



*Kirtland Air Force Base
Citizen's Advisory Board (CAB)*

*Cesar Chavez Community Center
7505 Kathryn Avenue SE
Albuquerque, New Mexico 87108*

*February 19, 2013
5:30 – 7:30 p.m.*

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Meeting Format



-
- **Introduction**
 - **3rd Quarter 2012 Report Highlights**
 - **EDB Plume Update**
 - **Jet Fuel Spill Remediation 101**
 - **BFF SVE Treatment System**
 - **Public Questions/Discussion**

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Meeting Guidelines



-
- **Hard copies of presentation are available near the sign-in sheet and will be posted online**
 - **One question/comment per turn at the microphone**
 - **Each question/comment will be allotted 3 minutes**
 - **In addition, comment cards have been made available**
 - **Return completed comment cards to Kirtland Air Force Base (AFB) Public Affairs Office staff**
 - **Questions will be answered at the end of the presentation**
 - **Questions will also be incorporated into the FAQ portion of the new Kirtland AFB Bulk Fuels Facility (BFF) Spill project website:**

www.kirtlandjetfuelremediation.com

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Acronyms



- **ATSDR** – Agency for Toxic Substances and Disease Registry
- **BFF** – Bulk Fuels Facility
- **BTEX** – Benzene, toluene, ethylbenzene, xylene
- **CAB** – Citizen's Advisory Board
- **CME** – Corrective Measures Evaluation
- **DPT** – Direct Push Technology
- **EDB** – Ethylene dibromide
- **EPA** – Environmental Protection Agency
- **FFOR** – Former Fuel Offloading Rack
- **ICE** – Internal combustion engine
- **IM** – Interim Measure

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Acronyms Continued



- **NAPL** – Non-Aqueous Phase Liquid
- **NMED** – New Mexico Environment Department
- **O & M** – Operation and Maintenance
- **RCRA** – Resource Conservation and Recovery Act
- **RFI** – RCRA Facility Investigation
- **ROI** – Radius of influence
- **SVE** – Soil vapor extraction
- **µg/L** – microgram per liter

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Project Background

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Kirtland AFB BFF Site History



- Kirtland AFB BFF operated from 1953 through 1999, when the receiving facility was removed from service due to discovery of an underground leak
- Three types of fuel were processed by the BFF: aviation fuel (AvGas) or high-octane gasoline, Jet Propellant Fuel-4 (JP-4), and JP-8
- AvGas and JP-4 was phased out in 1975 and 1993, respectively. JP-8 use continued until the leak was discovered in 1999
- A Soil vapor extraction (SVE) unit was installed in 2003 to begin remediation of soil contamination; three additional SVE units were added in 2004
- Investigation activities identified jet fuel on the groundwater table in February 2007 in an on-installation groundwater monitoring well

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RCRA PROCESS



CHARACTERIZATION

RCRA Facility Investigation

- ✓ Installation of 78 Groundwater Wells
- ✓ Installation of 35 Soil Vapor Wells
- ✓ DPT Soil Samples at FFOR
- ✓ Installation of 9 Pneulog Wells
- ✓ Installation of 9 Groundwater Wells

Interim Measures

- ICE Unit Operation - Pre-Remedy O&M
- Soil Removal at FFOR - Phase I Interim Measures
- SVE Treatment System - Phase II Interim Measures
- In-Well Treatment Interim Measure
- ✓ Move ICE Units to New SVE Wells
- Design and Build of Centralized SVE Treatment System

EVALUATION

Corrective Measures Evaluations

- ✓ Baildown Testing
- ROI Testing
- Quarterly Monitoring
- ✓ Pneulog Well Testing
- ✓ Slug Testing
- Use Phase II IM to Conduct Extended ROI Testing
- Continue to Evaluate Early Treatment



FINAL REMEDY

REMEDY IN PLACE

EARLY/INITIAL TREATMENT



3rd Quarter 2012 Highlights



3rd Quarter 2012 Highlights



- Third Quarter 2012 Report submitted to the New Mexico Environment Department (NMED) on December 20, 2012; covers sampling and site activities conducted July – September 2012
- Data for this quarter, relative to previous quarters, indicate total VOC concentration reduction in the 1000 parts per million by volume range
 - First and only quarter where this reduction has been observed; previous quarters show consistent vapor concentrations
 - Additional data is needed in order to determine the cause for the apparent reduction in soil vapor concentration
- Well KAFB-10615 detected ethylene dibromide (EDB) in 3rd Quarter 2012 sampling at a concentration of 0.075 micrograms per liter ($\mu\text{g/L}$)
 - This is the first quarter of an EDB detection in this well
 - Future sampling will confirm this detection

*KAFB reluctant to
provide single data
points -> examples*

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EDB Plume Update

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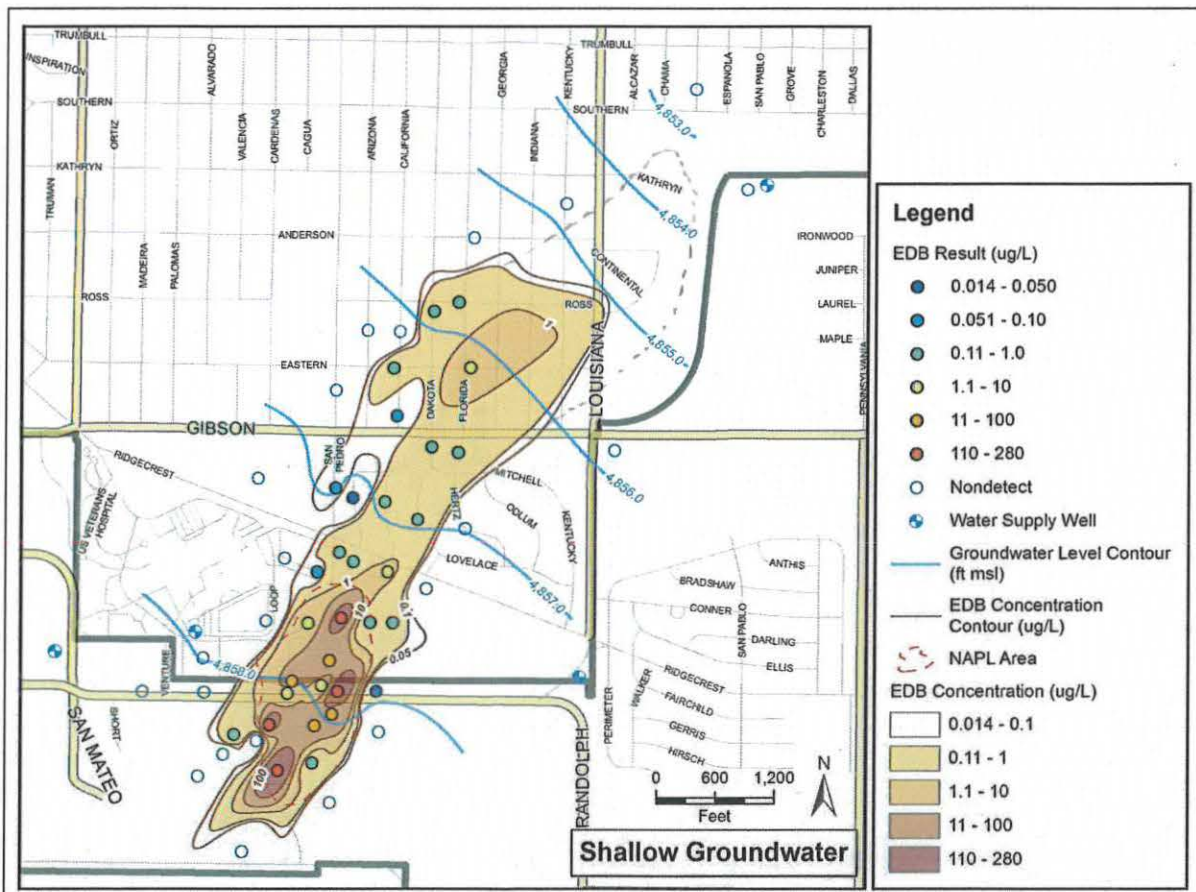


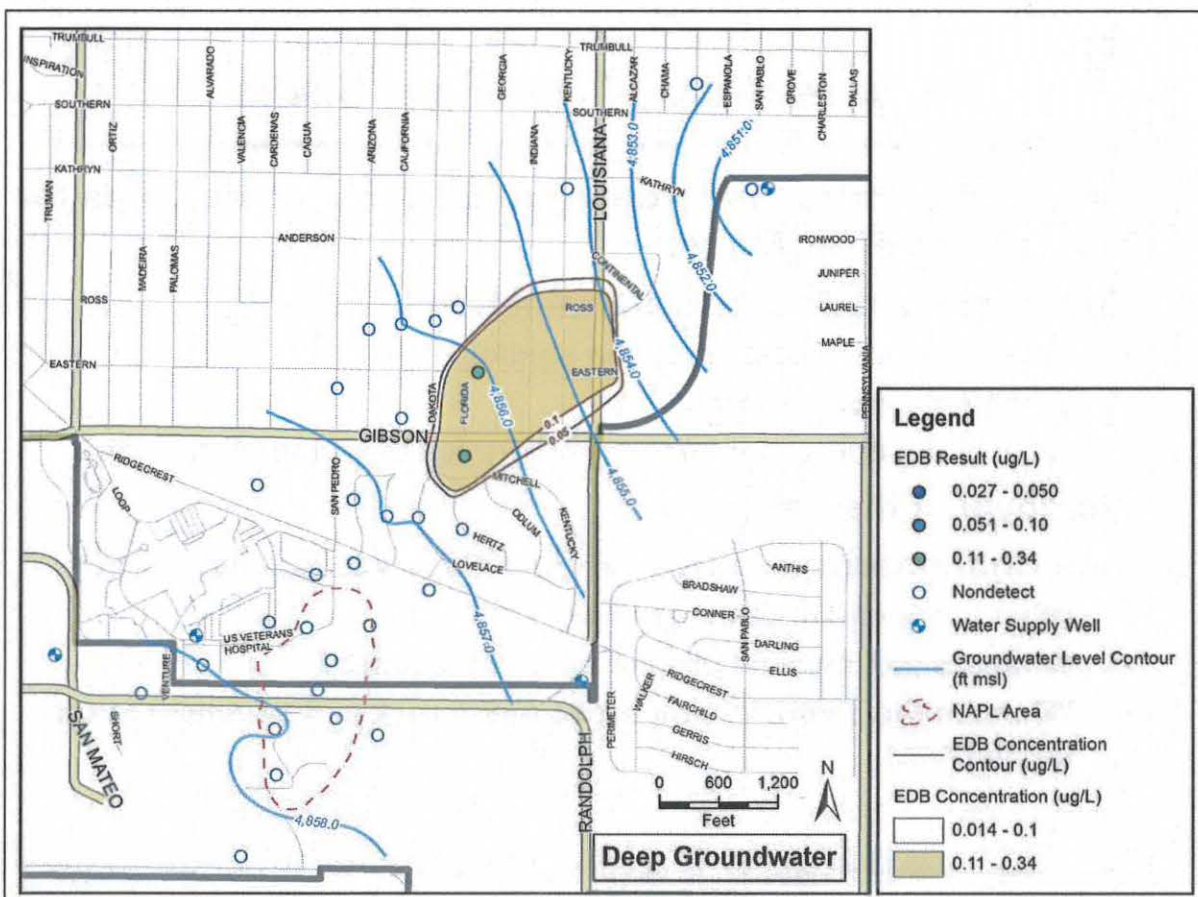
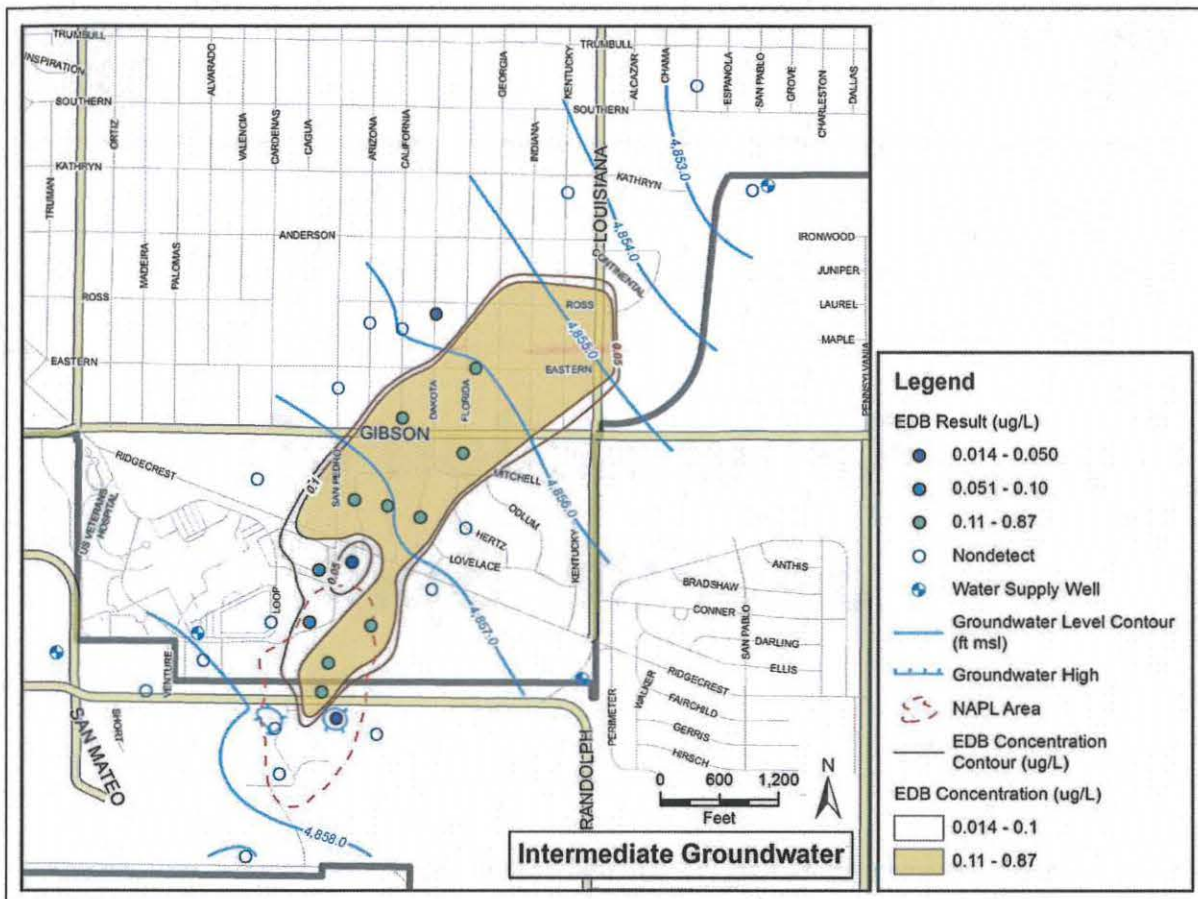
4th Quarter 2012 EDB Results



- Fourth Quarter 2012 sampling data indicate that the northeastern extent of the EDB plume is defined
- Groundwater monitoring data for this quarter were collected October through November 2012
- Nine additional groundwater monitoring wells were sampled during the 4th Quarter 2012 and are now incorporated into the quarterly monitoring program
- Data from 9 additional groundwater monitoring wells show that no fuel-related contaminants are present; these results have been confirmed with NMED sample data
- Contours are calculated using a robust interpolation method that uses sample results from the groundwater monitoring well network; same method as previous quarters

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Remediation of Jet Fuel Spill

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Remediation of Jet Fuel Spills



Environmental Protection Agency's (EPA) Six Basic Steps for Remediation of an Aquifer

1. Discovery and Source Determination

- What contaminant(s) are in the aquifer?
- What is the spatial extent?
- What is the contaminant(s) concentration at various locations?

2. Removal of the source

3. Site Characterization (RCRA Facility Investigation [RFI])

- What is the extent of the aquifer?
- What are the physical properties of the aquifer?
- What are the chemical properties of the rock and sediment in the aquifer?

1999 - discovery of spill
2007 - fuel disc on WT
2009 - cease BFR ops

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Remediation of Jet Fuel Spills



The Six Basic Steps for Remediation of an Aquifer (cont'd)

4. Impact Evaluation (RFI and Corrective Measures Evaluation [CME])

- How far has the contaminant spread?
- Has the composition changed due to natural remediation?

RERA allows non-linear approach = IMs

5. Modeling (CME)

6. Remediation (Corrective Measures Implementation/Remedy-in-Place)

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Remediation of Jet Fuel Spills



- Fuel spills have happened from sites as small as local gas stations to large sites at other military installations
- Technologies used for remediation can be new and innovative or an established, well-tested technology
- Common Remediation Techniques:
 1. Pump and treat
 2. Hydraulic containment
 3. Air Sparging/Soil Vapor Extraction (SVE)
 4. In-situ oxidation
 5. Permeable reactive barriers
 6. Phytoremediation
 7. Natural Attenuation
 8. Intrinsic and enhanced bioremediation

"Like 4 other treatment components will be added as we progress"

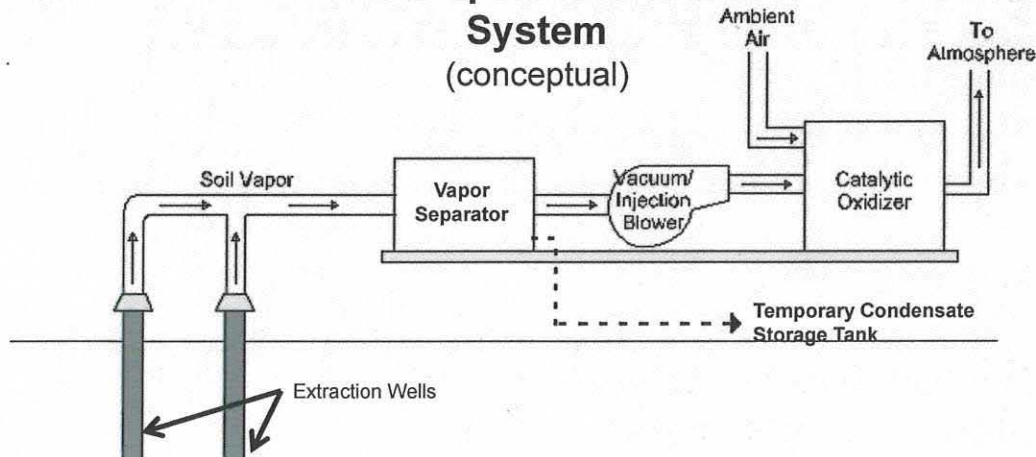
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Remediation of Jet Fuel Spills



Soil Vapor Extraction System (conceptual)



Pros:

- Proven performance; available equipment
- Short treatment times
- Can be combined with other technologies

Cons:

- Only treats unsaturated-zone soils; other methods needed to treat saturated soils and groundwater

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Remediation of Jet Fuel Spills



Soil Vapor Extraction

- Radius of influence (ROI) is a key parameter in SVE system design
 - ROI is defined as the greatest distance from an extraction well at which a sufficient vacuum and vapor flow can be induced to enhance volatilization (vaporization) and extraction of the contaminants in the soil
- Vapor concentration, vapor extraction rate, and vacuum data are used in system effectiveness evaluation
- Mass extraction data (pounds per day) and mass removal quantity data is used to determine reduction in contaminant quantities over the course of remediation
 - For example: "Approximately 3,250 lbs of the four target VOC compounds and 176,000 lbs of total VOCs were extracted from the treatment area."
- Final measure of remediation defined by groundwater concentrations

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Remediation of Jet Fuel Spills Kirtland AFB BFF Specific

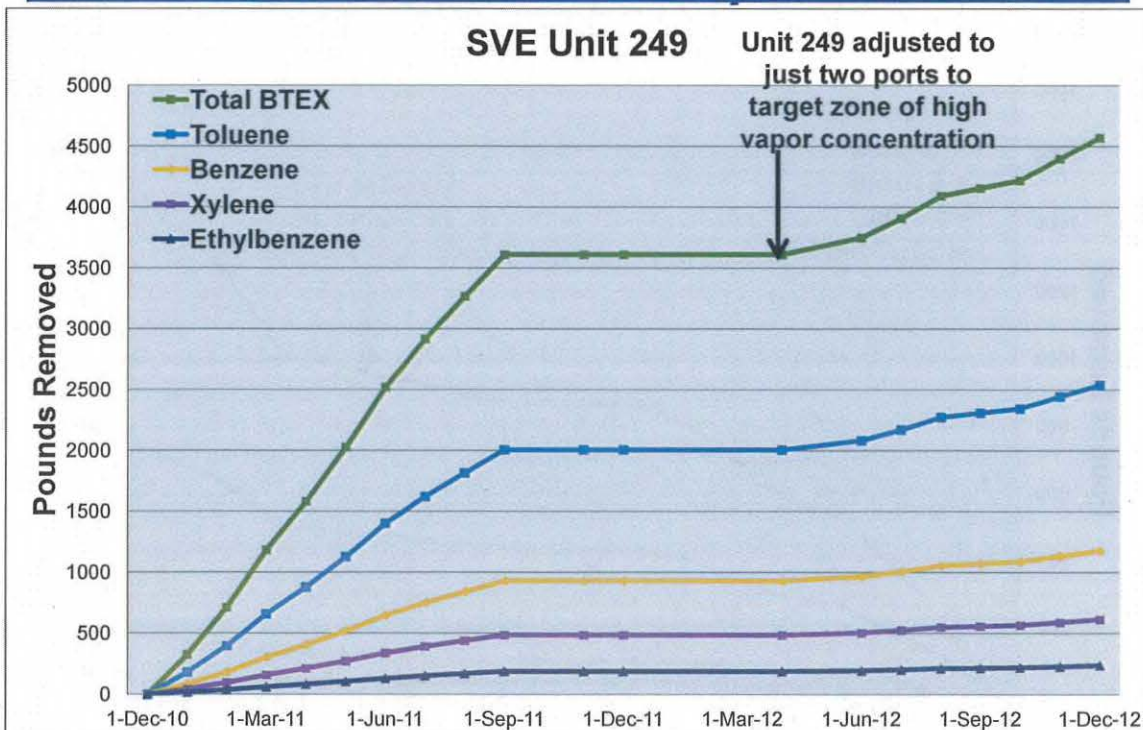


- Since 2003, soil vapor extraction has been in use at Kirtland AFB to remediate contamination in the vadose zone *expanded in 2007*
 - Soil vapor extraction units consist of two internal combustion engines, each
- A total of four SVE units have been operating at the site
 - Units 335, 344, and 345 have been at single wells
 - Unit 249 is at a manifold consisting of six shallow soil vapor monitoring wells
- In April 2012, Units 335, 344, and 345 were moved to optimized locations based on quarterly soil vapor concentration data (per the SVE Optimization Plan submitted to the NMED)

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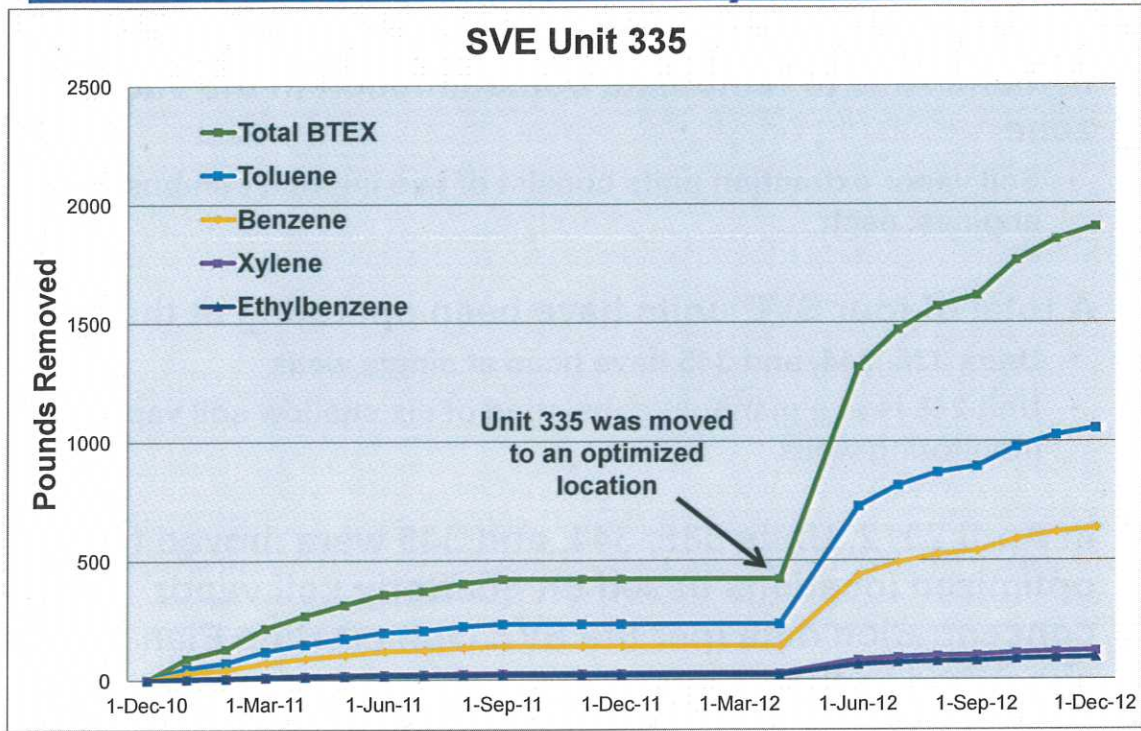


Remediation of Jet Fuel Spills Kirtland AFB BFF Specific

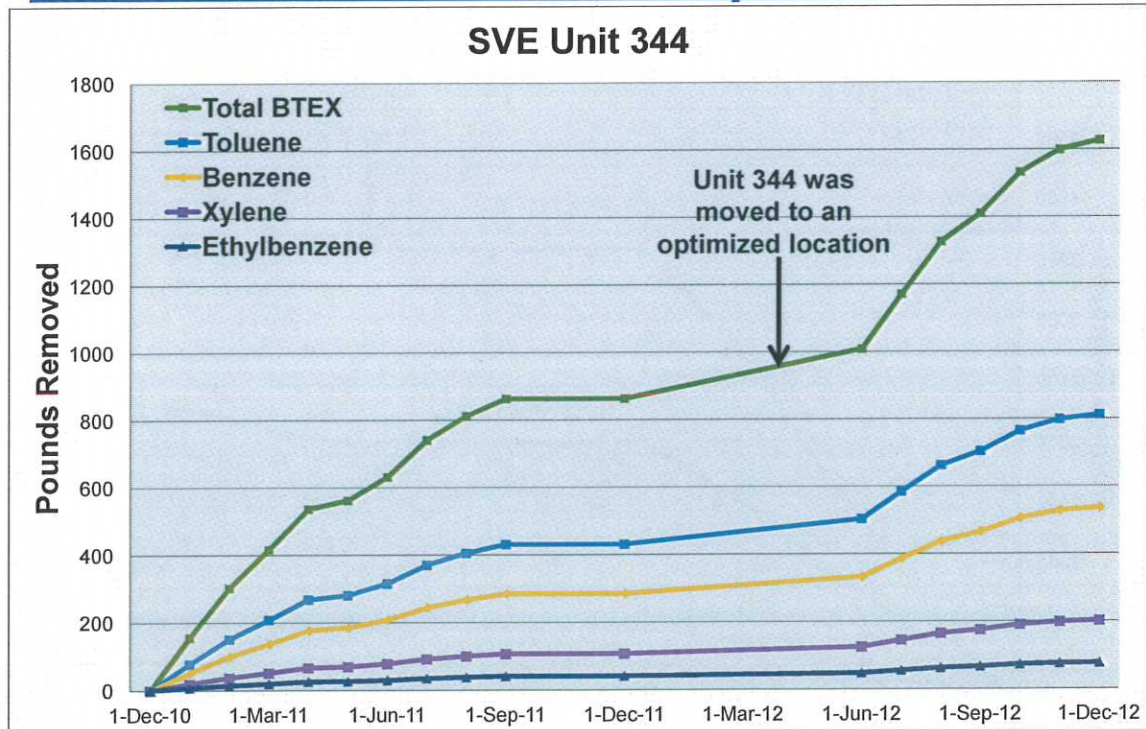




Remediation of Jet Fuel Spills Kirtland AFB BFF Specific

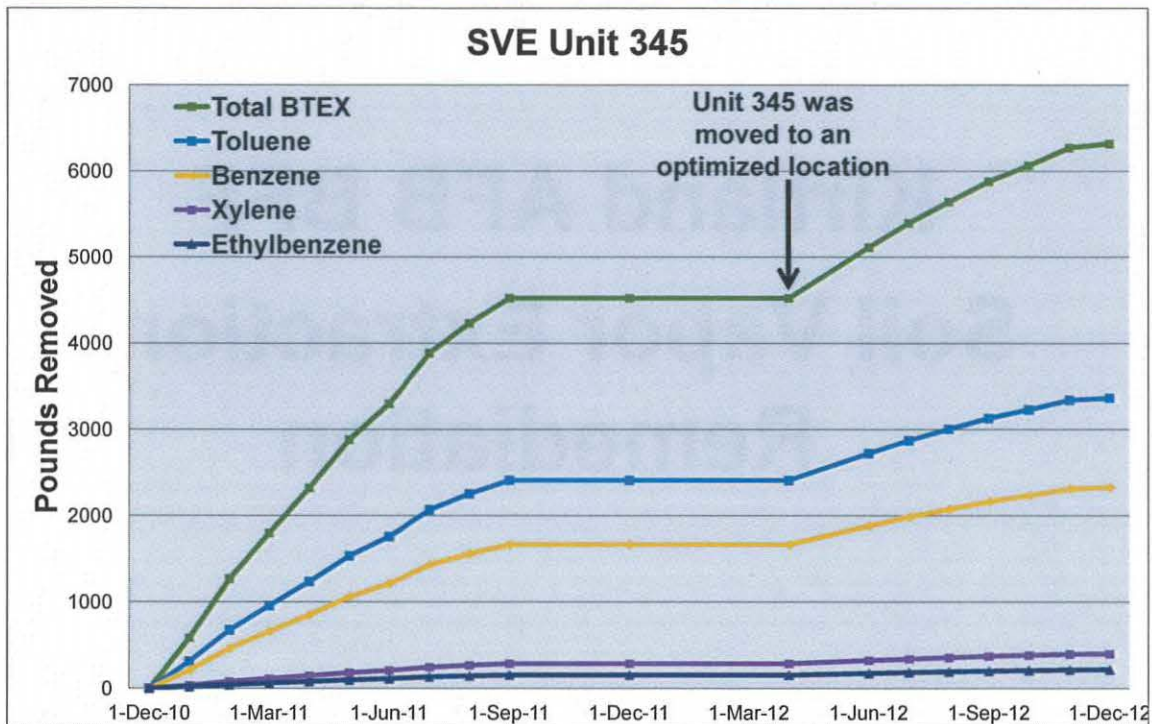


Remediation of Jet Fuel Spills Kirtland AFB BFF Specific





Remediation of Jet Fuel Spills Kirtland AFB BFF Specific



For more information:



- **Environmental Science in the 21st Century – An Online Textbook** (<http://oceanworld.tamu.edu/don>)
 - Reference provides an overview of groundwater remediation approaches and technologies
- **EPA Remediation Technologies for Fuel** (<http://www.epa.gov/oust/cat/remedial.htm>)
 - Reference provides detailed information on various new and existing technologies for fuel remediation
- **USGS Toxic Substances Hydrology Program** (<http://toxics.usgs.gov/topics/remediation.html>)
 - Reference provides additional information on fuel remediation in groundwater systems



Kirtland AFB BFF Soil Vapor Extraction Remediation

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Kirtland AFB Bulk Fuels Spill Remediation



- A new SVE system was brought online on January 22, 2013
- Representatives from NMED and Albuquerque Environmental Health Department were present to observe system startup/operation
- The new system has more capacity than the four previously used units and will be able to treat a larger footprint
- ROI testing on the new system is ongoing and will define optimized operating conditions and the footprint of remediation
- Mass extraction data (pounds per day) and mass removal quantity data will be reported in the BFF quarterly reports

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SVE Treatment System



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SVE Treatment System



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Looking Forward

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Up and Coming



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- A website specific to the BFF spill has been developed: www.kirtlandjetfuelremediation.com
 - Fourth Quarter 2012 Report is being written and will be delivered to NMED by 29 March 2013
 - Design and construction of an in-well treatment system that uses air sparging and air stripping is in process – will be online in late Spring 2013
 - Submittal of Groundwater and Vadose Zone RFI anticipated Summer 2013
 - Agency for Toxic Substances and Disease Registry Report due out Spring 2013

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POINTS OF CONTACT



Col. Jeff Lanning
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(505) 846-5991

Citizens may review Air Force Environmental Restoration Program documents at the Kirtland AFB Information Repository located at the Central New Mexico Community College-Montoya Campus Library, 4700 Morris NE, (505) 224-5721
or

by visiting www.kirtlandjetfuelremediation.com or the Kirtland AFB website at <http://www.kirtland.af.mil> in the Environmental Issues section for Public Records.

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Discussion

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Meeting Dates

19 February 2013

21 May 2013

20 August 2013

19 November 2013

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36



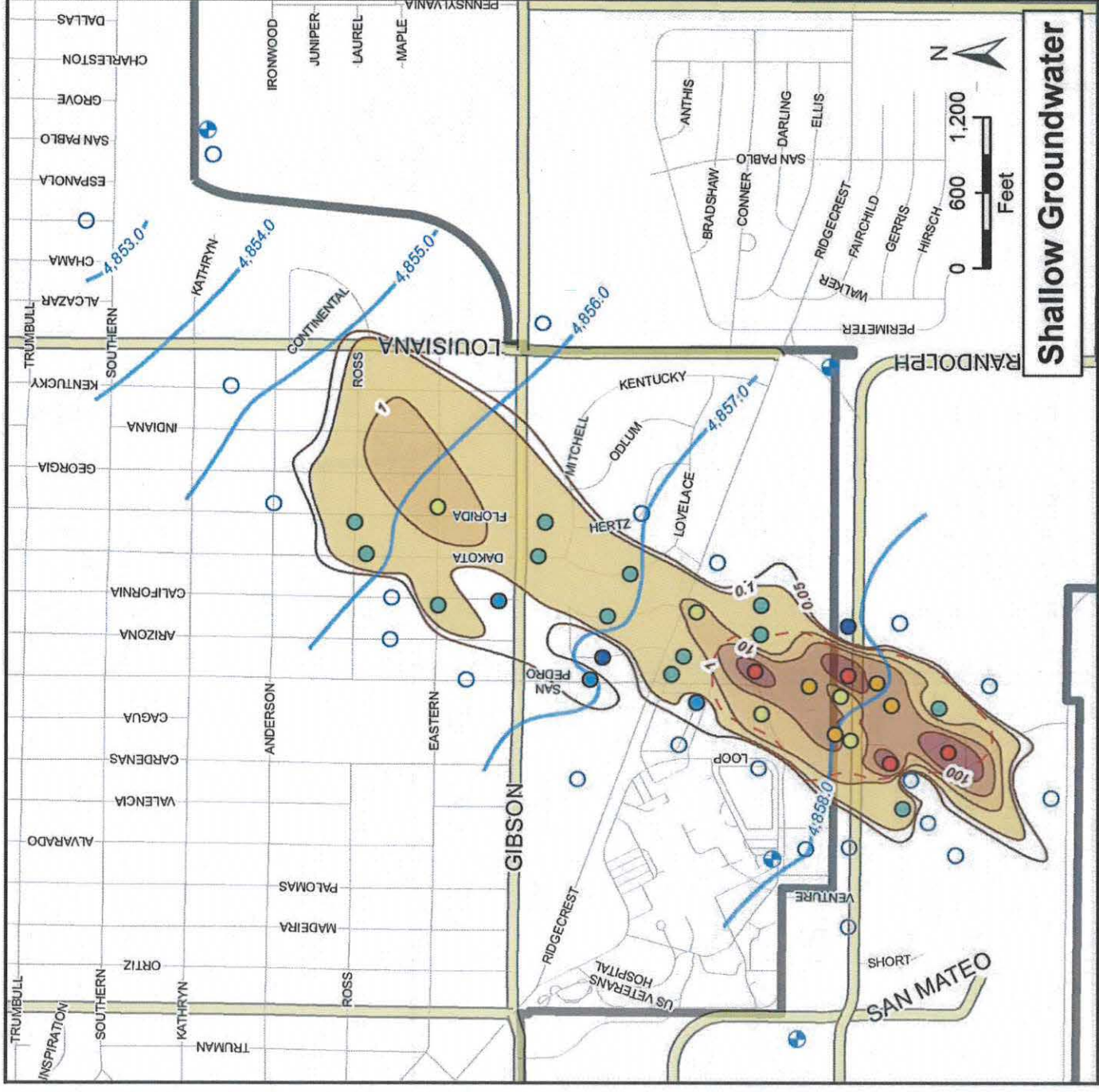
Request for Agenda Topics

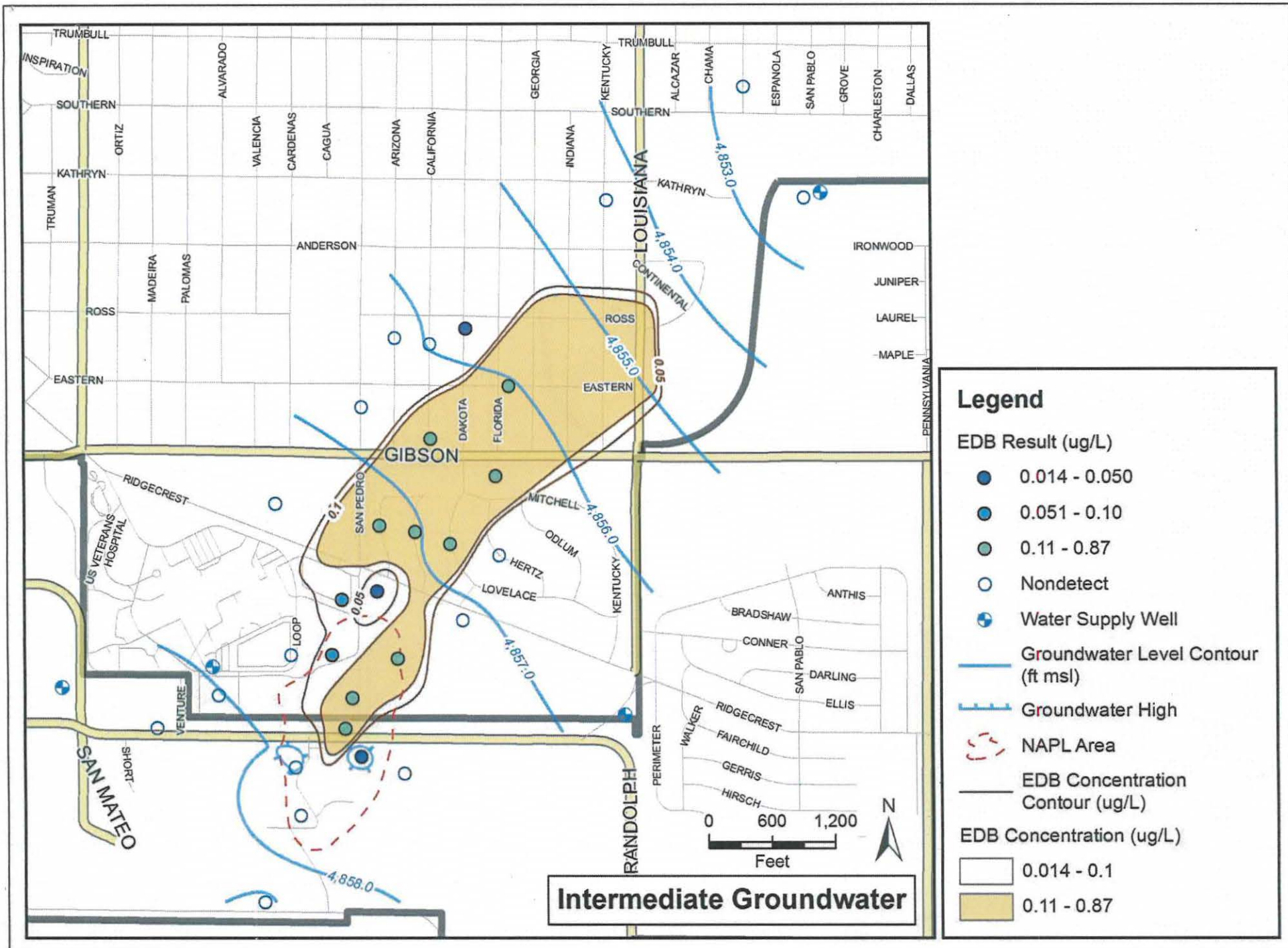
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with My data

Legend

	EDB Result (ug/L)		Water Supply Well
	0.014 - 0.050		Groundwater Level Contour (ft msl)
	0.051 - 0.10		EDB Concentration Contour (ug/L)
	0.11 - 1.0		NAPL Area
	1.1 - 10		EDB Concentration (ug/L)
	11 - 100		0.014 - 0.1
	110 - 280		0.11 - 1
	Nondetect		1.1 - 10
	Water Supply Well		11 - 100
	Groundwater Level Contour (ft msl)		110 - 280
	EDB Concentration Contour (ug/L)		
	NAPL Area		
	EDB Concentration (ug/L)		

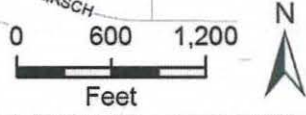




Legend

- EDB Result (ug/L)**
- 0.014 - 0.050
 - 0.051 - 0.10
 - 0.11 - 0.87
 - Nondetect
 - ⊕ Water Supply Well
- Groundwater Level Contour (ft msl)**
- Groundwater High**
- NAPL Area**
- EDB Concentration Contour (ug/L)**
- EDB Concentration (ug/L)**
- 0.014 - 0.1
 - 0.11 - 0.87

Intermediate Groundwater



Legend

EDB Result (ug/L)

- 0.027 - 0.050
- 0.051 - 0.10
- 0.11 - 0.34
- Nondetect

Water Supply Well

Groundwater Level Contour
(ft msl)

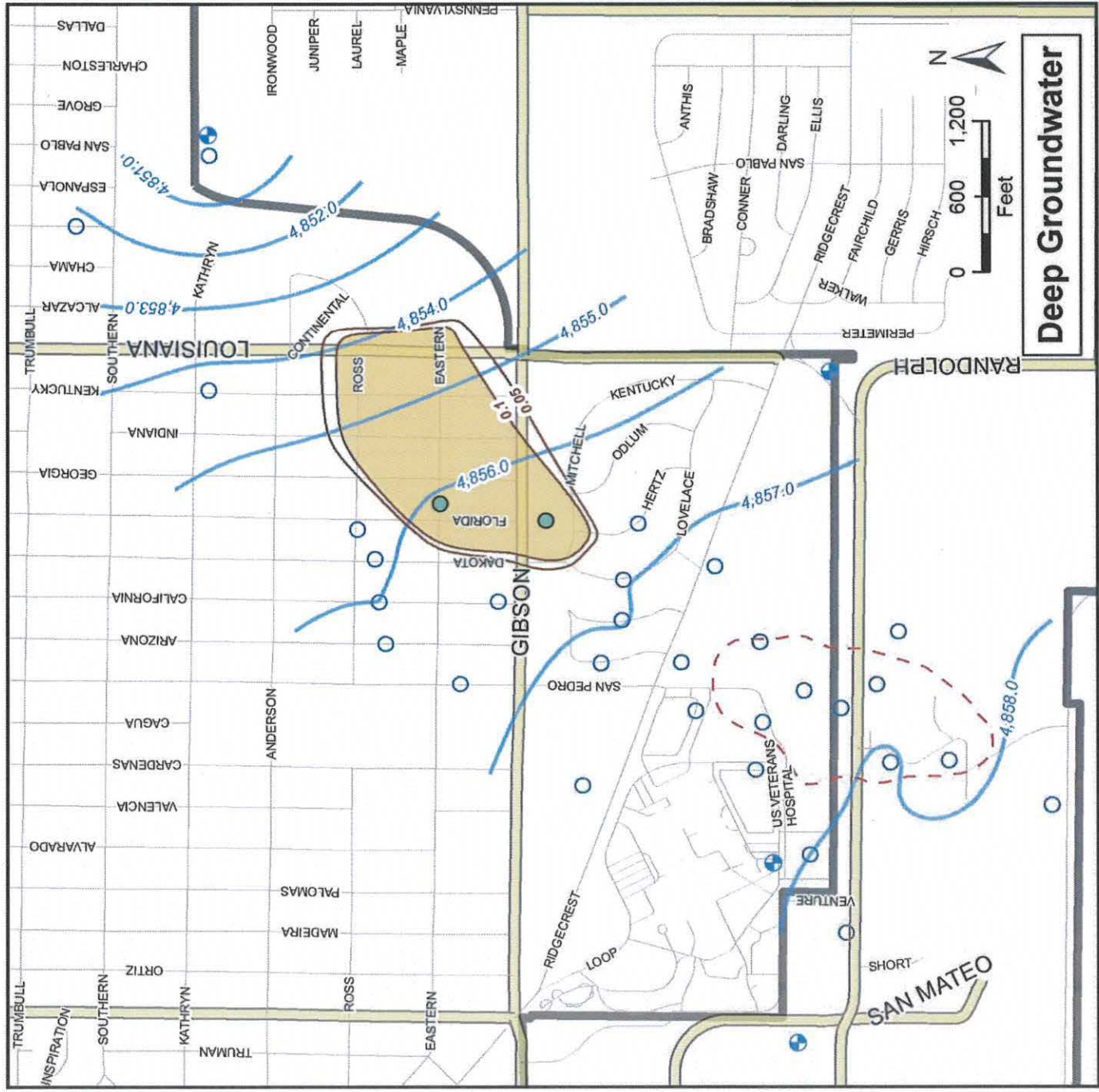
NAPL Area

EDB Concentration
Contour (ug/L)

EDB Concentration (ug/L)

0.014 - 0.1

0.11 - 0.34



Deep Groundwater