

Kirtland Air Force Base Fuel Facility Groundwater Issues of Concern To West Side Neighborhoods

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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.

RCRA Corrective Action Process

- EPA developed regulations, guidance, and policy for implementing and complying with the waste management program
- Corrective action is required for all releases of hazardous waste or constituents from any solid waste management unit (SWMU) at a permitted facility

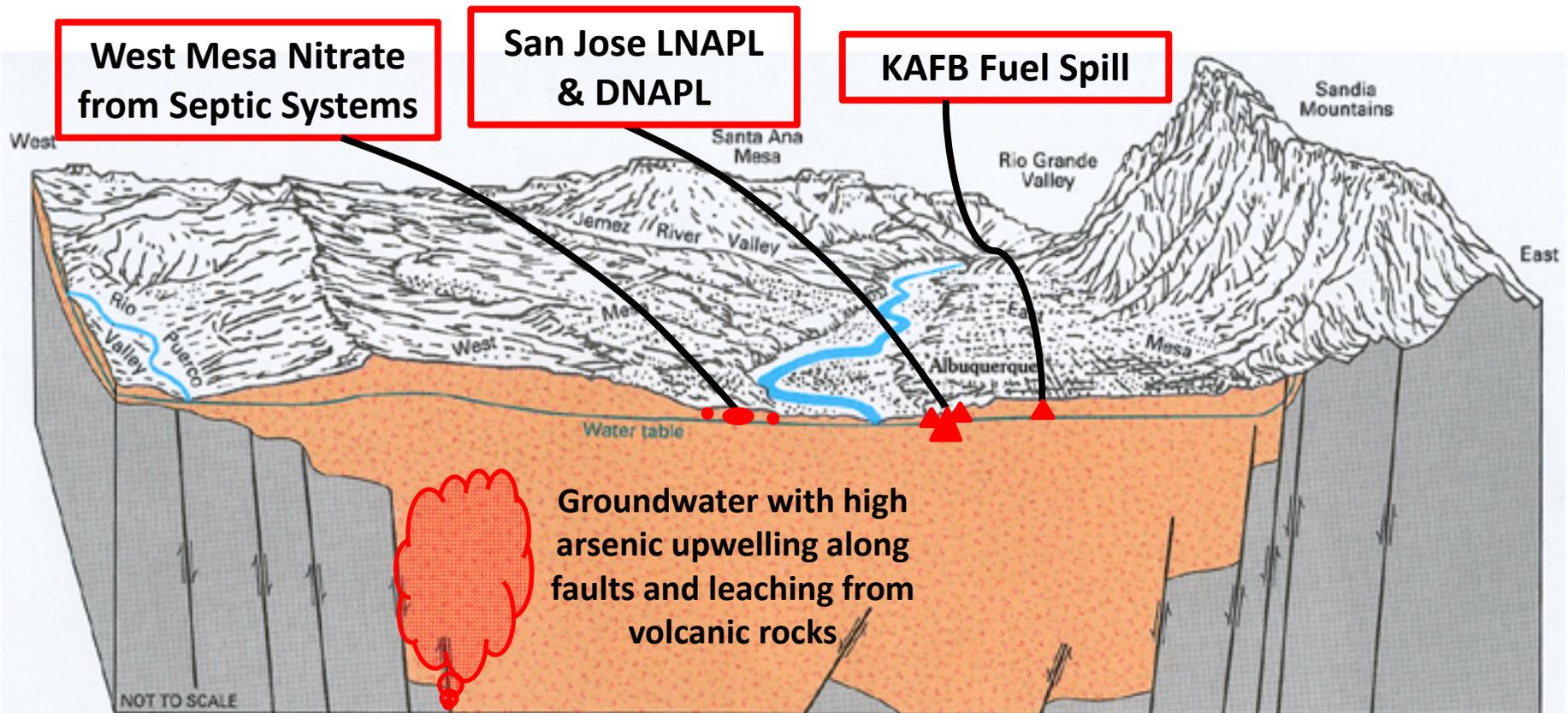
Site Assessment & Characterization

Identify & Evaluate Final Corrective Measures

Implement Final Corrective Measures

Develop & Implement Interim Measures

Albuquerque's Aquifer



Modified from Bjorklund and Maxwell, 1961

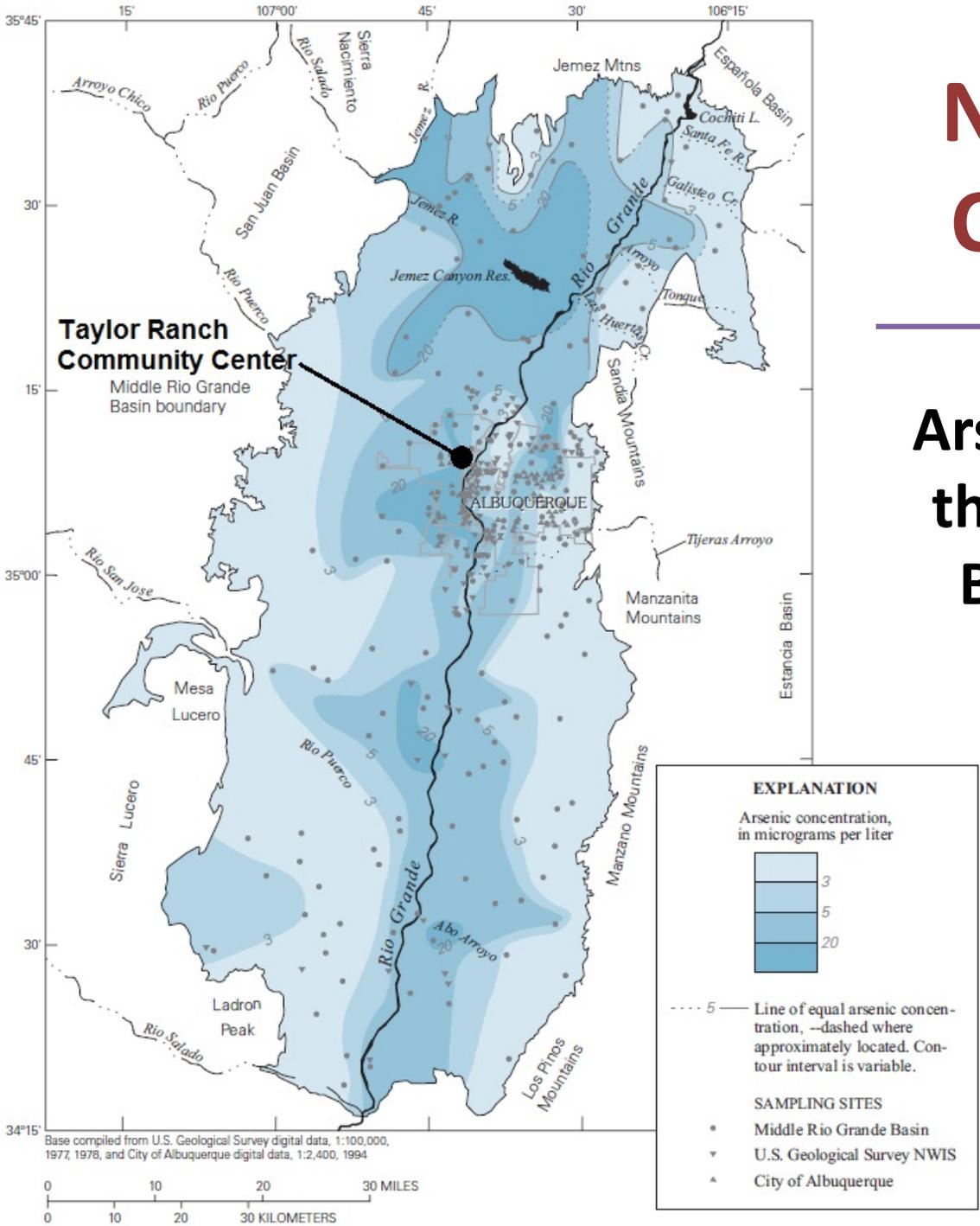
Figure 56. This diagram of the area near Albuquerque, N. Mex., shows the configuration of the land surface and its relation to the generalized subsurface geology.

EXPLANATION

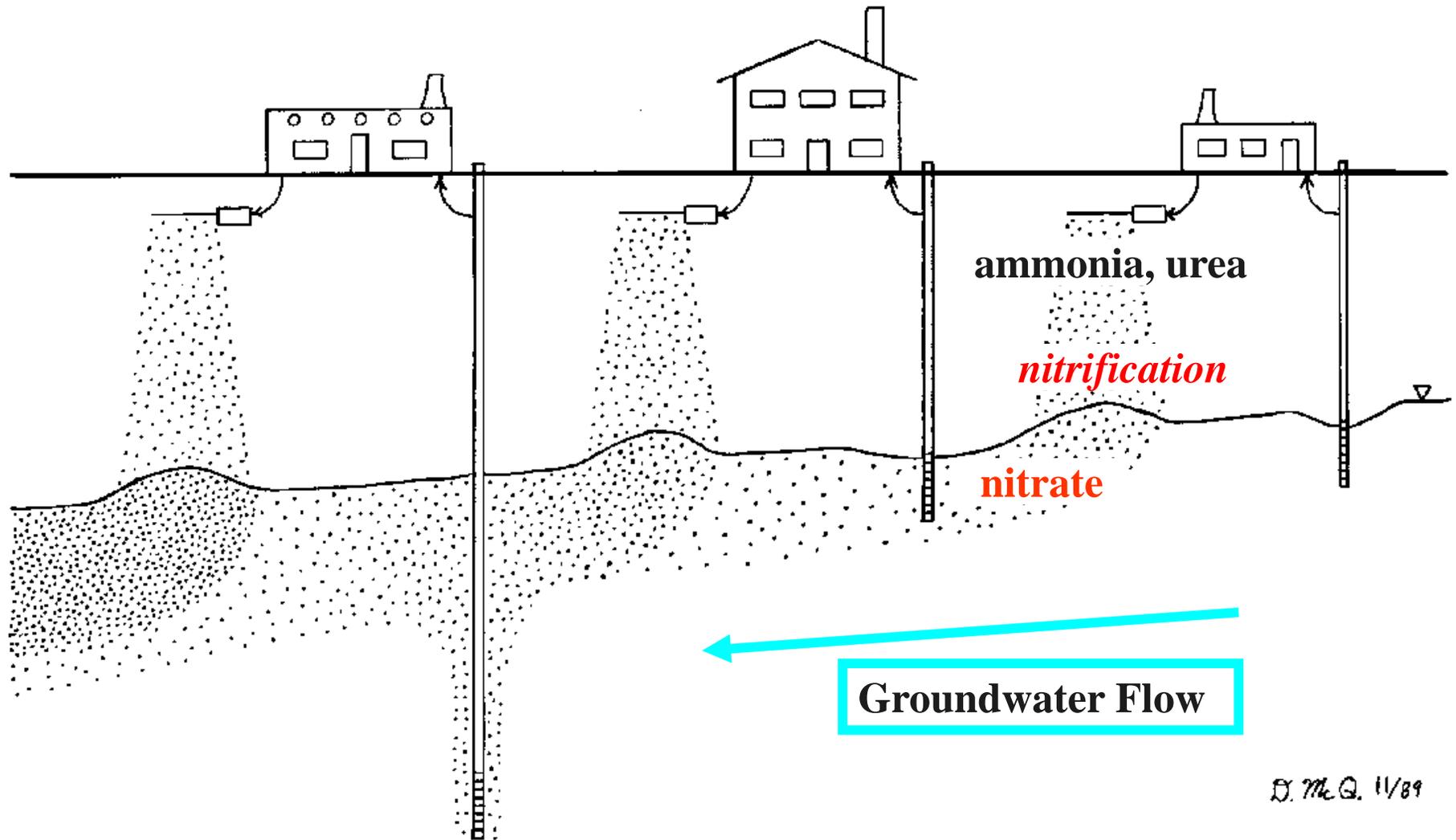
-  Basin-fill deposits
-  Bedrock
-  Fault—Arrows indicate relative vertical movement

Natural Arsenic Contamination

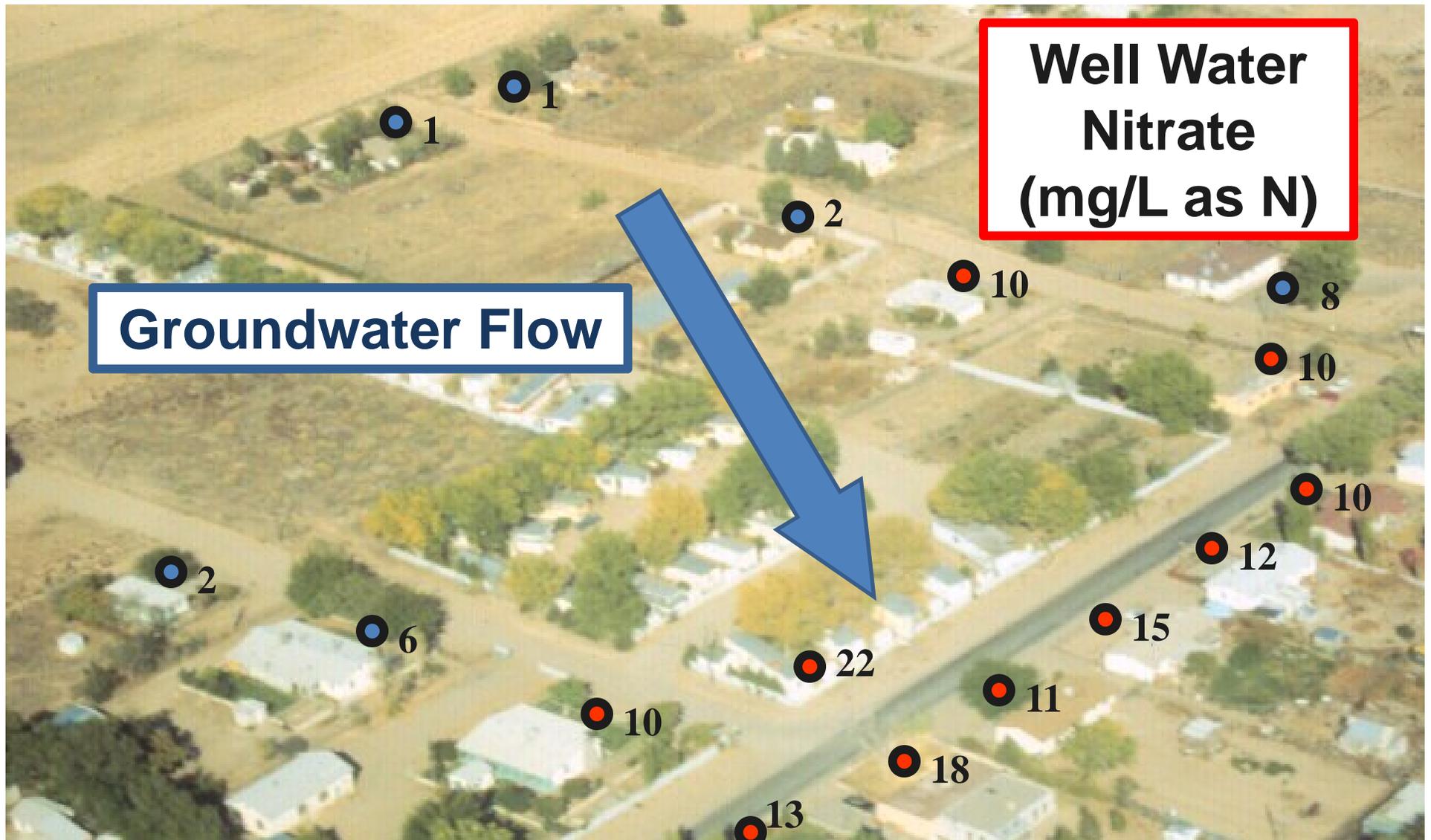
Arsenic is widespread in the Middle Rio Grande Basin aquifer system



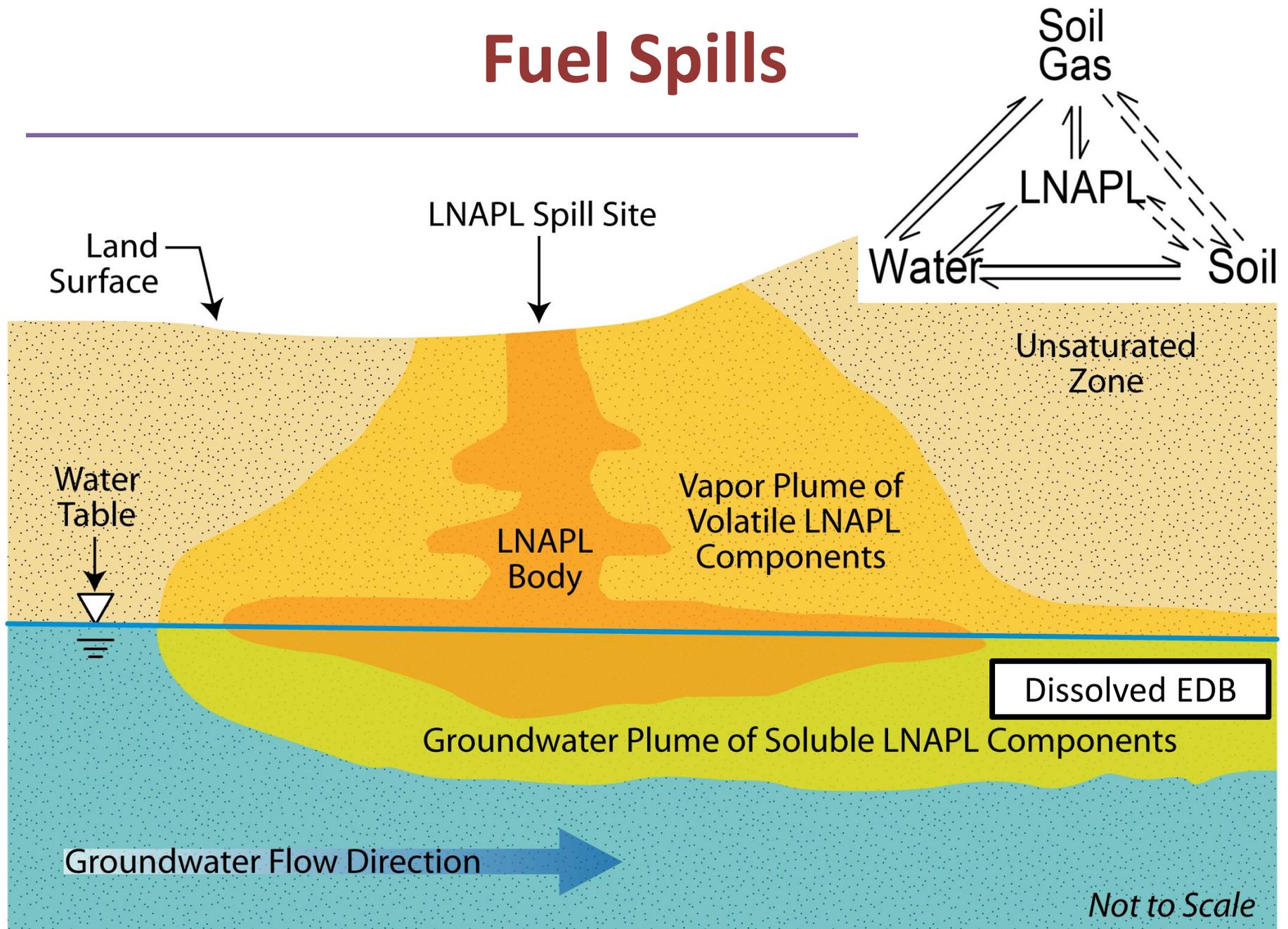
Nitrate Contamination from Septic Tanks



Nitrate Contamination from Septic Tanks On the West Mesa



Fuel Spills



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

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 and ceased use of piping
- **2001** – KAFB notified NMED of groundwater contamination with dissolved fuel constituents
- **2003** – Soil vapor extraction (SVE) technology began to vacuum contaminants from soil
- **2007** – Fuel (light non-aqueous phase liquid, LNAPL) discovered floating on groundwater; attempted to skim LNAPL from water table with limited success
- **2009** – Water level rise begins to submerge LNAPL within aquifer
- **2013** – Additional interim measures were undertaken

2014 Site Status

- 4020 tons of contaminated soil excavated since 2000
- 287 soil monitoring wells installed since 2000
- 116 groundwater monitoring wells installed since 2000
- More than 500,000 gallons of fuel recovered by SVE since 2003
- SVE capacity will be expanded from 90 lbs/hr up to as much as 1500 lbs/hr
- KAFB work plan to begin aggressive cleanup of EDB groundwater plume approved by NMED
- Pilot tests underway for physical and biological LNAPL cleanup

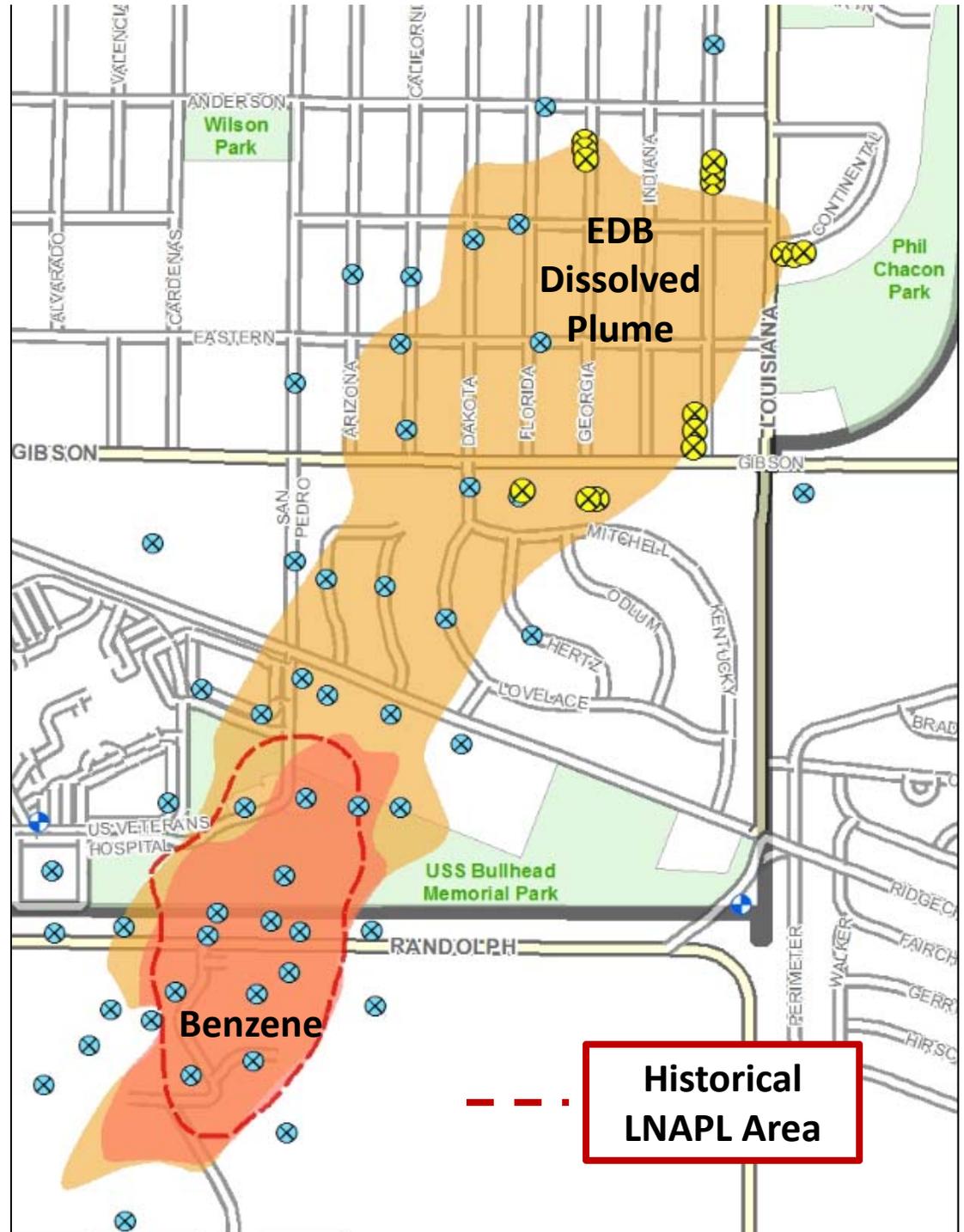
Monthly testing of drinking water wells shows no fuel contamination.

EDB Plume

Biodegradation only in the area with dissolved hydrocarbons, EDB plume footprint is much larger than benzene footprint

Benzene Plume

Hydrocarbons are being biodegraded by natural aquifer bacteria



Priorities

- 1) **Protect Drinking Water Supply Wells (SDWA)**
- 2) **Collapse the EDB Plume (RCRA)**
- 3) **Remediate LNAPL (RCRA)**
- 4) **Soil Vapor Extraction in the Source Area (RCRA)**

**Interim Measures are Underway
to Cleanup the KAFB BFF Site.**

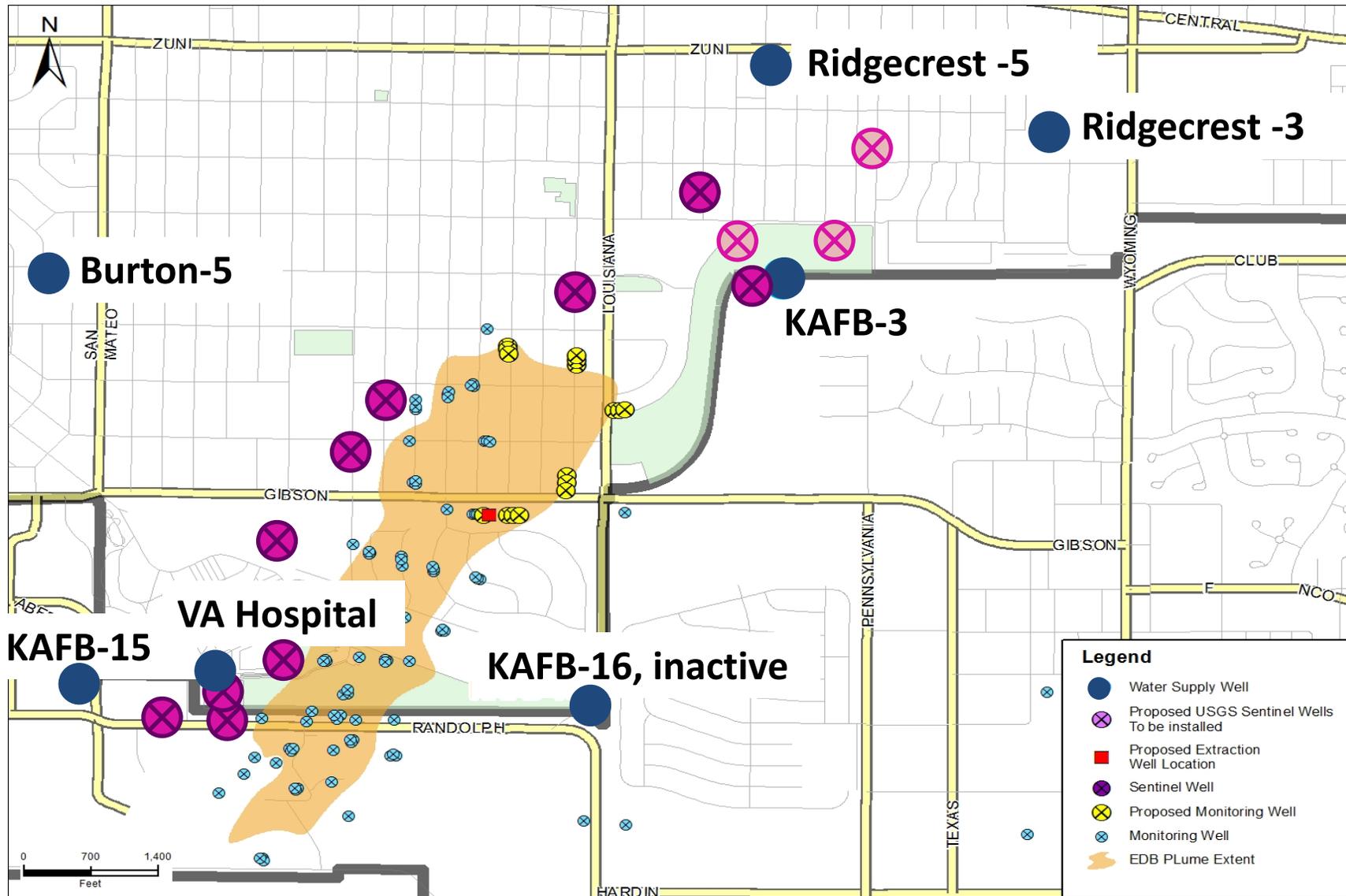
Drinking Water Protection

EDB Drinking Water Standards	
U.S. EPA	0.05 µg/L
State of New Mexico	0.05 µg/L

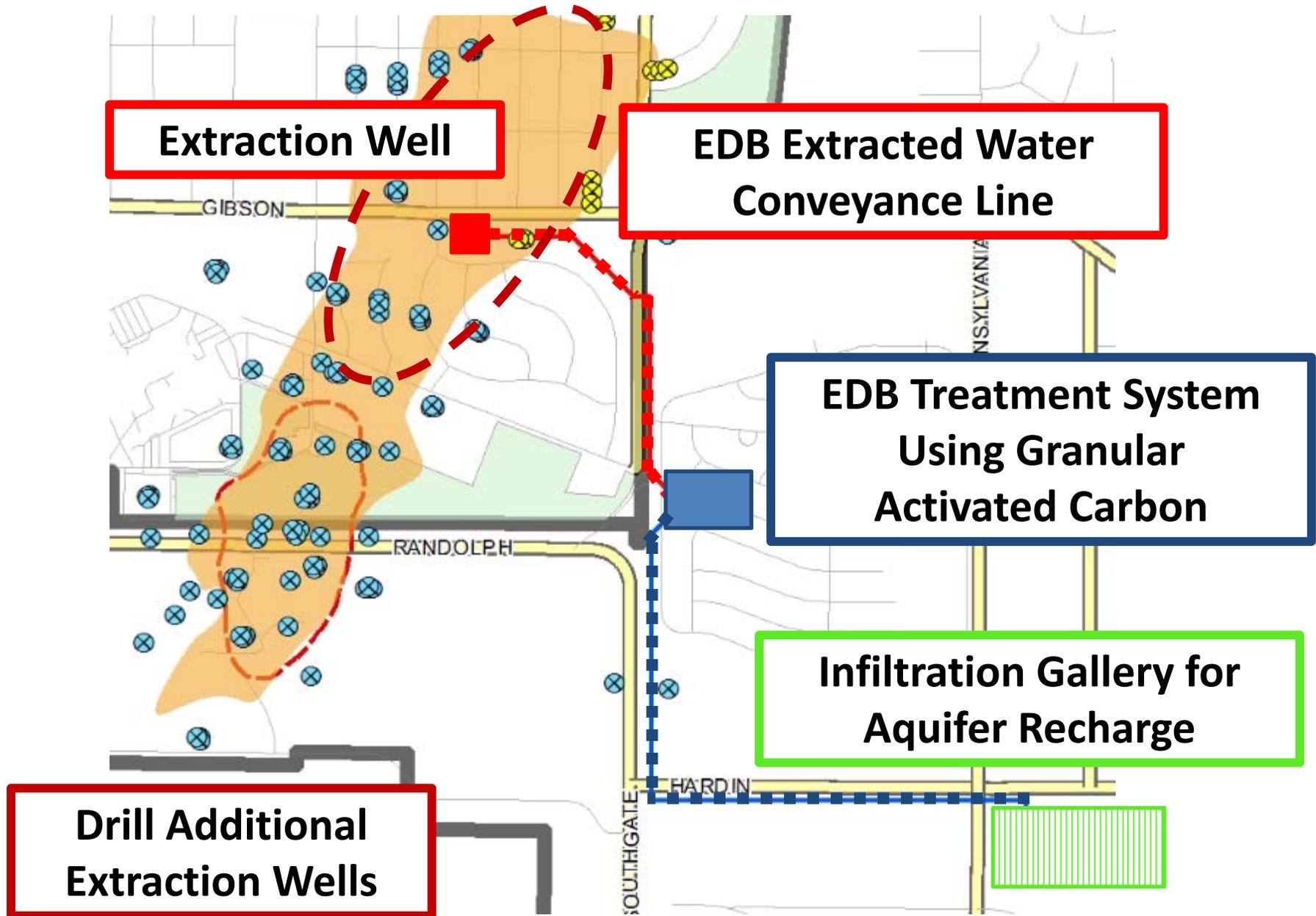
- Public water system must comply with drinking water standards
- SDWA requires testing once every 3 years for EDB and benzene
- Drinking water supply wells in the area are being tested monthly
- No detections of any fuel contaminants in any production well
- EDB regulatory detection limit = 0.01 µg/L for public water systems
- Sentinel wells have been installed to provide early detection of any plume migration in the direction of the water supply wells

Dissolved EDB will not be allowed to impact any drinking water supply system at detectable concentrations

Protecting Drinking Water Supply Wells

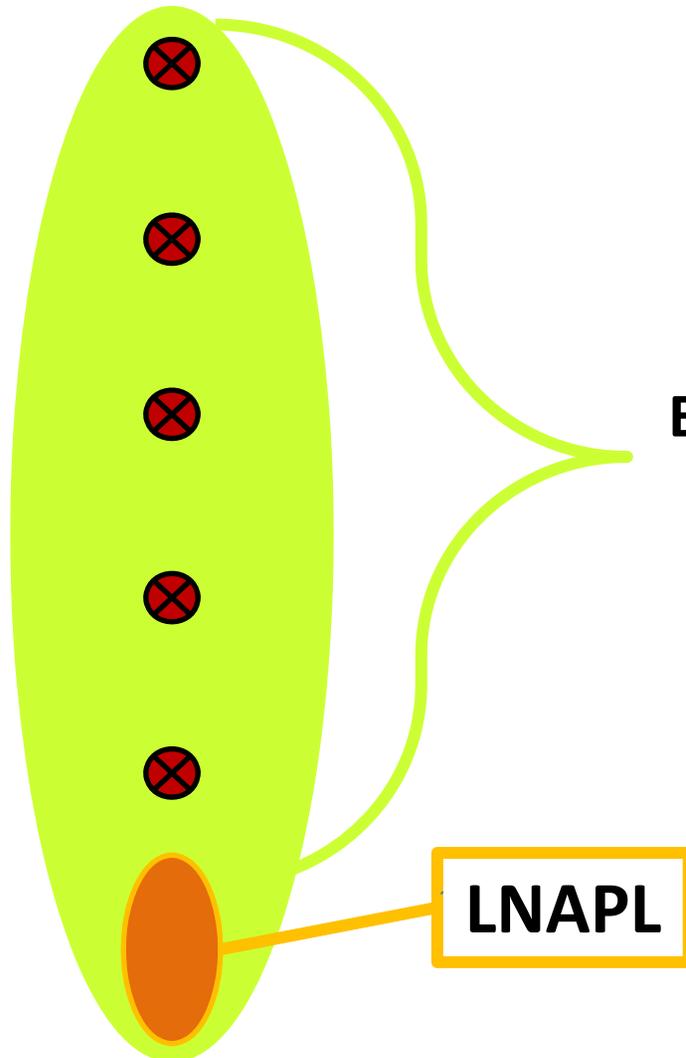


Collapse the EDB Plume





Collapsing the EDB Plume Take Away



Extraction
wells

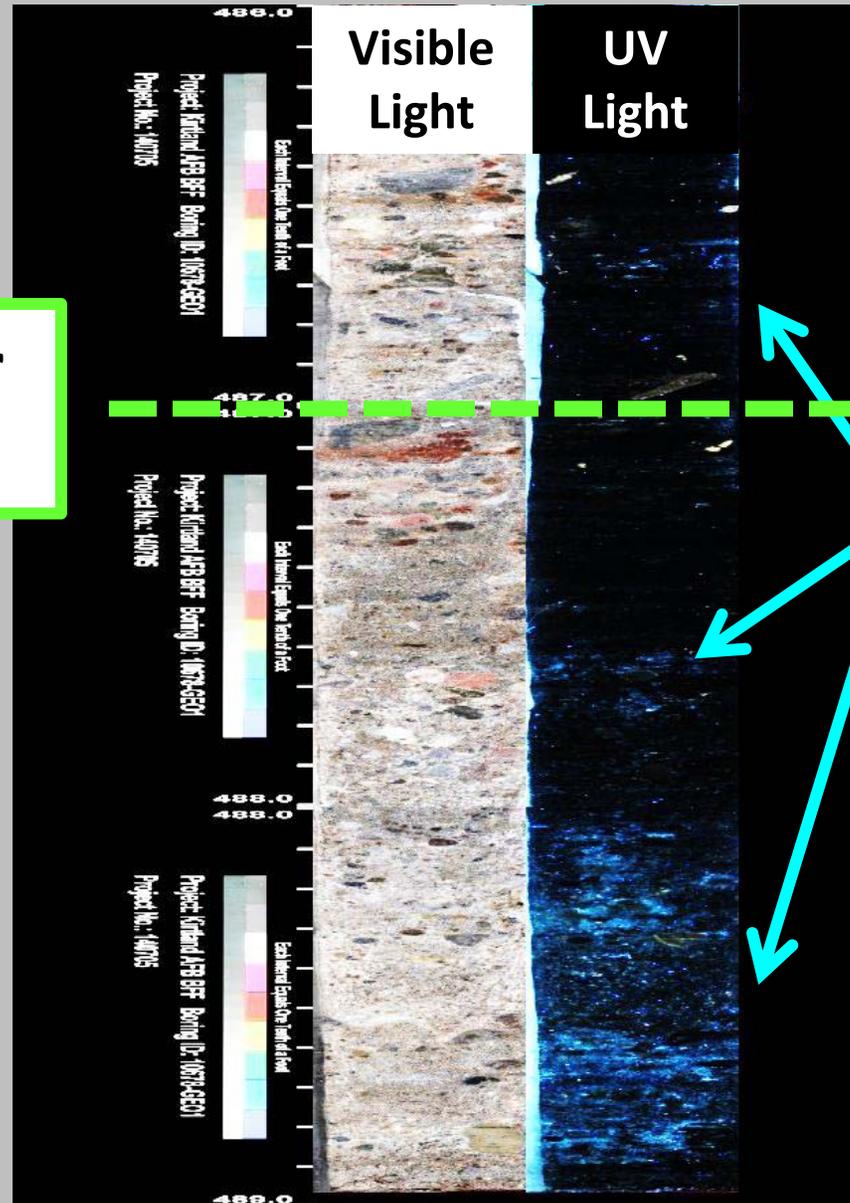
Extracted groundwater
will be treated to 0.05
 $\mu\text{g}/\text{L}$ or better, and put
to beneficial use.

Options being
considered:

- Aquifer recharge
- Non-potable industrial
use (irrigation, dust
control)

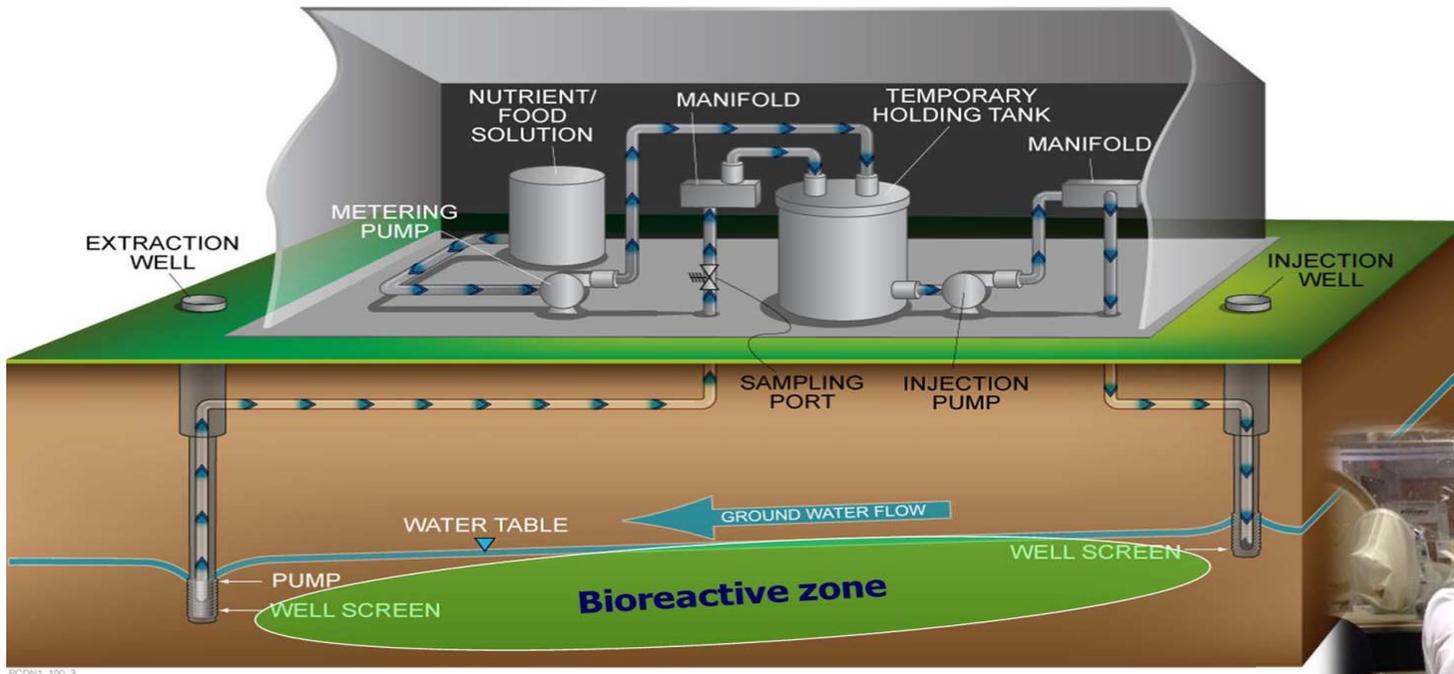
Drowned LNAPL – BFF Soil Cores

**Groundwater
Table**



**LNAPL Under
UV Light
Fluoresces
Blue**

LNAPL Bioremediation Option

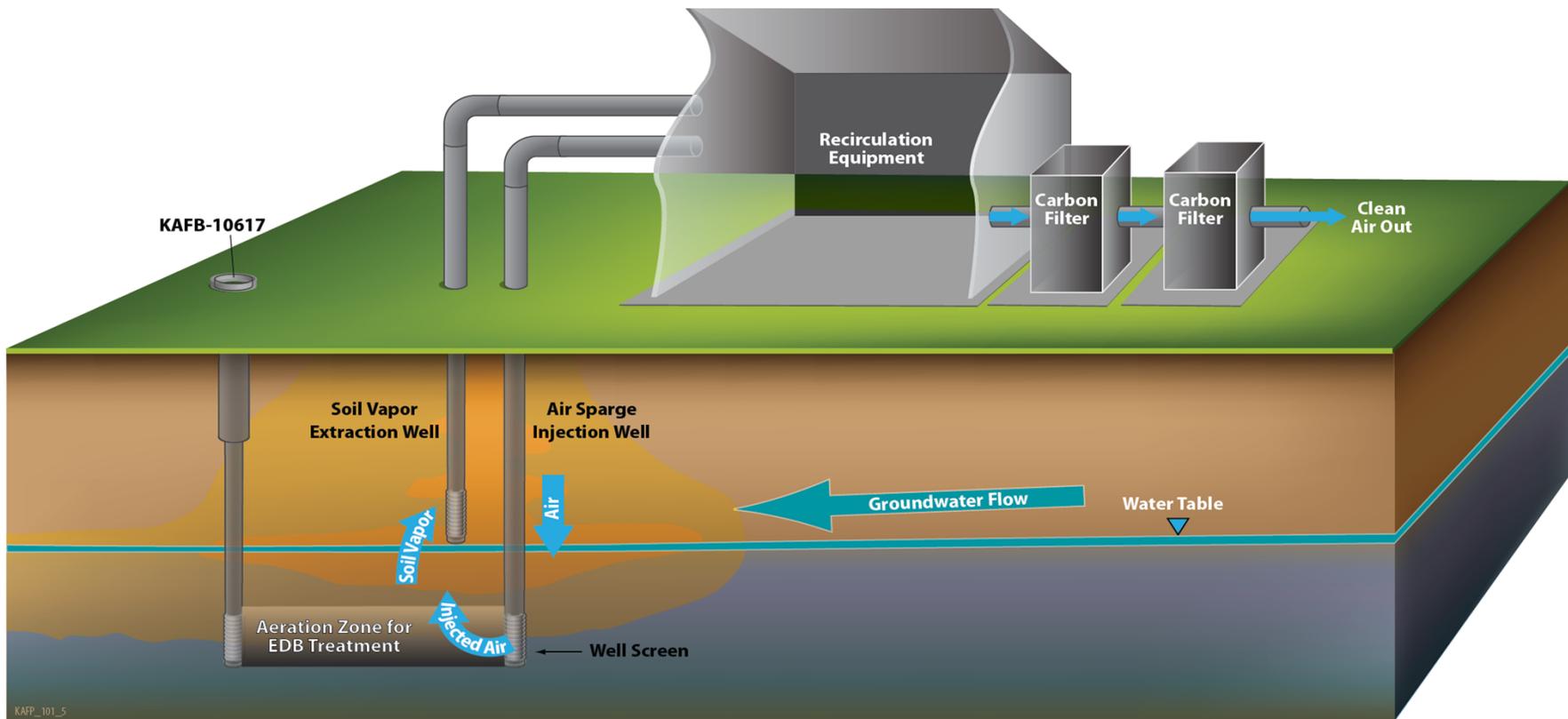


- **Laboratory studies are evaluating abiotic and biotic degradation including aerobic and anaerobic conditions**
 - Results expected early 2015
 - Ramping up for in situ bioremediation pilot test based on the results obtained



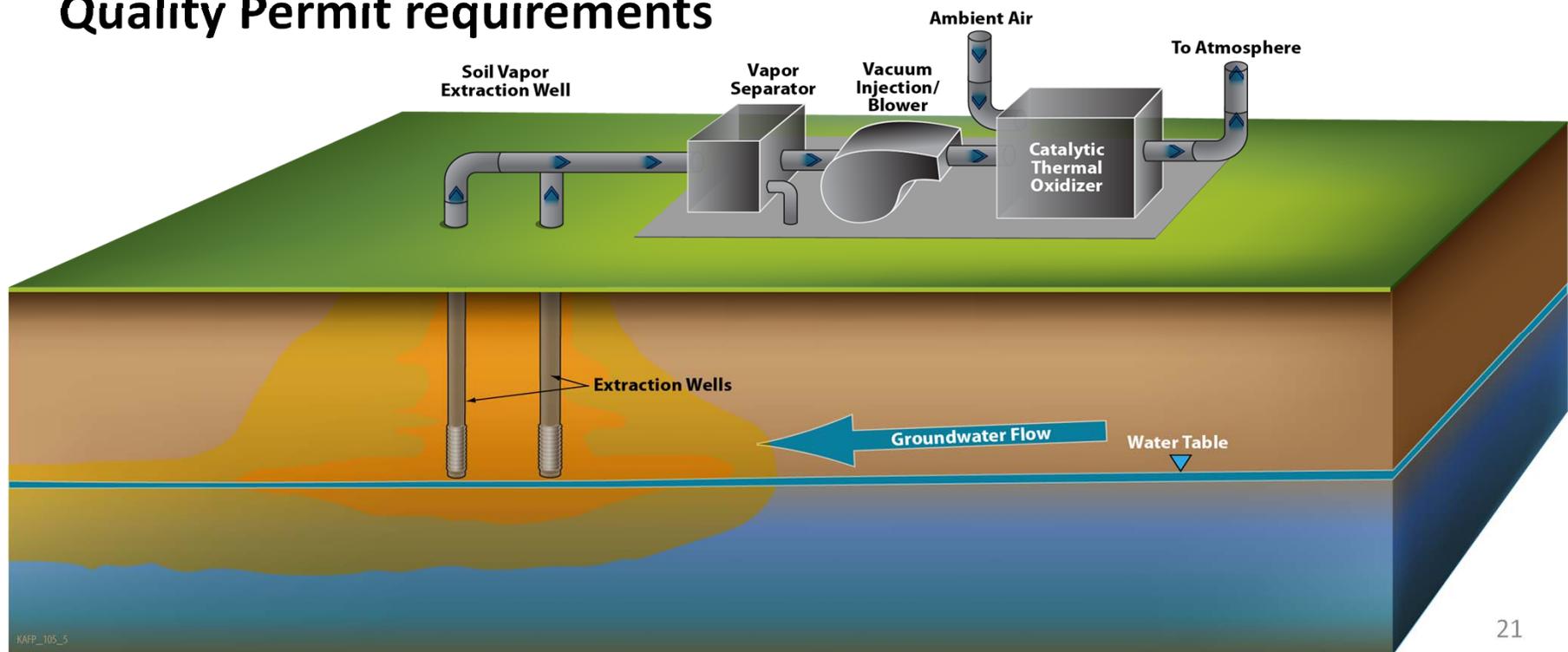
LNAPL Air Sparging Option

- Air sparging pilot currently operating and results are expected in late 2014/early 2015
- Ramping up for pilot study of three air sparging wells to target both dissolved-phase and LNAPL zone



Soil Vapor Extraction

- More than 500,000 gallons (3.5M pounds) of fuel recovered by SVE
- SVE capacity will be increased from 90 up to as much as 1500 pounds per hour
- Vapor will be treated in accordance with City of Albuquerque Air Quality Permit requirements



Recap

Protect Drinking Water Supply Wells

- Sentinel wells for early detection
- Monthly testing of drinking water wells

Collapse the EDB Plume

- Extract EDB plume and pull it away from drinking water wells

Remediate LNAPL

- Pilot tests underway

Soil Vapor Extraction in the Source Area

- Expand and increase capacity



How to get information on the Kirtland AFB BFF ?

Kirtland AFB Website: www.kirtlandjetfuelremediation.com

and www.kirtland.af.mil/environment.asp

NMED Website:

www.nmenv.state.nm.us/NMED/Issues/KirtlandAFBFuels.html

Kirtland AFB Information Repository (Hard Copy):

Central New Mexico (CNM) Community College-Montoya Campus Library,
4700 Morris NE, (505) 224-5721

Contact Information:

AFCEC / Office of Public Affairs

(210) 925-0956 or (866) 725-7617 or afcec.pa@us.af.mil

NMED / Communications Officer

(505) 222-9548 and jill.turner@state.nm.us

Questions?