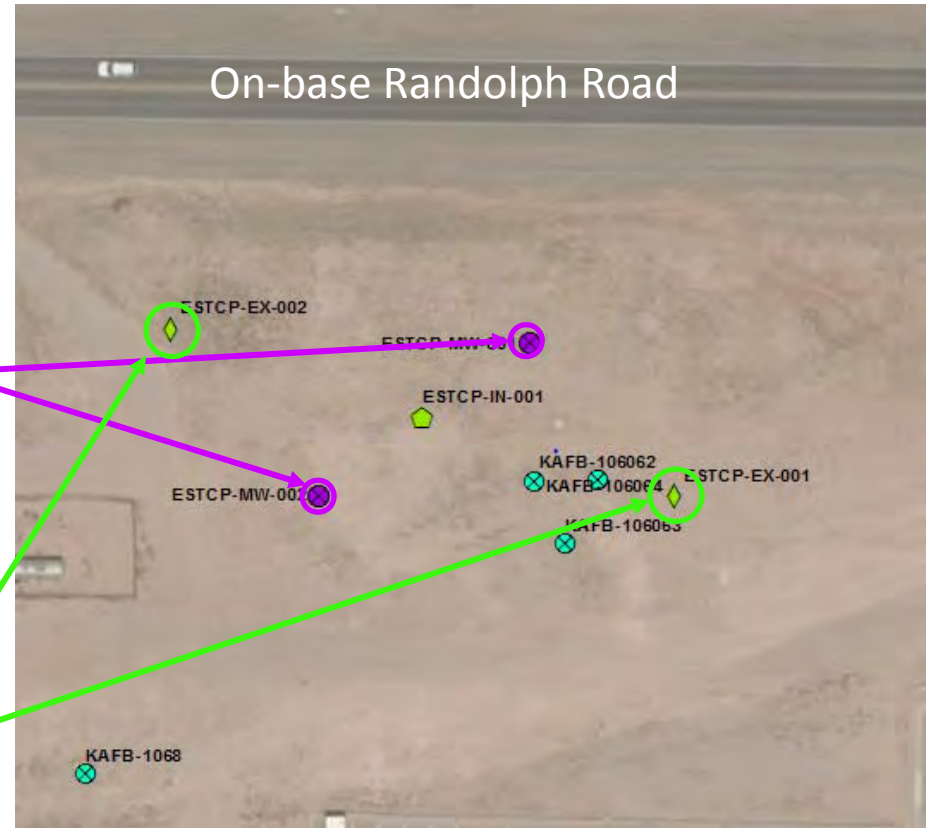
- Air Force has applied for a Class V Underground Injection Control (UIC) discharge permit from the NMED Ground Water Quality Bureau (GWQB) for KAFB-7 and up to four additional UIC wells
- Draft permit was out for public comment which ended on February 13, 2017 for 90-day public comment period
- Revised draft permit was streamlined and re-posted on March 3, 2017 for a additional 30-day public comment period
- Air Force is currently discharging to KAFB-7 under a Temporary Permission issued by the NMED GWQB

What's next for EDB Plume Collapse?

- Rehabilitate and redevelop extraction well KAFB-106233 on California St./Gibson Blvd.
- Design and construct conveyance pipeline from new extraction well KAFB-106239 on Ridgecrest Dr. to GWTS
- Operate GWTS with all 4 extraction wells
- Continue plume capture evaluation through tracking multiple lines of evidence which will feedback to GWTS operations

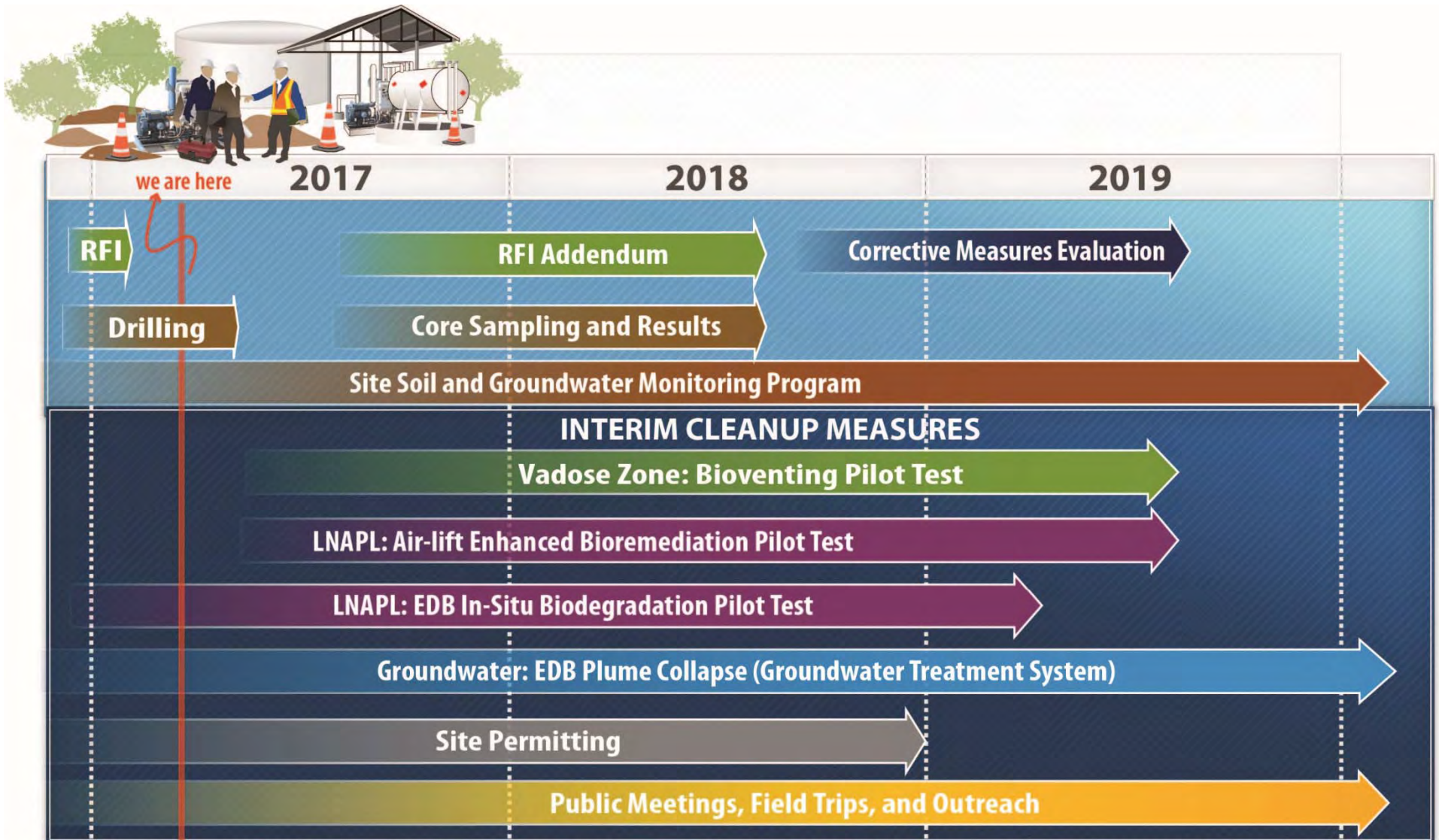
EDB In Situ Biodegradation Pilot Test

- Field activities began in January 2017
- Drilled and installed two groundwater monitoring well nests
- Drilling extraction wells; one extraction well installed
- Pilot test Phase 1 target start date May 2017



Legend	
	Groundwater Monitoring Well
	ESTCP Proposed Injection Well
	ESTCP Proposed Observation Monitoring Well
	ESTCP Proposed Extraction Well

Current Project Timeline



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

What to expect in 2017?

- Continue monitoring soil vapor, groundwater, and drinking water supply wells including rising water levels
- Continue operations of the GWTS
- Obtain continuous cores from source area to address LNAPL data gaps
- Construct EDB in situ bioremediation pilot test
- Design and implement bioventing pilot test to target residual fuel hot spots in vadose zone
- Design and implement air-lift enhanced bioremediation pilot test
- Continued public outreach at public meetings, and with neighborhood associations and various community groups

RCRA Facility Investigation (RFI) Report



Dr. Adria Bodour

Air Force Civil Engineer Center
Environmental Remediation Specialist

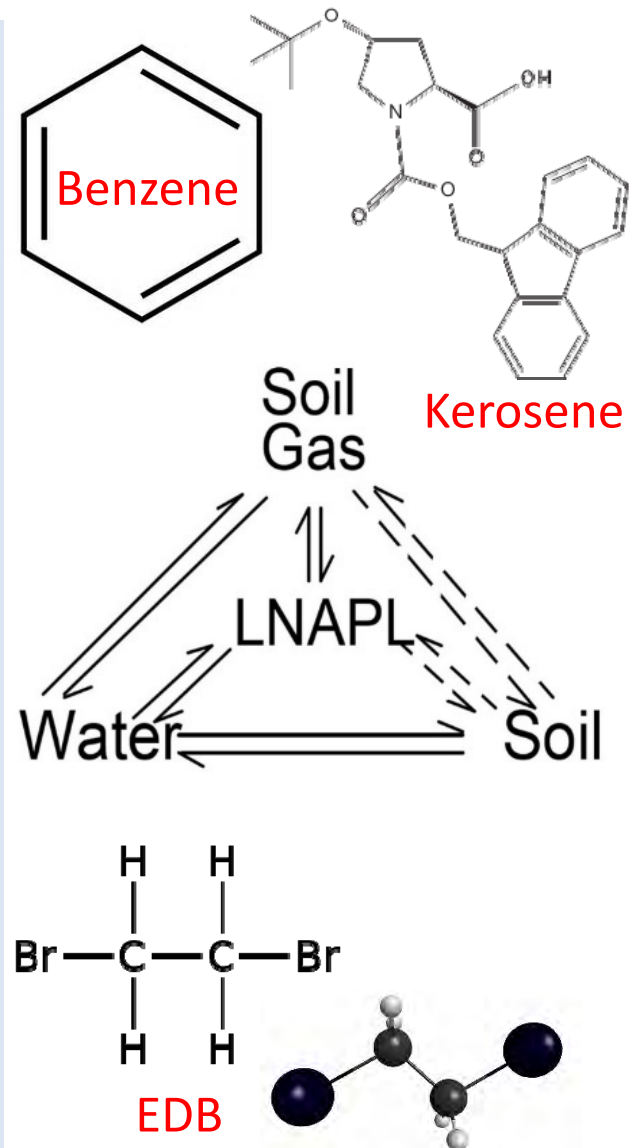
RFI Report

Air Force officially submitted the RFI Report on January 31, 2017:

- Describes nature and extent of contamination in the soil and groundwater
- Provides a comprehensive evaluation of site data from discovered release 1999 to December 2015
- Follows regulatory process to define nature and extent
- Presents data based on media (soil, vapor, and groundwater)
- Presents the conceptual site model (CSM) showing the fate and transport of contamination through media

Defining the Problem

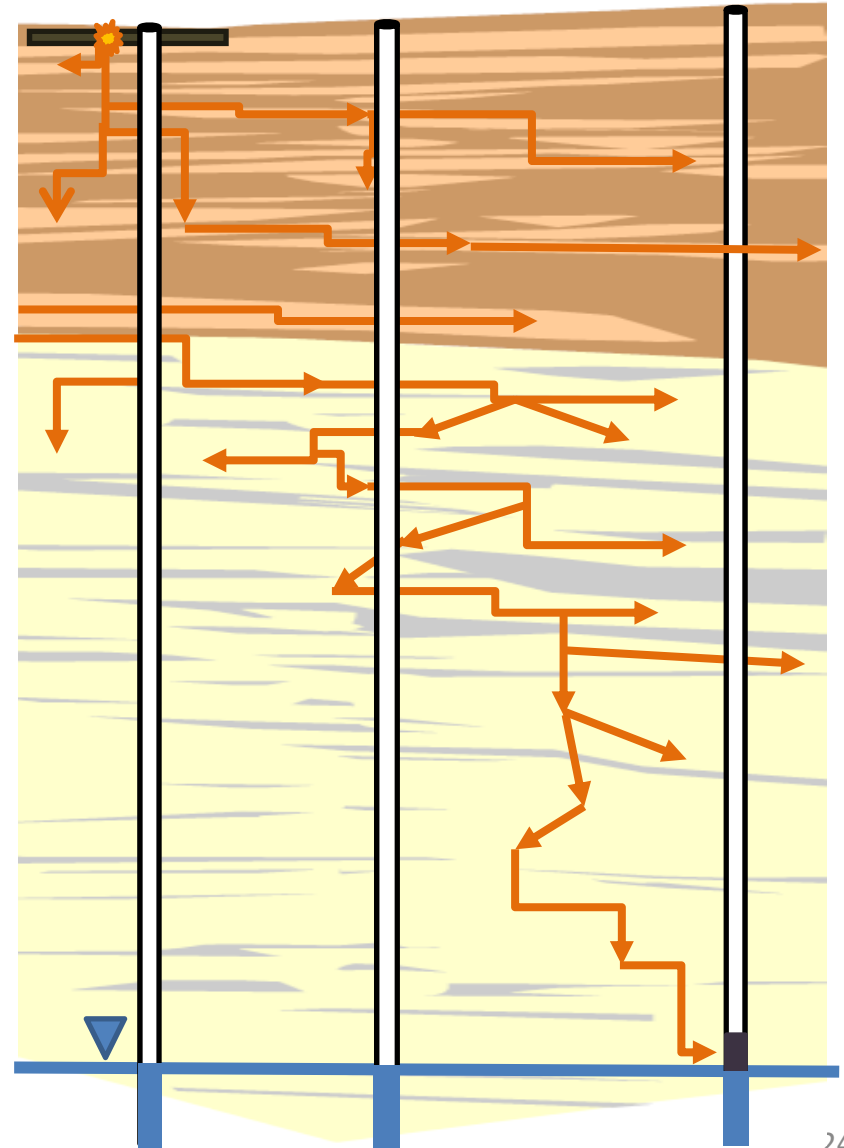
- What does “nature and extent” mean?
 - Type of contamination, how and where the contamination moved in the environment
- Jet fuel is commonly called “Light non-aqueous phase liquid (LNAPL)”
- LNAPL consists of four phases
 - RFI report evaluates all four phases



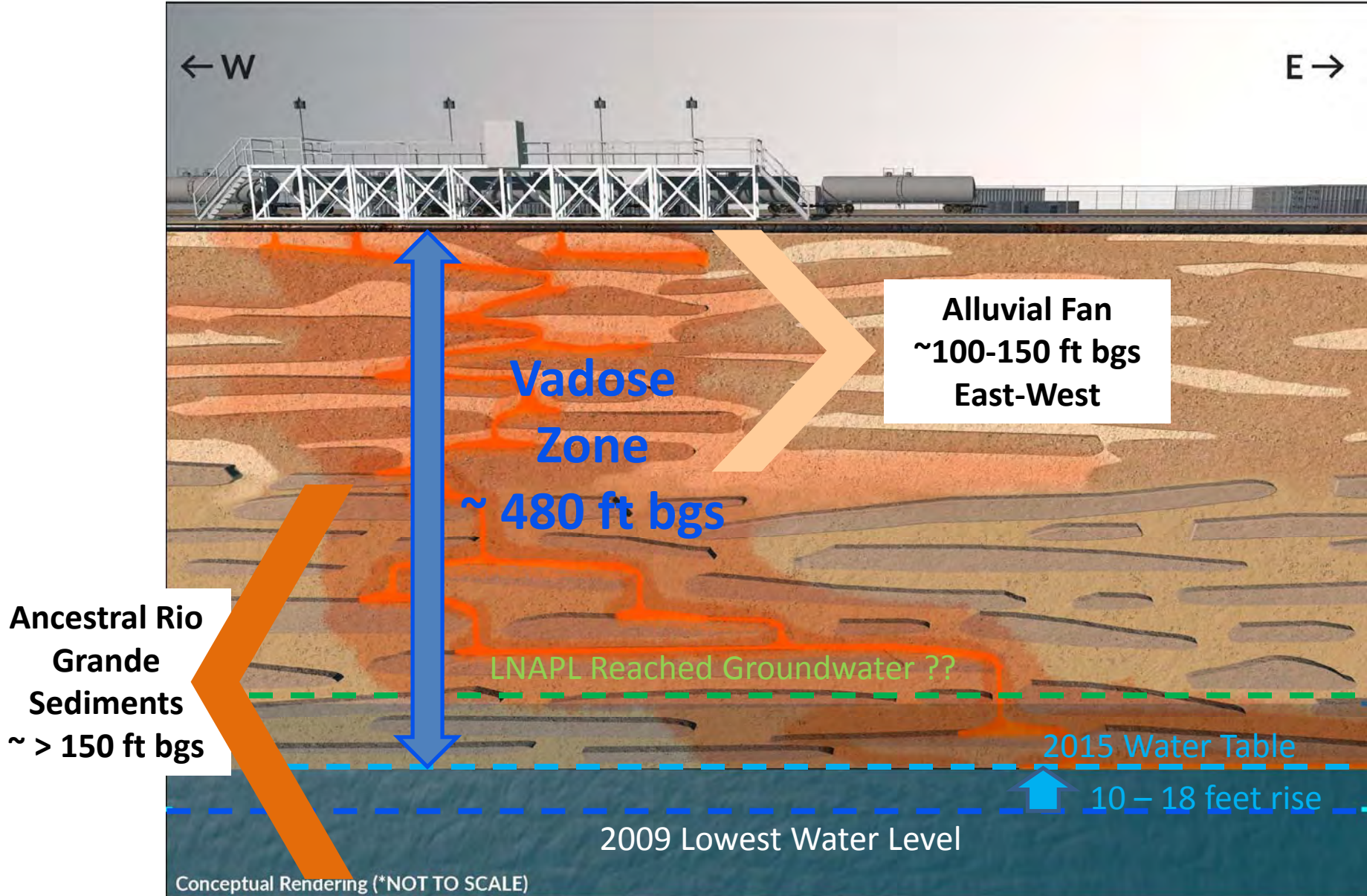
Four Phases of LNAPL

LNAPL released into the environment interacts with media (air, soil, and water)

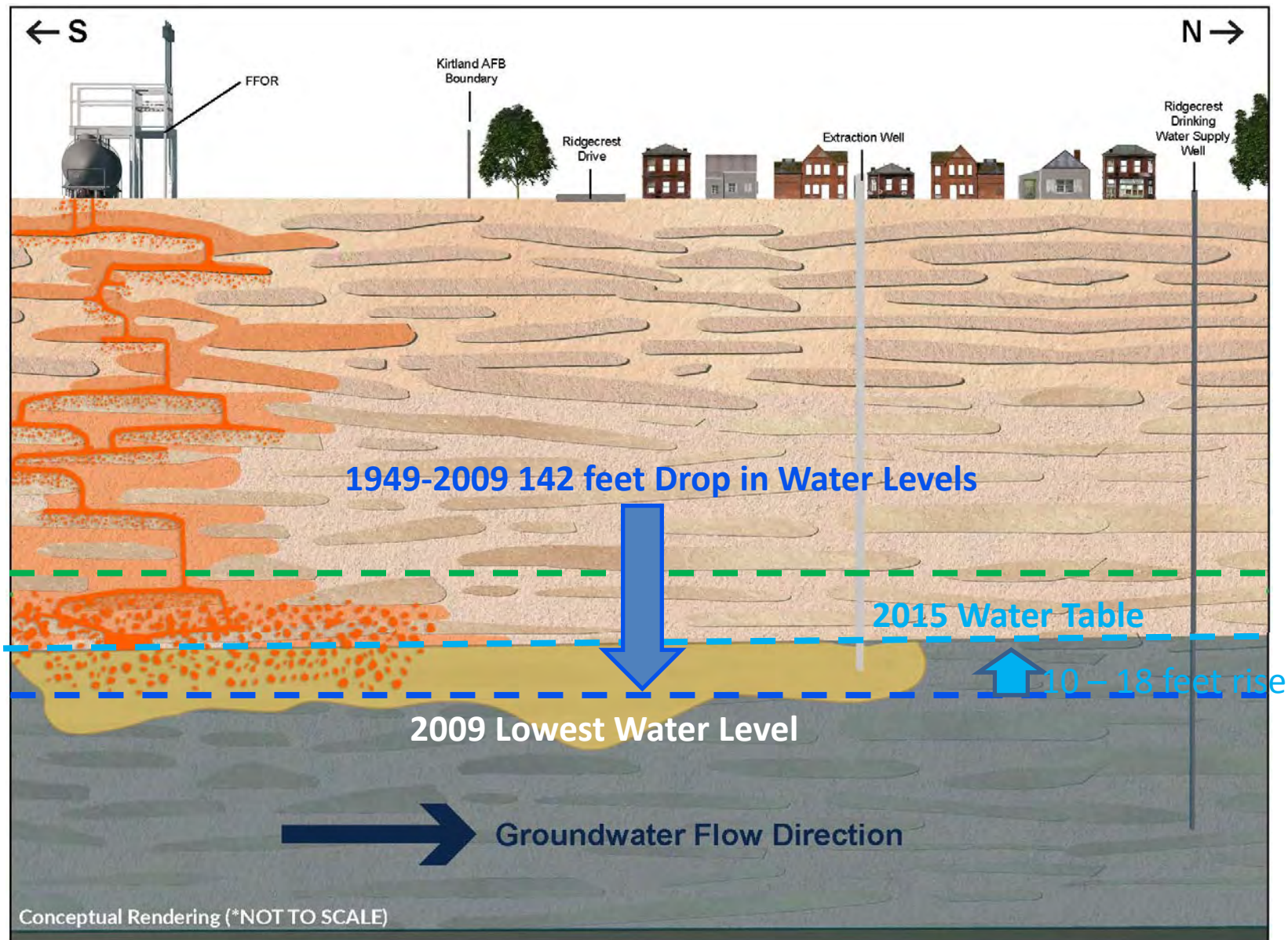
1. LNAPL residual fuel (free product)
2. Soil vapor (volatile fuel constituents as vapor in soil air pockets)
3. Adsorbed (fuel constituents attached to soil particles)
4. Dissolved (fuel constituents in groundwater and pore water in the vadose zone)



Media – Vadose Zone



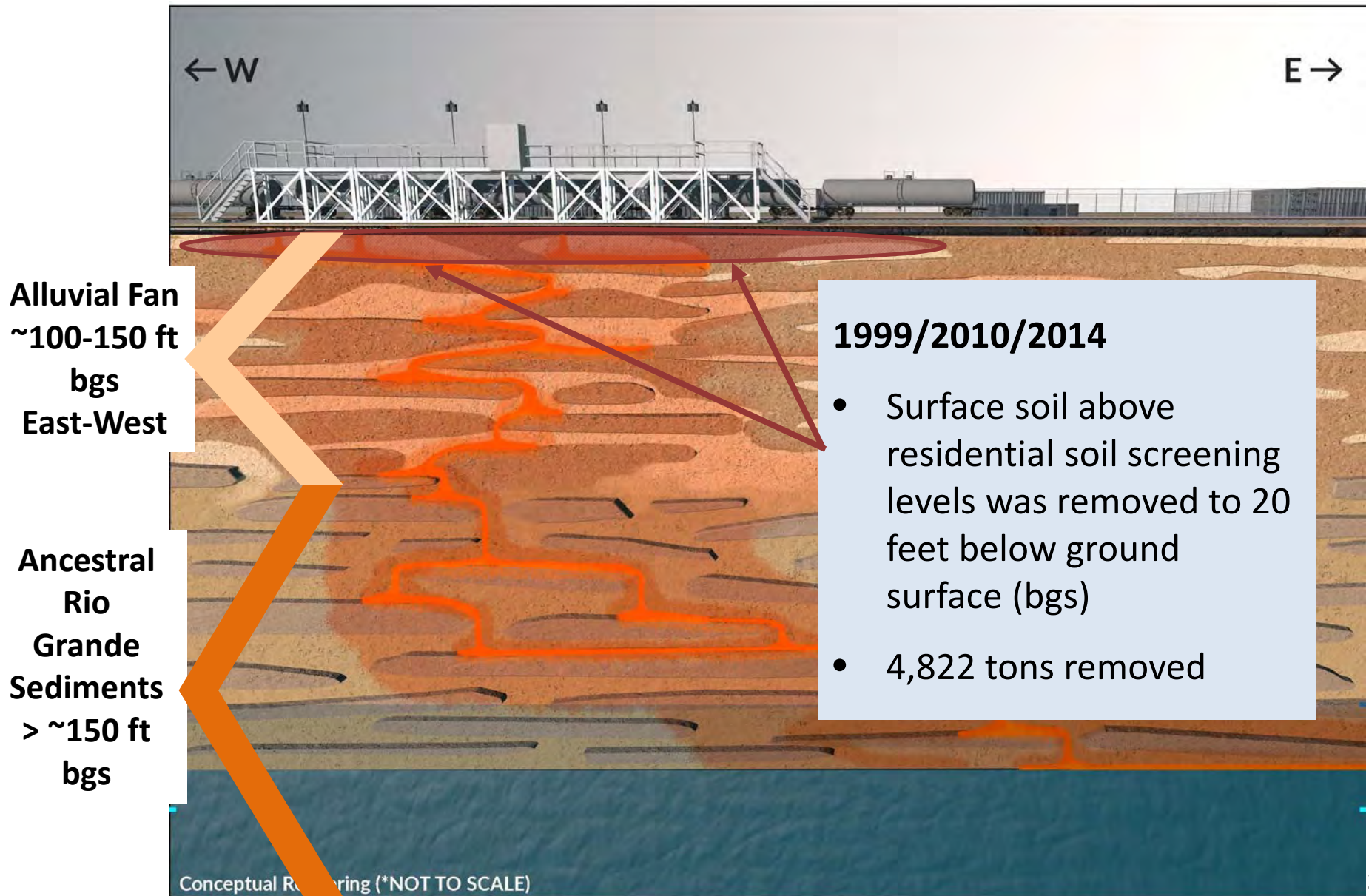
Media – Groundwater



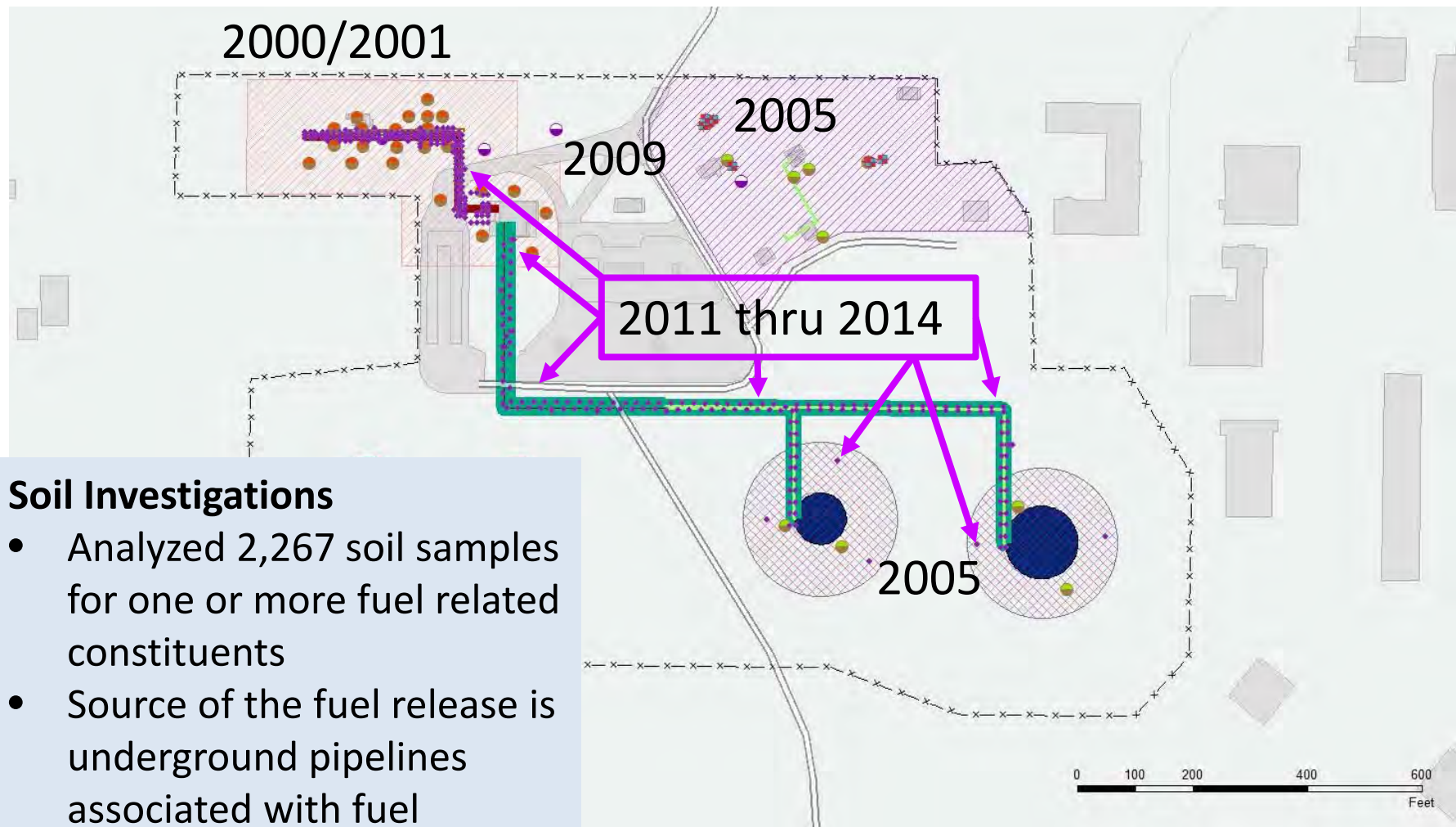
Fate and Transport

- Jet fuel in pipe changes when it enters the environment
- Factors and processes that affect jet fuel change
 - Physical (e.g., air, water, soil, advection, diffusion, etc)
 - Chemical (e.g., zinc, sodium, calcium, hydrolysis, etc)
 - Biological (e.g., worms, amoebas, bacteria, biodegradation, etc)
 - Time
 - Complexity
- Jet fuel is composed of many constituents and their behavior in the environment varies

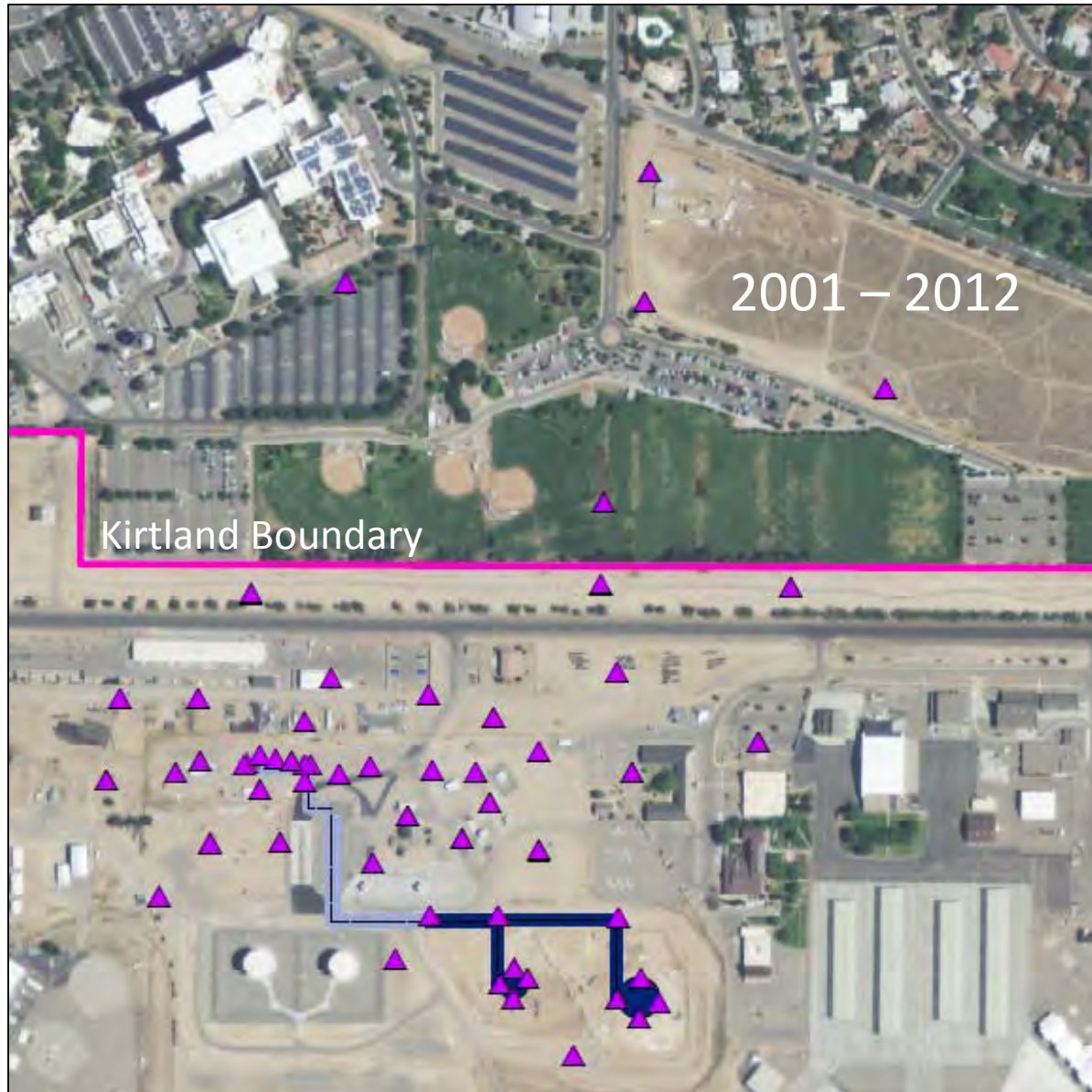
Conceptual Site Model – Vadose Zone



Vadose Zone – Nature & Extent



Vadose Zone – Nature & Extent



Soil Vapor Monitoring (SVM) Locations

- Nested wells with up to 6 SVM points
- Screened intervals at ~25, 50, 100, 150, 250, 350, 450 feet bgs
- Soil analysis and geophysical logging were performed during installation to collect information about fuel contamination and subsurface geology

LNAPL – Nature & Extent

2007 thru 2008

- First well with measurable LNAPL
- Skimmer technology with limited success

2007 thru 2015

2012

Air permeability testing provided insight into LNAPL migration through the vadose zone

2016

- Minimal LNAPL measured
- LNAPL measured is present in low permeable zones that are being saturated by rising water table and releasing the trapped LNAPL

2016

Vadose Zone/LNAPL – Interim Measures

2003 thru 2015

2003 thru 2012
Internal combustion engine (ICE) unit attached to the first nine SVE wells

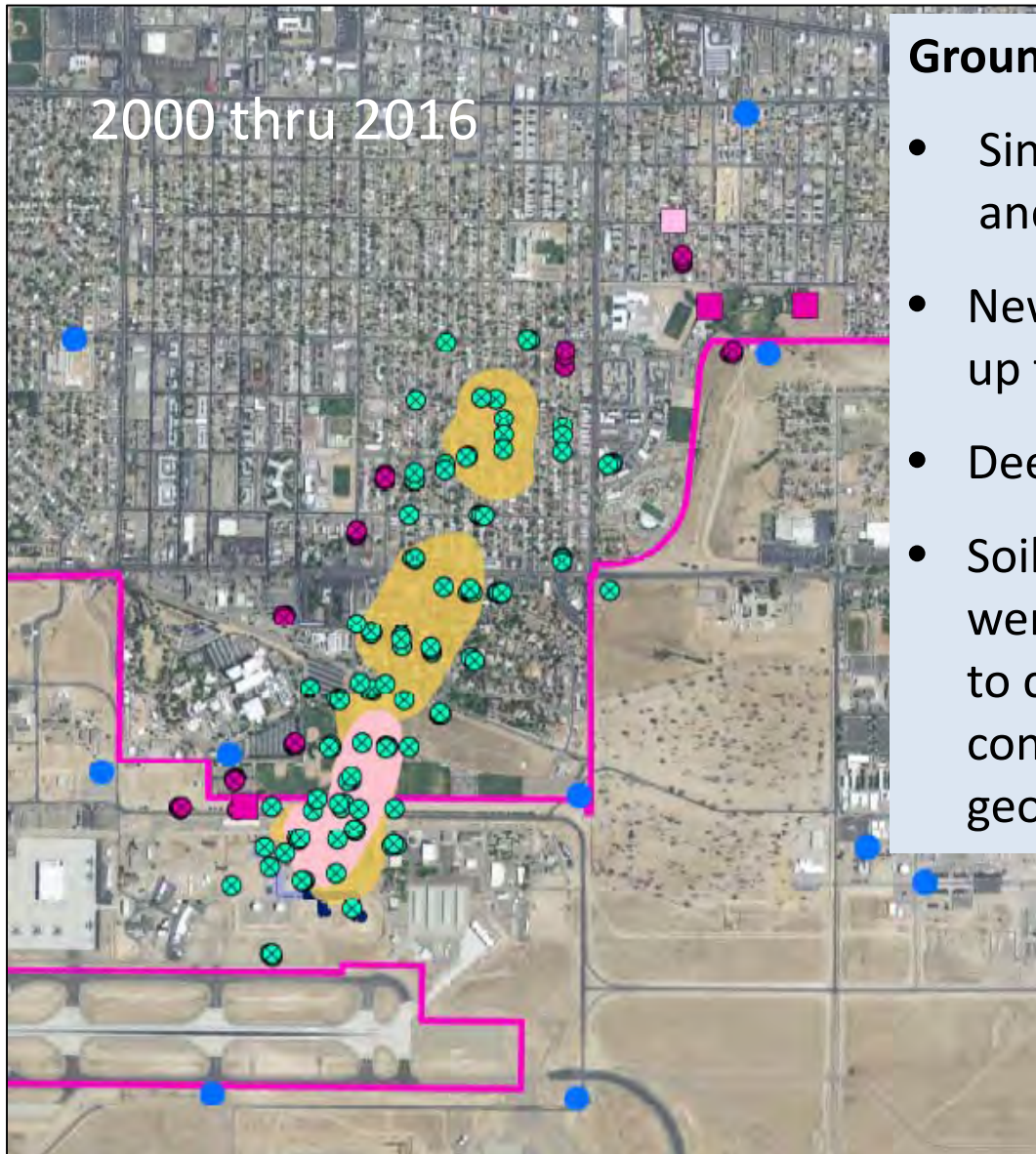
2008/2009 thru 2011
Bioslurping locations had ICE units attached that were used to remove floating LNAPL from groundwater monitoring wells

2013 thru 2015
Expanded vacuum and destruction capacity with a catalytic oxidizer (CATOX) SVE system

Legend

- ◆ SVE Location
- ⊗ Bioslurping Location
- Former Aboveground Fuel Transfer Lines and Tanks
- Former Buried Fuel Transfer Lines
- ▭ KAFB Base Boundary

Groundwater – Nature & Extent



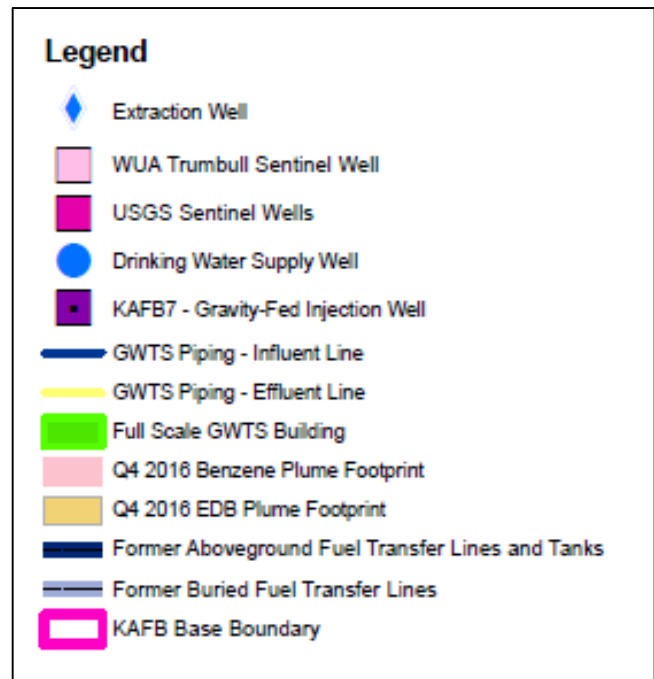
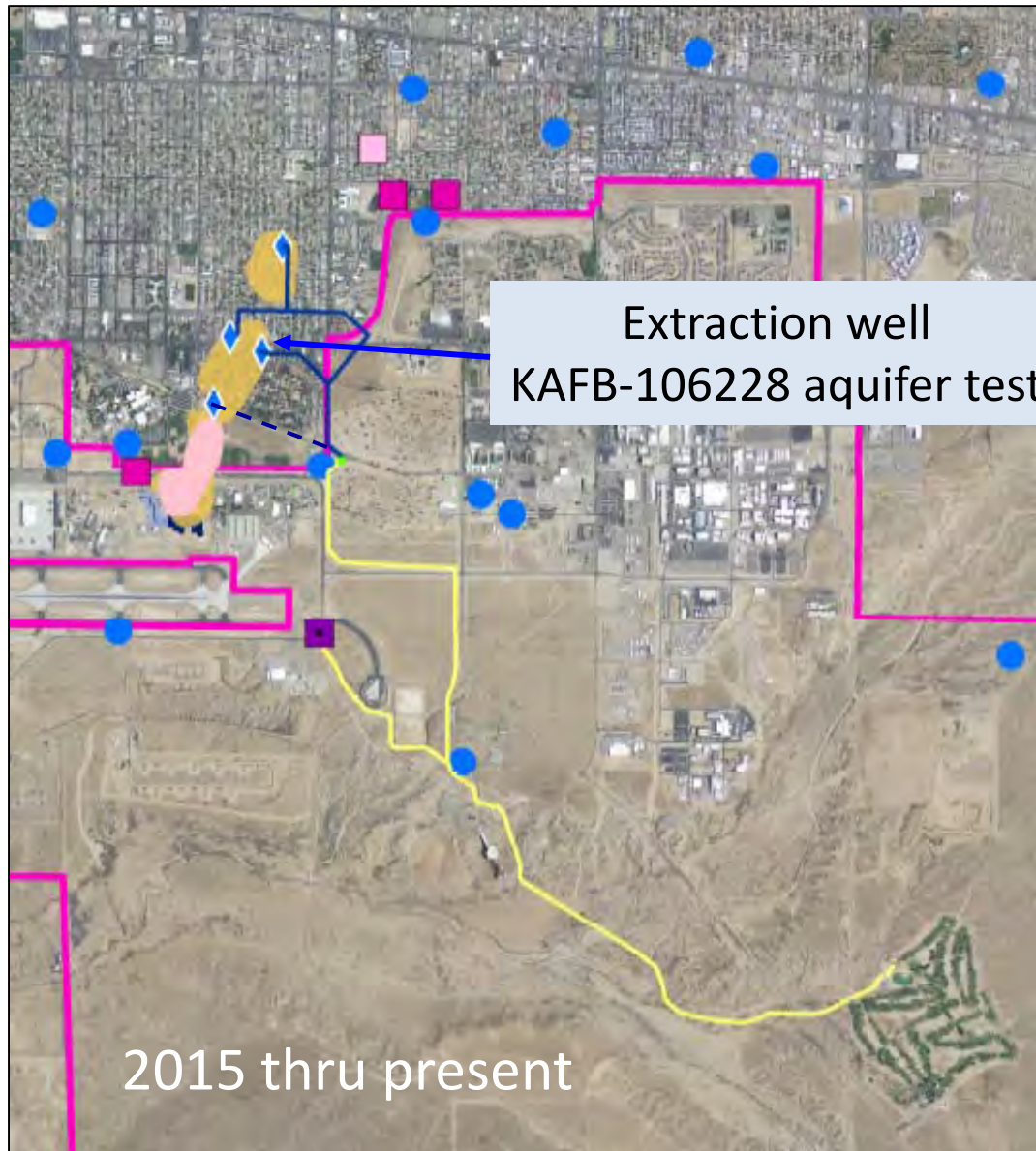
Groundwater Monitoring Locations

- Single wells shallow, intermediate, and deep
- New wells designed as nested with up to four wells in one borehole
- Deep sentinel wells
- Soil analysis and geophysical logging were performed during installation to collect information about fuel contamination and subsurface geology

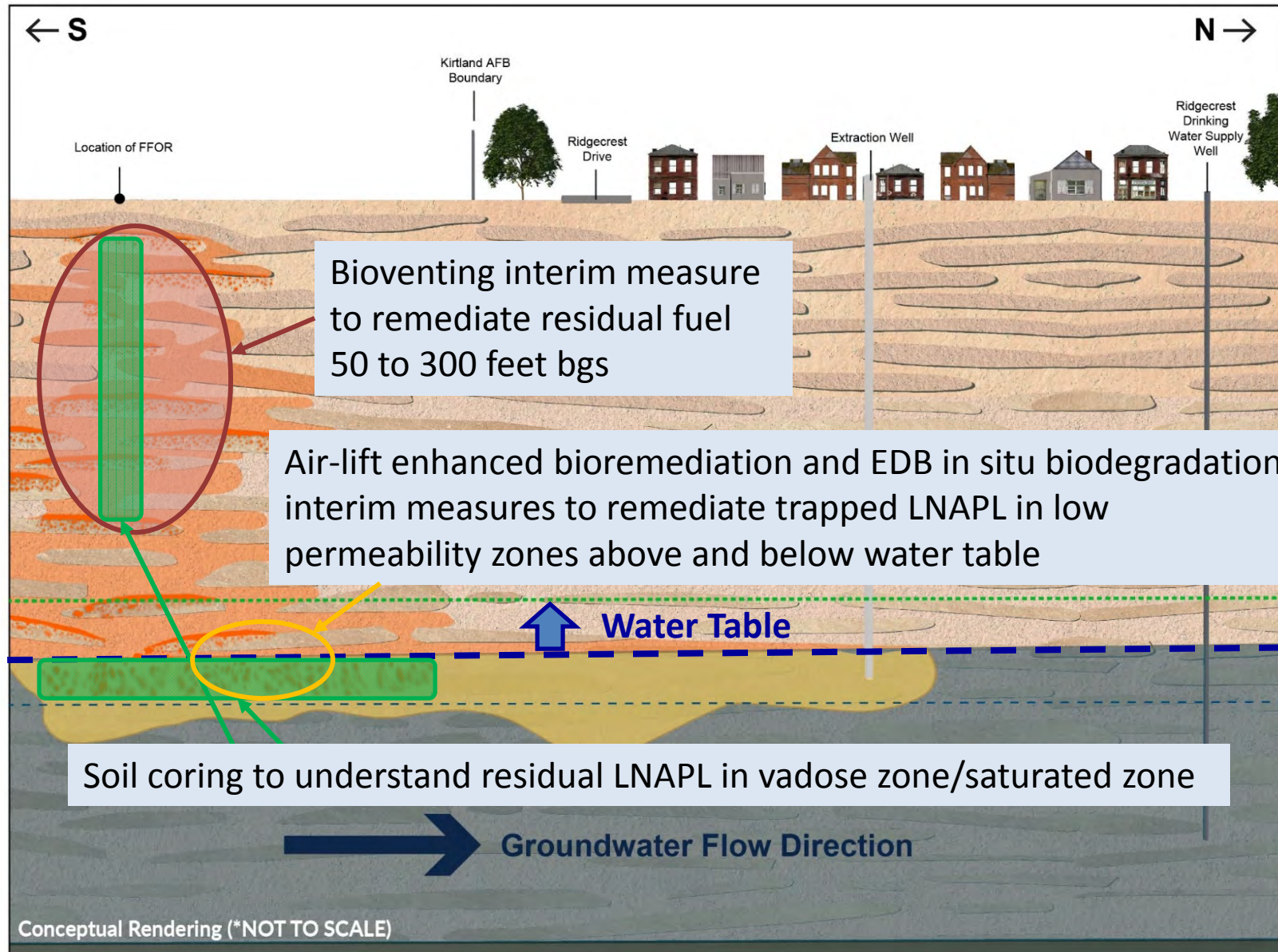
Legend

- Groundwater Monitoring Well
- Sentinel Well or Well Nest
- WUA Trumbull Sentinel Well
- USGS Sentinel Wells
- Drinking Water Supply Well
- Q4 2016 Benzene Plume Footprint
- Q4 2016 EDB Plume Footprint
- Former Aboveground Fuel Transfer Lines and Tanks
- Former Buried Fuel Transfer Lines
- KAFB Base Boundary

Groundwater – Interim Measure



Current Conceptual Site Model



RFI Key Findings

- Fuel contamination nature and extent has been defined for soil, soil vapor, and groundwater
- Underground pipelines associated with former offloading rack were the sources of the jet fuel release
- Data gaps that need to be resolved
 - EDB dissolved-phase plume delineation in the northwest toe of the plume
 - Vertical extent of the LNAPL

RFI Path Forward

- RFI Addendum Report expected 2018 to include:
 - Data from recently installed data gap groundwater monitoring wells
 - Continuous cores from source area to fill LNAPL data gap
- Risk assessment to be submitted as a separate document

Public Workshop

March 11, 2017

9 am to 12:00 pm

**Christ United Methodist Church
6200 Gibson Blvd. SE**

9 - 9:15 am	Meet and Greet along with Poster Session
9:15 - 11:30 am	Workshop Topic Sessions
11:30 - 12:00 pm	Final Discussions and Wrap-up

Questions and Answers

- One question/comment per turn at the microphone
- We request that each question/comment be limited so that everyone has an opportunity to be heard
- Comment cards have been made available:
 - Return completed comment cards to NMED and/or Air Force staff
 - Questions will be incorporated into the Kirtland AFB BFF project website:

www.kirtlandjetfuelremediation.com

How do I get more information?

Contact NMED:

Allison Majure	Communications Lead	(505) 827-2855	Allison.majure@state.nm.us
Diane Agnew	Technical Lead	(505) 222-9555	diane.agnew@state.nm.us

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

Contact the Air Force:

Kathryn Lynnes	Senior Advisor	(505) 846-8707	kathryn.lynnes@us.af.mil
AFCEC Public Affairs		(866) 725-7617	afcec.pa@us.af.mil
Kirtland AFB Public Affairs		(505) 846-5991	377ABW.PA@us.af.mil

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

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

THANK YOU!

Field Trips



Well installation in neighborhoods



Source Area Cleanup



GWTS