New Mexico Environment Department

Kirtland Air Force Base Fuel Spill Cleanup Status Report

For the Military and Veteran's Affairs Committee

Monday, September 22, 2014

Site History

- **1951-53 – Bulk Fuels Facility constructed**
- **1999 – U.S. Air Force notified NMED of soil contamination**
- **2001 – U.S. Air Force notified NMED of groundwater contamination with dissolved fuel constituents**
- **2003 – Soil vapor extraction (SVE) begins**
- **2007 – Fuel discovered floating on groundwater (light non-aqueous phase liquid, LNAPL); unsuccessful attempt to skim LNAPL from water table**
- **2009 – Water level rise begins to submerge LNAPL within aquifer**
- **2014 – SVE has recovered more than 500,000 gallons of fuel since 2003**

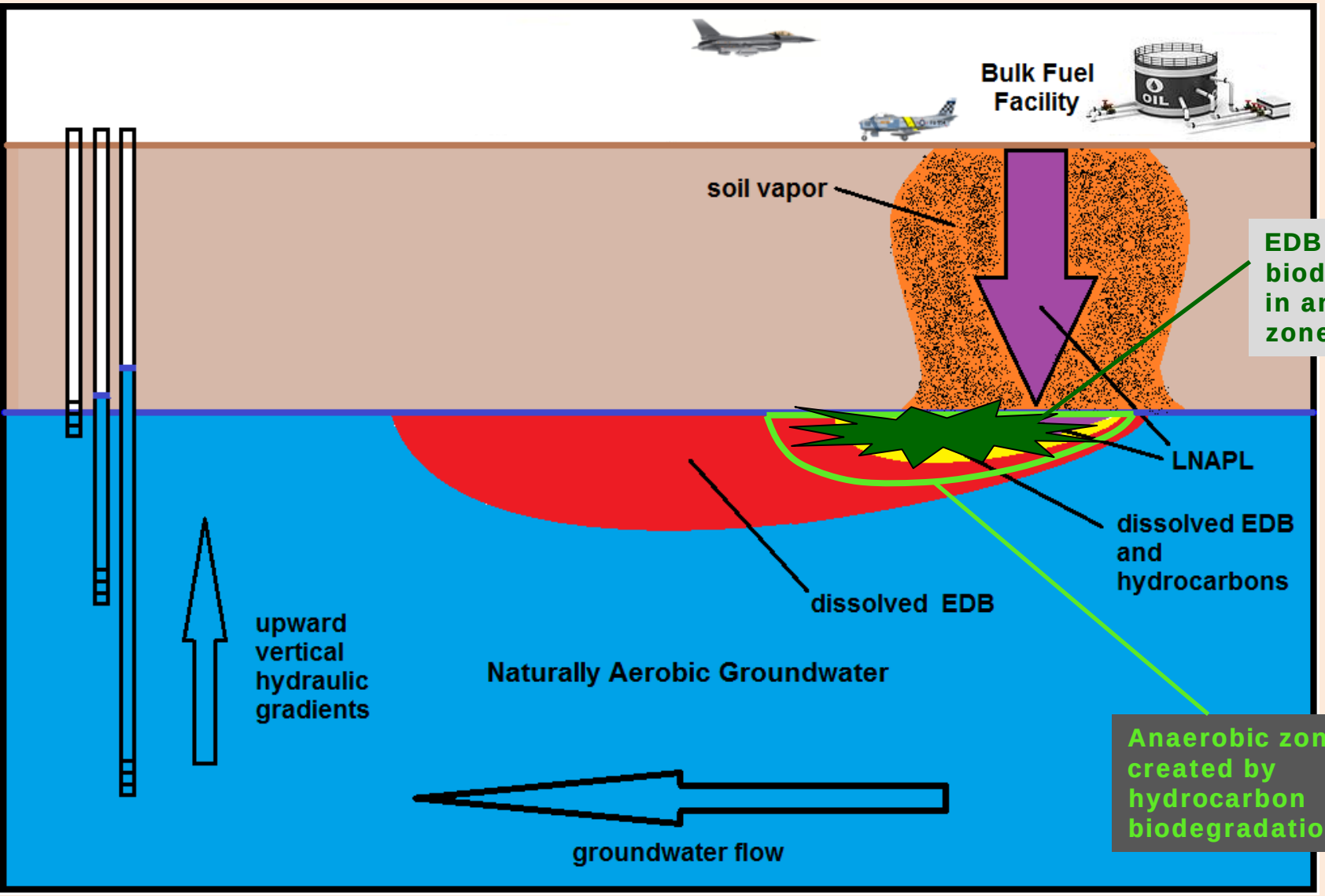
Recent Progress

Expert working groups* have been created and are making progress to:

- Fill critical data gaps;
- Define the physical, chemical, and biological processes that influence the contamination; and
- Increase the robustness of interim measures.

*** Working Groups include staff from NMED, KAFB, AFCEC, ABCWUA, CABQ, EPA**

Fuel Spill Plumes



Schematic, not to scale

Intrinsic Biodegradation

- Natural bacteria living in the aquifer are biodegrading the petroleum hydrocarbons, and destroying some of the EDB in the process.

- Natural biodegradation, alone, will not adequately clean up all of the contamination. It may be possible, however, to stimulate the aquifer bacteria to do a better job of biodegrading the contamination.

Priorities

1) Protect Drinking Water Wells

2) Collapse the EDB Plume

3) Remove LNAPL

4) Soil Vapor Extraction in the Spill Area

Tasks will be conducted simultaneously.

Drinking Water Protection

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

- Federal law requires testing once every 3 years for EDB and benzene. Sampling increases to quarterly if contaminants are detected.
- 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.

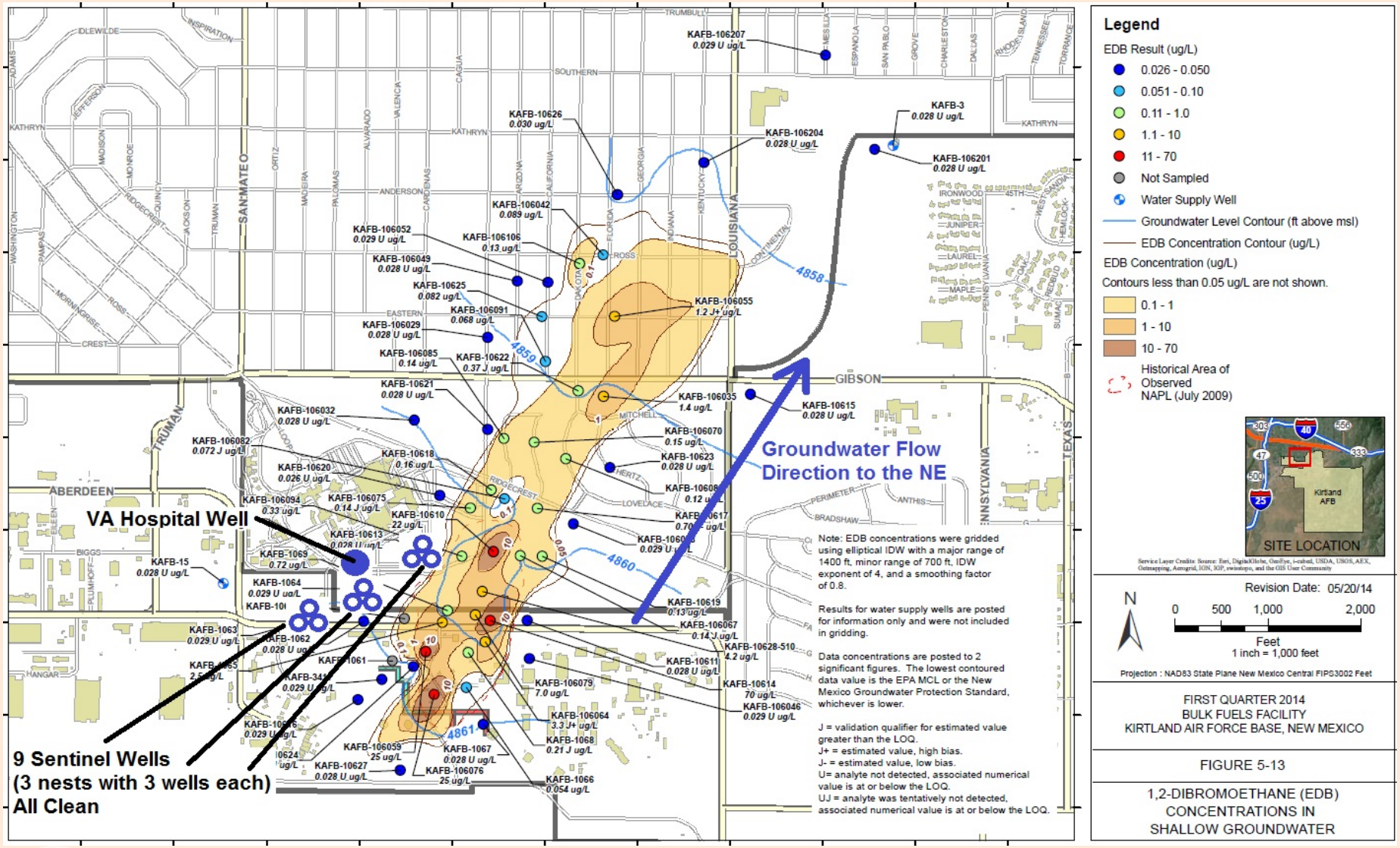
NMED strongly supports the USAF in their resolve that,

EDB will not be allowed to migrate into any water supply wells, at any detectable concentration.

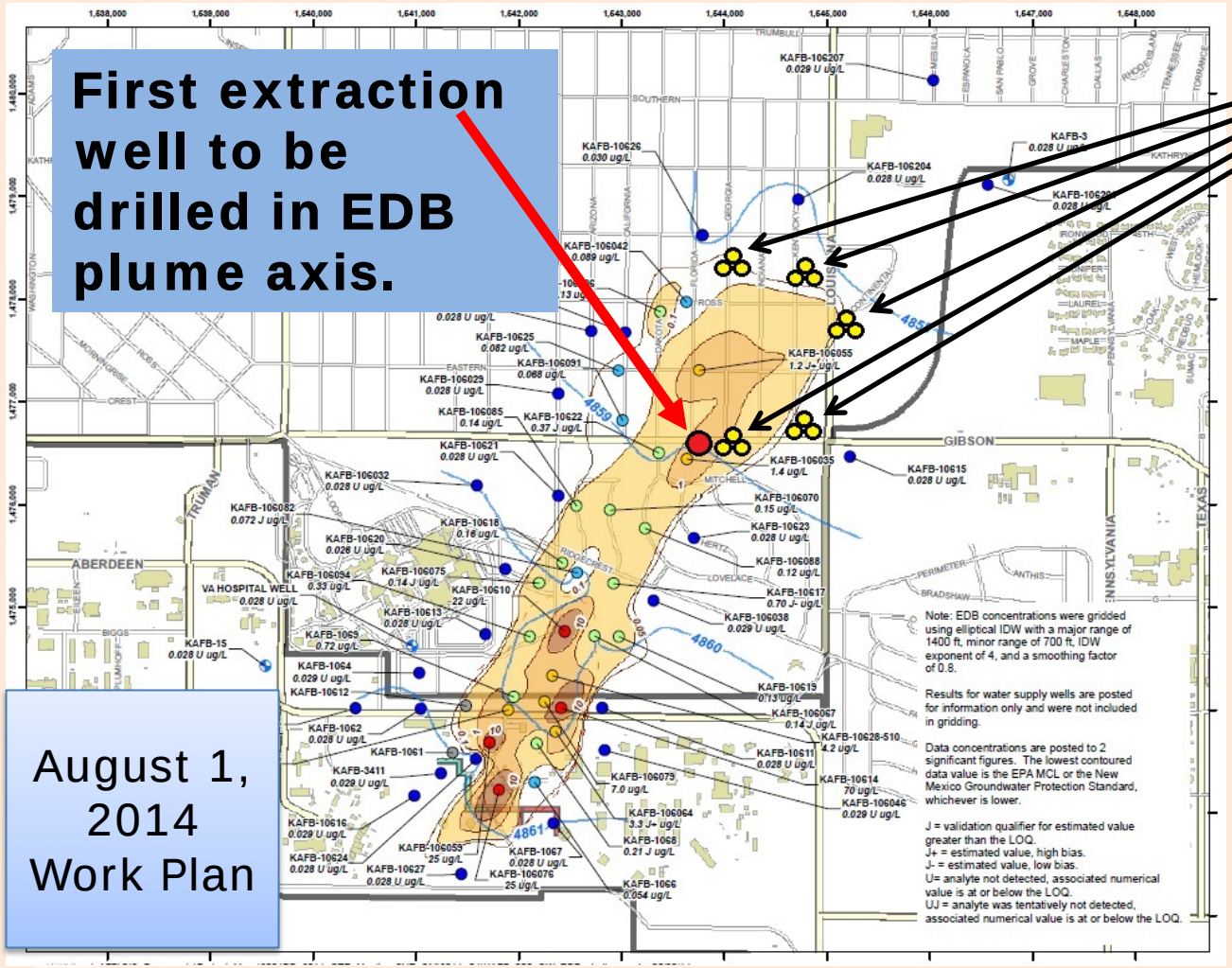
Protection of VA Well

- VA well is being tested monthly.
- No fuel contamination has been detected in the VA well.
- NMED and the VA signed a Source Water Protection Plan in July 2013 that establishes protective measures and contingencies for the VA well.
- 9 sentinel wells have been drilled between the EDB plume and the VA well. Sentinel wells will detect contamination before it reaches VA well.
- To date, all 9 sentinel wells are clean, and there is no evidence of plume migration towards the VA well.

Sentinel Wells Provide Early Detection



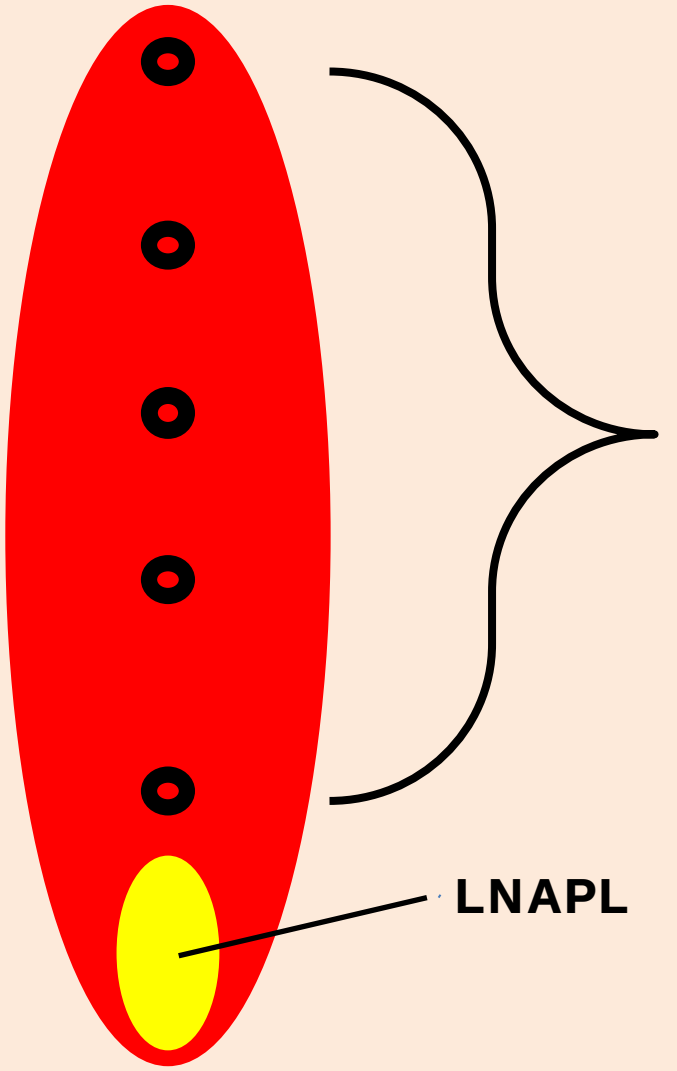
Dissolved EDB Cleanup



5 additional well nests (with 3 wells each) will be drilled to define horizontal and vertical extent of EDB plume.

Additional extraction wells will be installed to collapse EDB plume.

Collapsing the EDB Plume



Extracted groundwater will be treated to 0.05 µg/L or better, and put to beneficial use.

Options being considered:

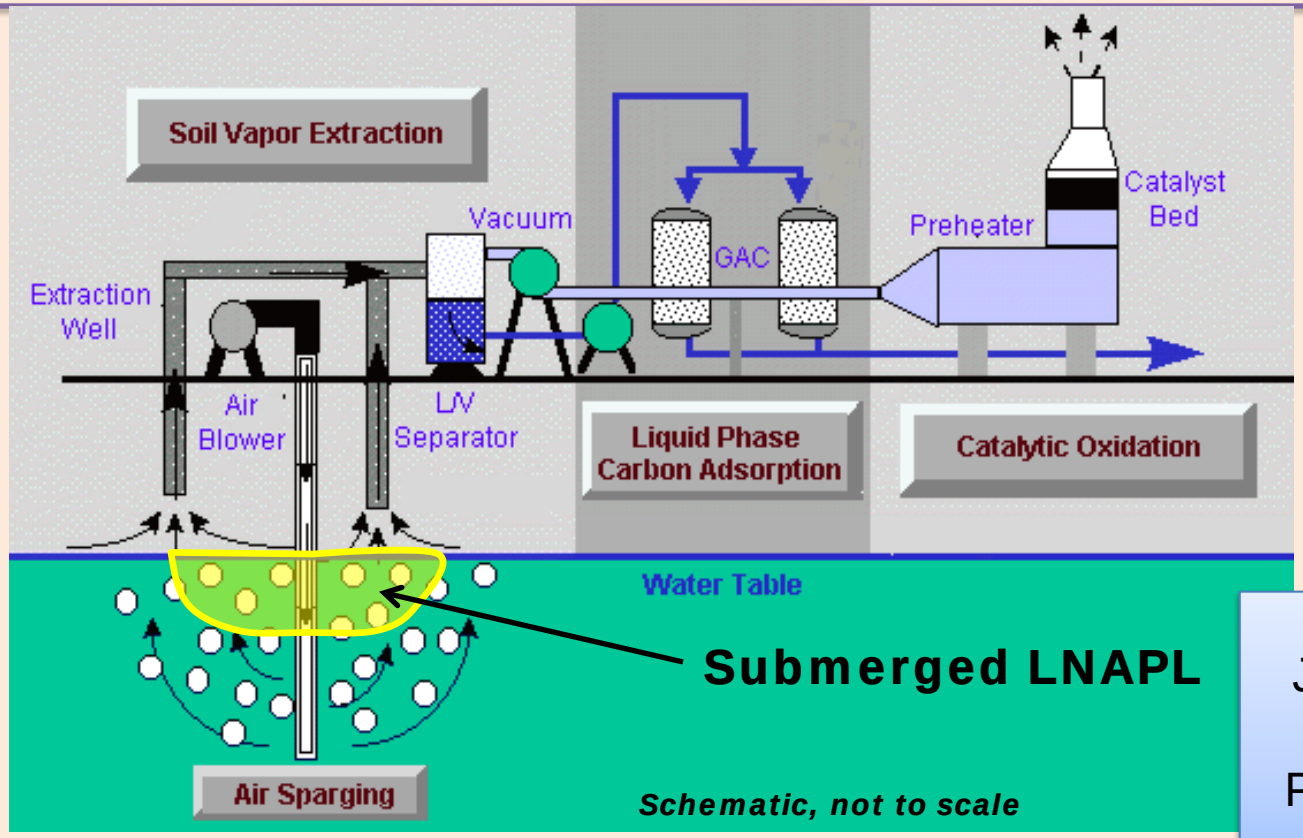
- Aquifer recharge
- Non-potable industrial use (irrigation, dust control)

Schematic, not to scale

LNAPL Remediation

- **LNAPL (oil) floating on the water table was discovered in 2007.**
- **LNAPL is a long-term source of dissolved phase contamination.**
- **In 2009, the water table began rising, and the LNAPL has become smeared and trapped below the water table.**
- **Remediating the drowned LNAPL will be extremely difficult.**
- **Options to remediate LNAPL are being evaluated and pilot tests are underway.**

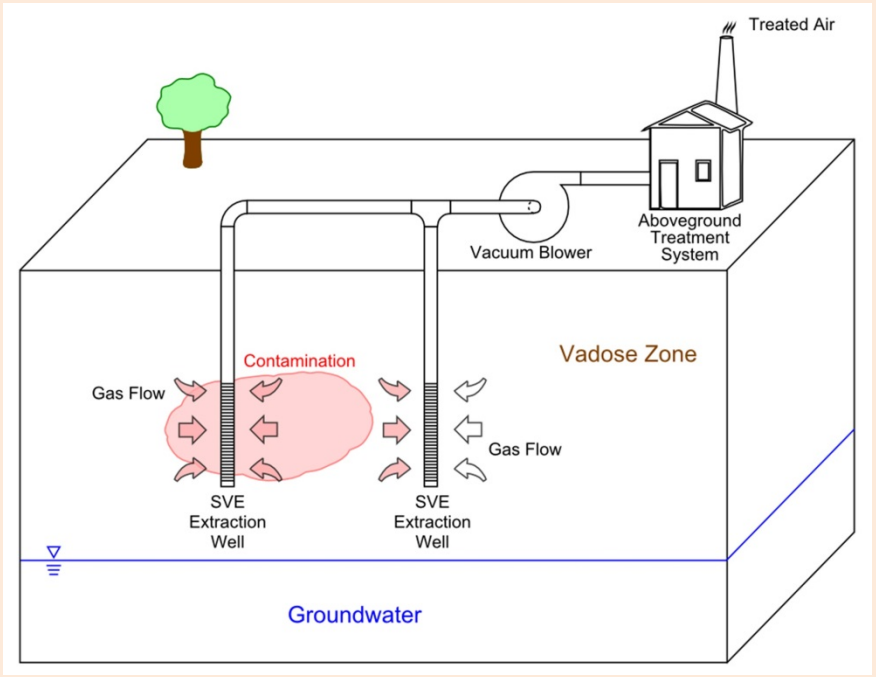
Air Sparging Pilot Test

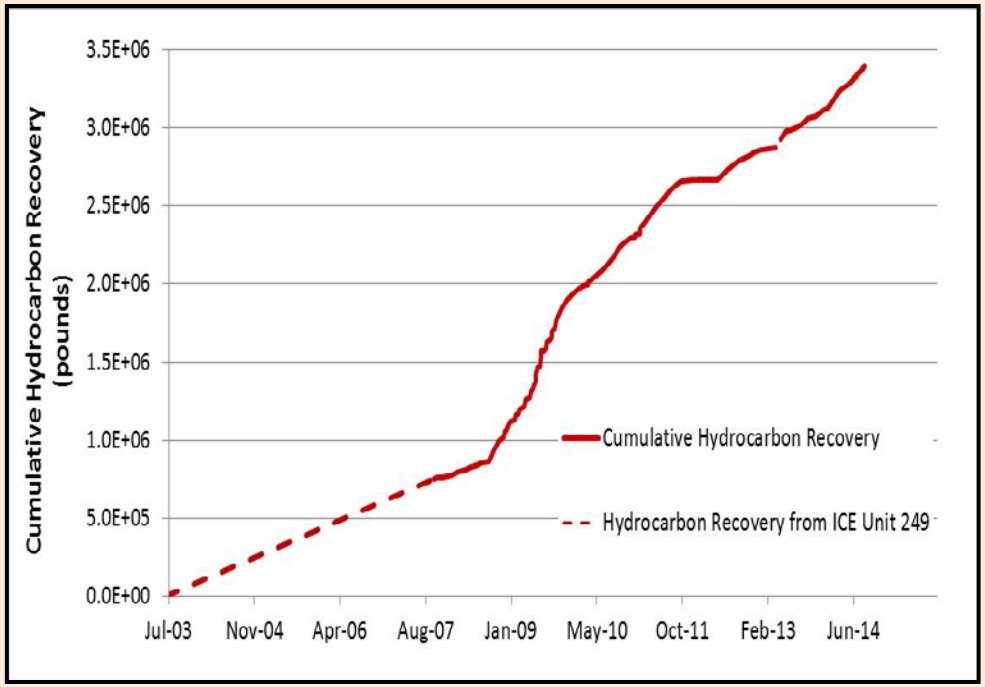


July 29, 2014 Proposal

Three air sparging wells will be installed directly into the 44 acre LNAPL zone.

Soil Vapor Extraction (SVE)





More than 500,000 gallons (3.5M pounds) of fuel recovered by SVE. Based on this success, SVE capacity will be increased from 90 lbs/hour to 1500 lbs/hour.

Interim Measures

SVE Expansion

- SVE was expanded in March 2014.
- Additional expansion will raise capacity from 90 to 1500 lbs/hour.

LNAPL Remediation

- Laboratory and field tests of aerobic and anaerobic treatment options are underway.
- Aerobic sparge and vent field tests are being scaled up; approvals granted in June and September 2014.
- Anaerobic laboratory microcosm tests underway for LNAPL biodegradability.

EDB Remediation

- Extraction well, approved August 2014, will begin to collapse EDB plume.
- Laboratory microcosm tests underway for EDB biodegradability.
- 15 additional wells will be drilled to fill data gaps.

NMED may require additional interim measures, if warranted.

Questions?