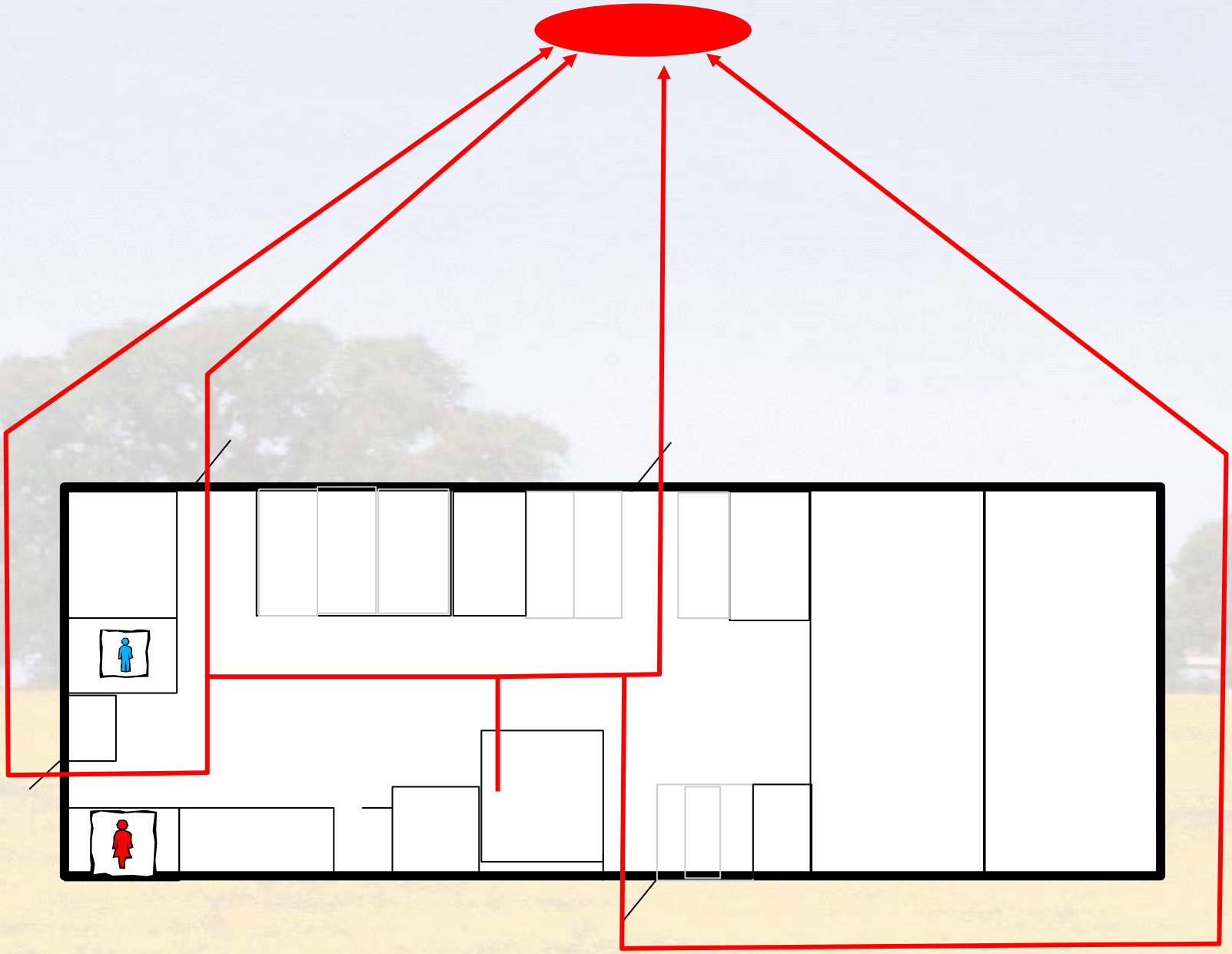
Camp Stanley Storage Activity Status Update

June 27, 2013

INTRODUCTIONS AND WELCOME



Emergency Evacuation & Restrooms

Agenda

Introduction

SWMU and AOC Updates

Groundwater Monitoring Program

- Groundwater Monitoring Update
- CS-1/CS-13

Treatability Study Updates

- SWMU B-3
- AOC-65 ISCO
- Off-Post Vapor Intrusion Investigation Results

Risk Assessment

- Conceptual Site Model Review
- Proposed Approach

Closure Path for EPA Order

Adjourn

SWMU AND AOC UPDATES

Site Closure Status

Recent TCEQ Closure Approval:

SWMU B-4

Field Efforts In Progress/Recently Completed

SWMU B-34
Metal Recycling

Closure Report in Progress/Review

SWMU B-13 *(submitted 4/15/13)*
AOC-75 *(to be submitted in June)*
RMU-3 *(submitted 5/9/13)*
RMU-4 *(to be submitted in July)*

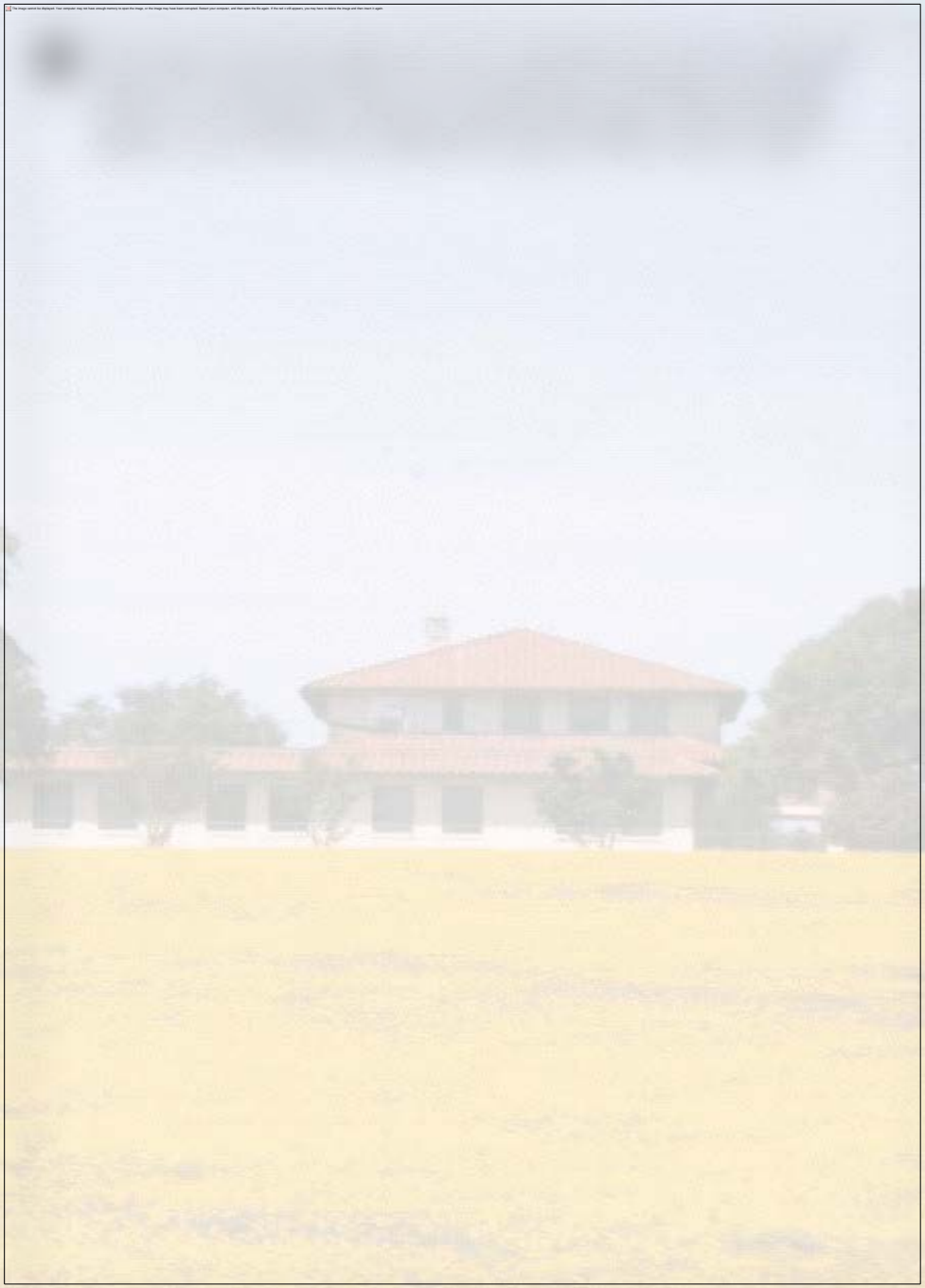
Consolidated Sites within RMU-1 (active range)

SWMU B-2
SWMU B-8
SWMU B-20/21
SWMU B-24

Groundwater Sites

AOC-65
SWMU B-3

70 Sites Previously Closed under TRRP
Total closed: 71 out of 82



Site Closures since 2010

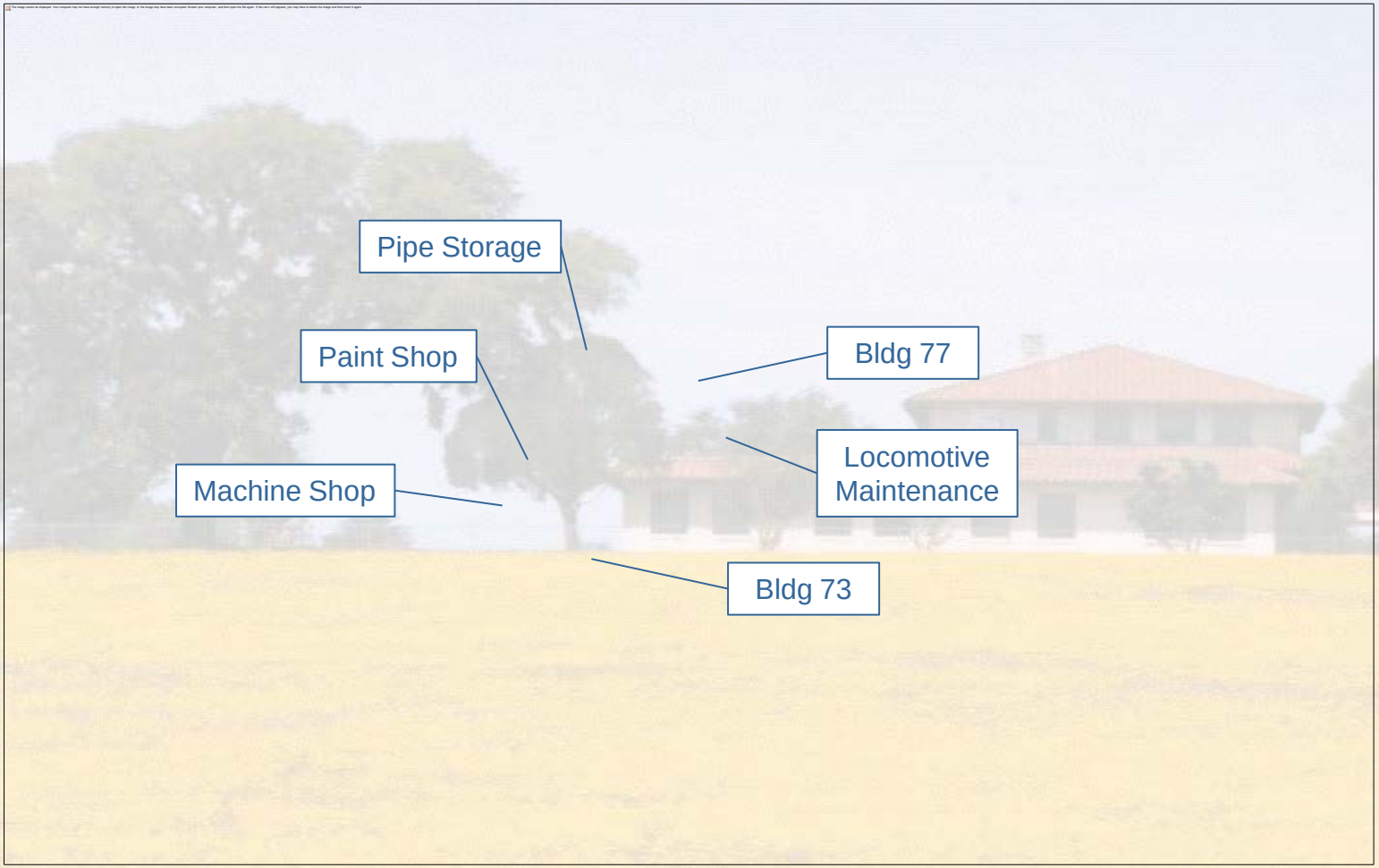
June 2013

FIELD EFFORTS IN PROGRESS

SWMU B-34
Overview

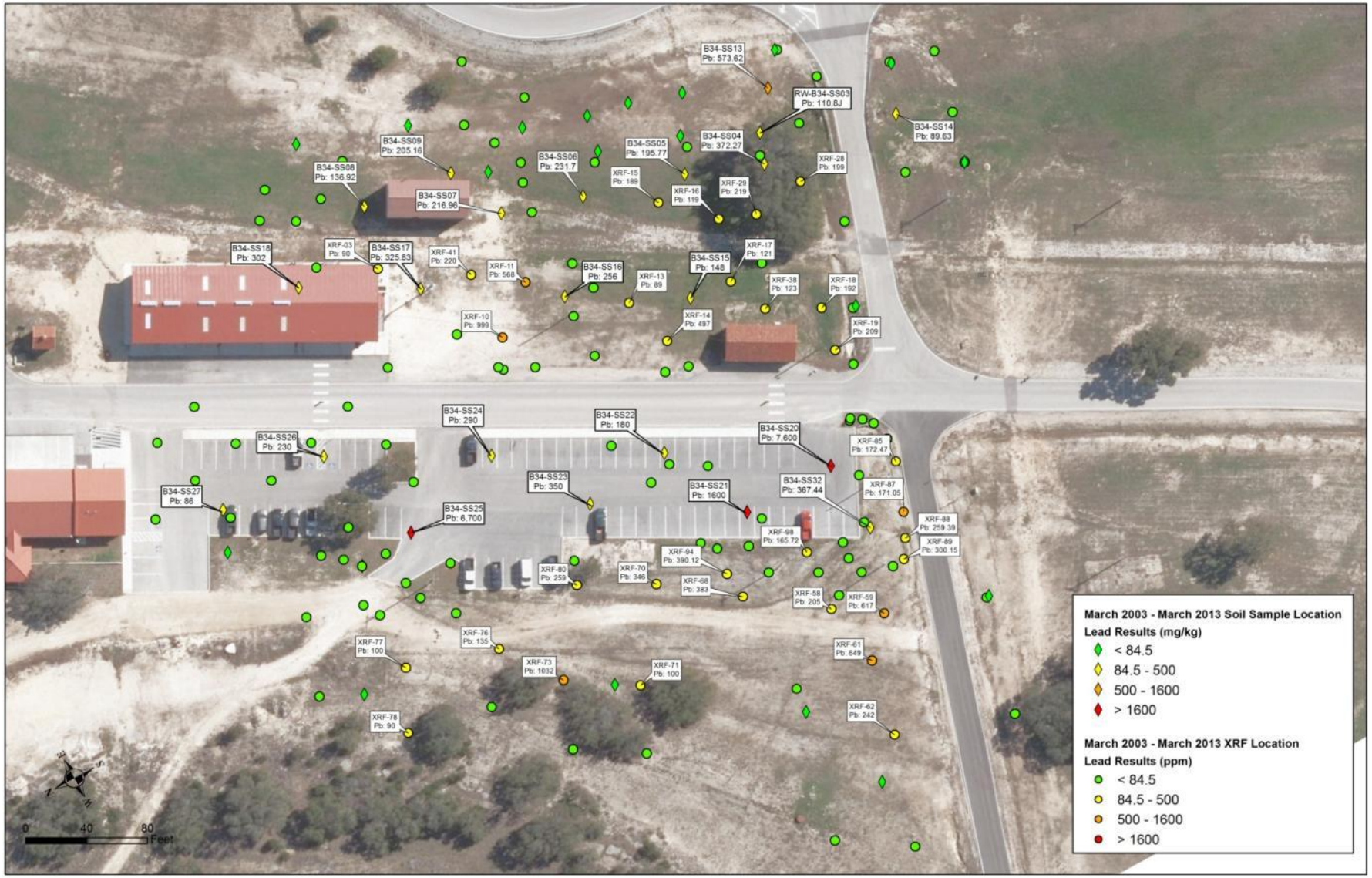
- SWMU B-34 originally consisted of the below-grade piping and pipe bedding that drained from the locomotive maintenance pit. Investigations have included:
  - Soil Gas Survey (1995).
  - Geophysics, surface samples, and soil borings (1996).
  - Additional surface samples and RFI Report (2003).
  - Collected additional surface samples that extends further north and west (2004).
  - Site-wide XRF survey conducted over 5.22 acres surrounding SWMU B-34 (December 2010 and March 2013).
  - Additional surface sampling to extents show Pb above background
- Investigate soils beneath the road and parking to the west at 78 locations (June 2013).

SWMU B-34
1966 Aerial Image



SWMU B-34

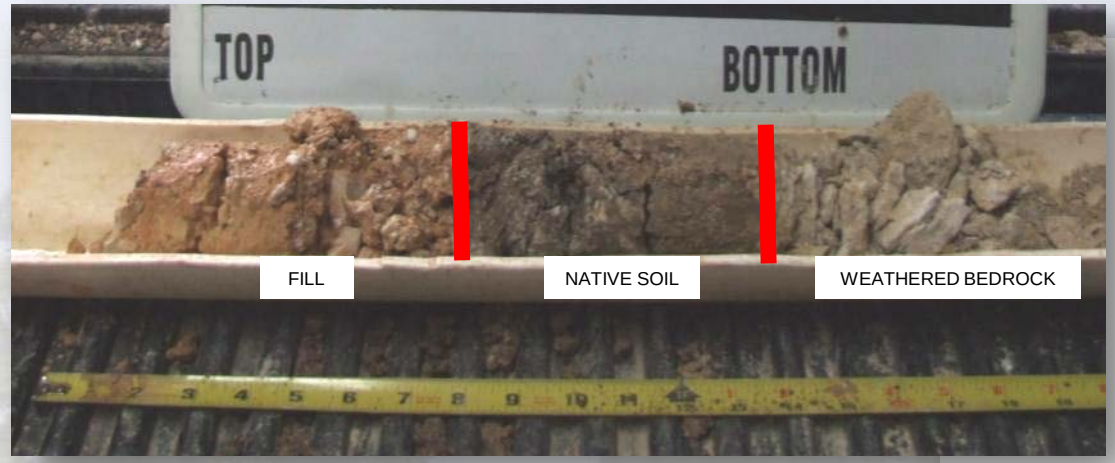
XRF and Surface Sampling Locations (Historical)



SWMU B-34
June 2013 XRF and Subsurface Sampling

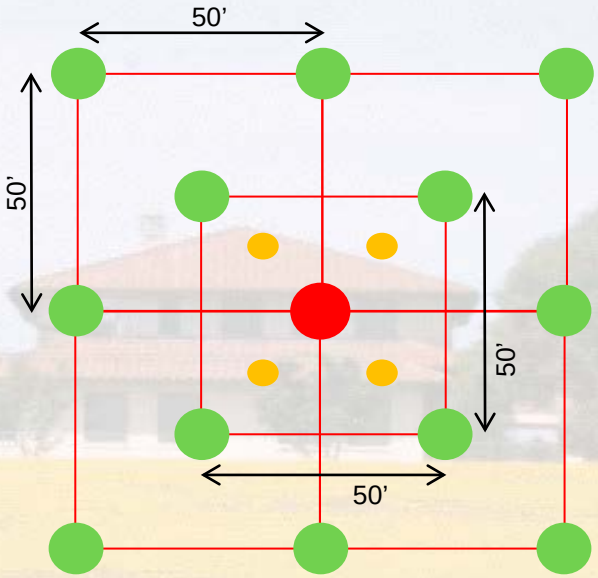
- Collected 78 subsurface samples from beneath Tompkins Road and the Building 606 Parking Lot:
  - Paved areas were cored with hole saw
  - Undisturbed samples were collected using a rig-mounted geotechnical hammer until bedrock refusal (typically <2')
  - Subsurface beneath pavement is generally 6-12" of base material above a thin veneer of native soil, which overlies weathered limestone bedrock
  - Retrieved sample was screened with XRF and sample submitted from the native soil, where present
  - Results above 300 ppm on the XRF were analyzed quickly with a 7-day TAT
  - Remainder of results expected in mid-July

SWMU B-34
June 2013 XRF and Subsurface Sampling



SWMU B-34
June 2013 XRF and Subsurface Sampling

- Phase I:
  - Samples collected on nested 50’ square grids
- Phase II:
  - Samples collected in quadrants around a “hot” sample location
  - Effort to determine the minimum area of paved surface to be removed for a remedial action



SWMU B-34
June 2013 XRF and Subsurface Sampling

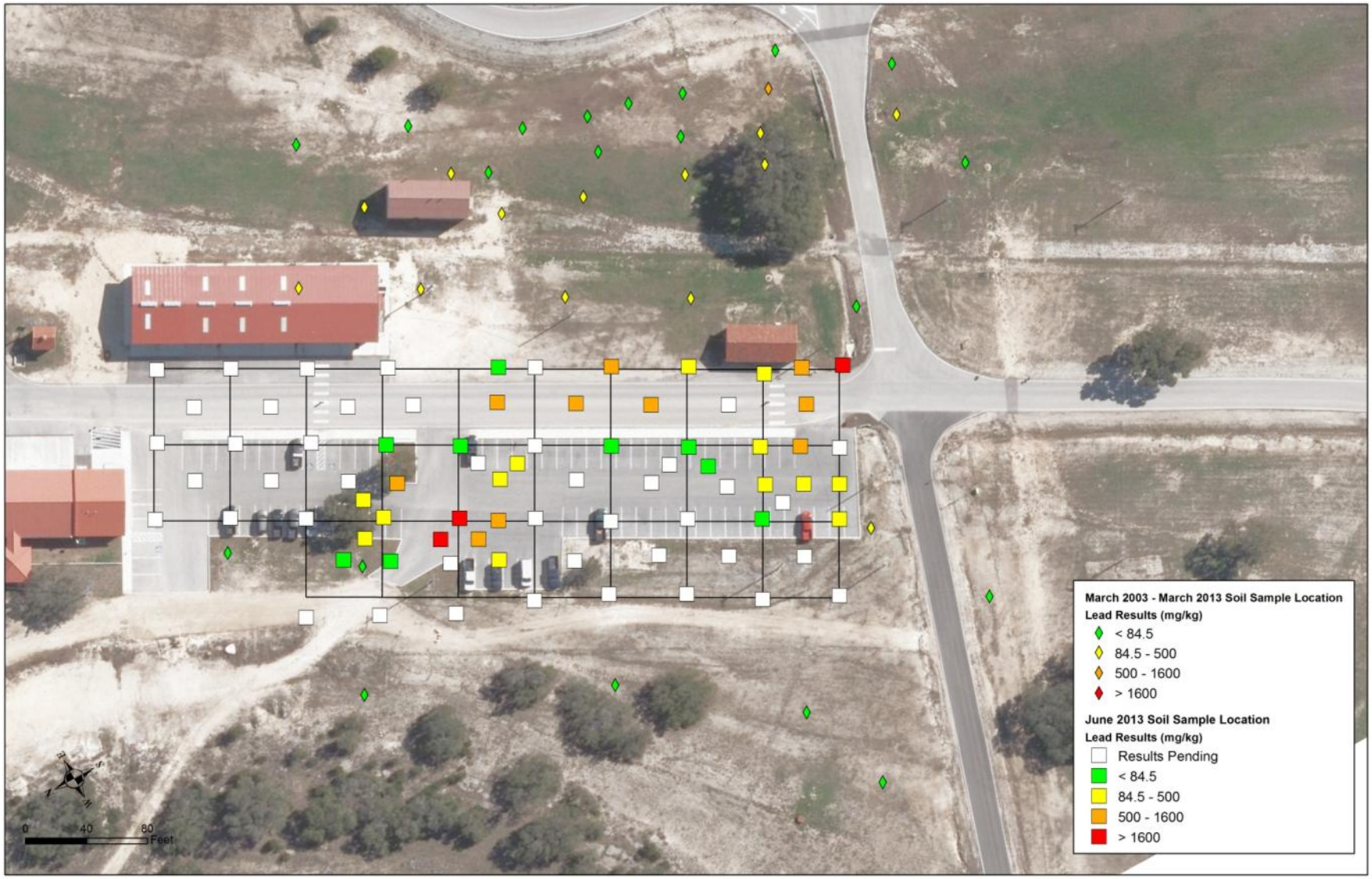
- Phase I:
  - 63 samples collected on a 50’ grid spacing
  - Samples with an XRF screening of 300 ppm or greater were identified for additional Phase II delineation
  - Imported base material did not indicate Pb contamination
  - Screening of underlying weathered bedrock did not indicate Pb contamination
  - Due to parking lot construction, the native soils have been removed (base material directly over weathered bedrock)
- Phase II:
  - 15 samples collected in quadrants around a “hot” sample location
- 39 samples were submitted for quick turn-around, and are presented today

SWMU B-34

XRF and Surface Sampling Locations (June 2013)

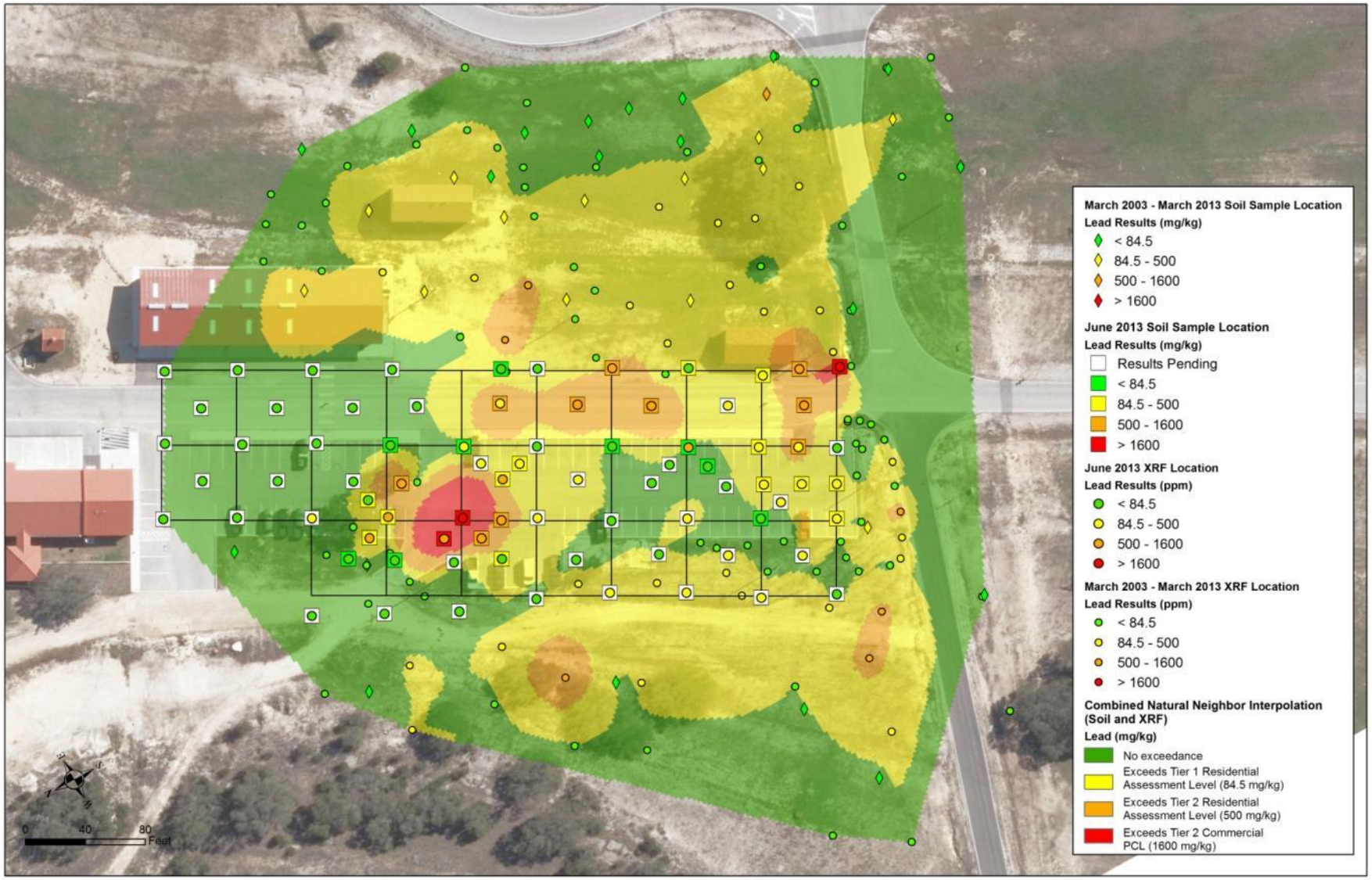
SWMU B-34

Combined Surface Sampling Locations (2003 - 2013)



SWMU B-34

Interpolation of XRF and Surface Sampling Locations (2010)

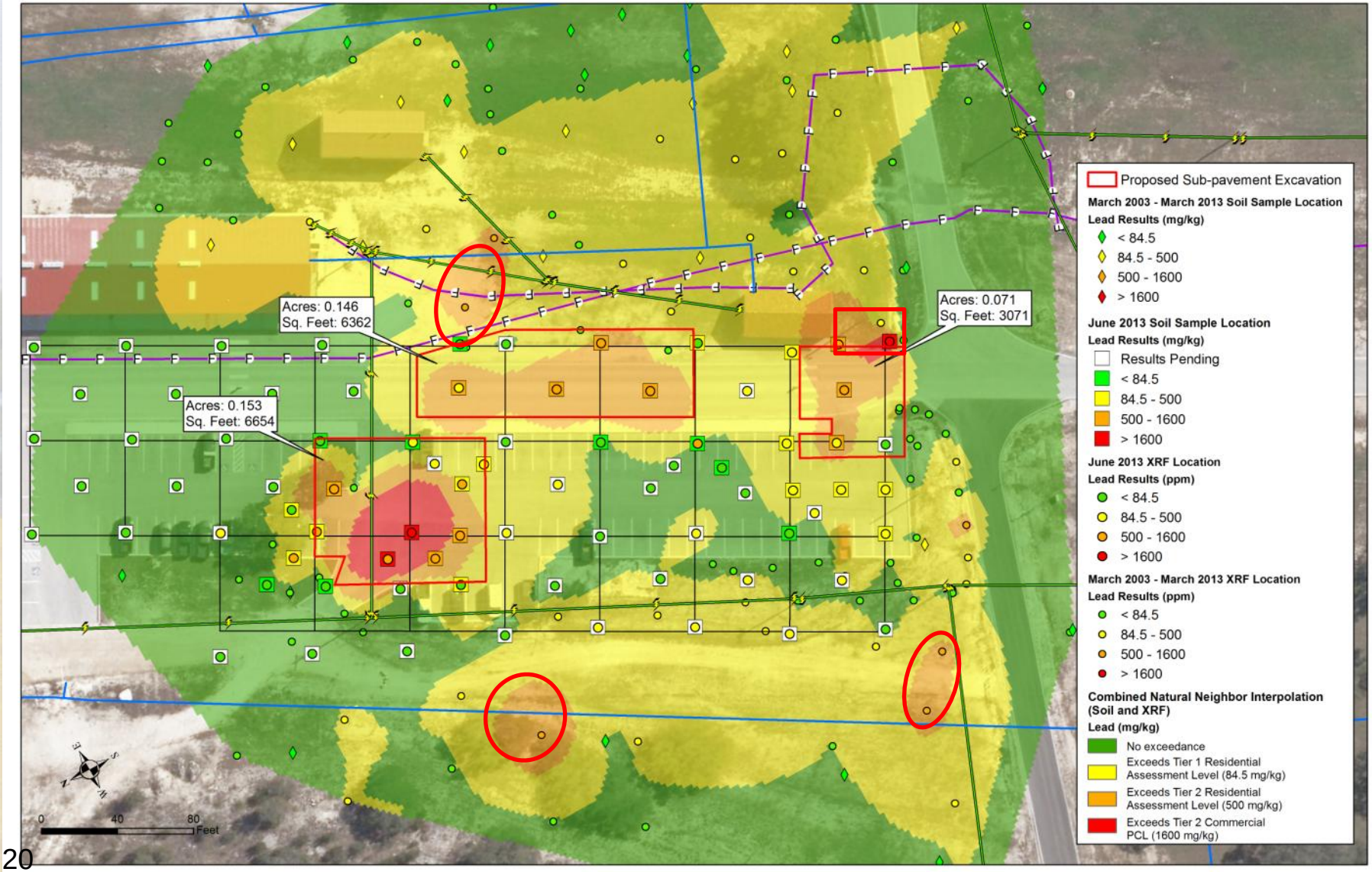


SWMU B-34
Potential Closure Standards

Scen-ario	Closure Path	Land Use Classification	Critical PCL	Route to Achieving said Closure	Closure Documents	Future implications
A	Release not Subject to TRPP	Residential	84.5 mg/kg	Remove contamination above the critical PCL.	RIR	Unrestricted future land use
B	TRRP Remedy Standard A - Residential	Residential	500 mg/kg	Remove contamination above the critical PCL.	APAR (no further action)	Unrestricted future land use
C	TRRP Remedy Standard A - Commercial	Commercial	1,600 mg/kg	Remove contamination above the critical PCL.	APAR (no further action)	Commercial/industrial land use only
D	TRRP Remedy Standard B - Residential	Residential	500 mg/kg	Remove contamination above the critical PCL, where accessible. Cover remaining contamination (much of it is already covered).	APAR RAP ICP RACR PRACR	Unrestricted land use in excavated areas; Post-response action care to ensure cover remains in place in other areas
E	TRRP Remedy Standard B - Commercial	Commercial	1,600 mg/kg	Remove contamination above the critical PCL, where accessible. Cover remaining contamination (much of it is already covered).	APAR RAP ICP RACR PRACR	Commercial/industrial land use only in excavated areas; Post-response action care to ensure cover remains in place in other areas

SWMU B-34

Proposed Excavation Limits



METAL SCRAP RECYCLING EFFORT

Metal Scrap Recycling Effort

Metal Materials Recovered from Salado Creek Sites

Metal Scrap Recycling Effort

18 Conex Boxes + Large Debris Pile

Metal Scrap Recycling Effort

The Process

After removing the material from the Conex boxes, it was:

- Certified free of materials potentially presenting an explosive hazard (MPPEH)
- Loaded into roll-off containers and transported to Monterrey Iron & Metal for recycling
- Run through a shredder, as observed by CSSA and/or Parsons

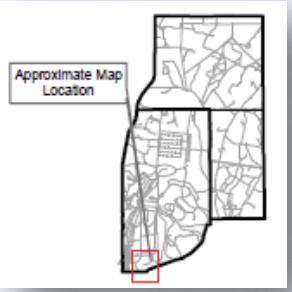
Monterrey Shredder

Metal Scrap Recycling Effort

The Numbers

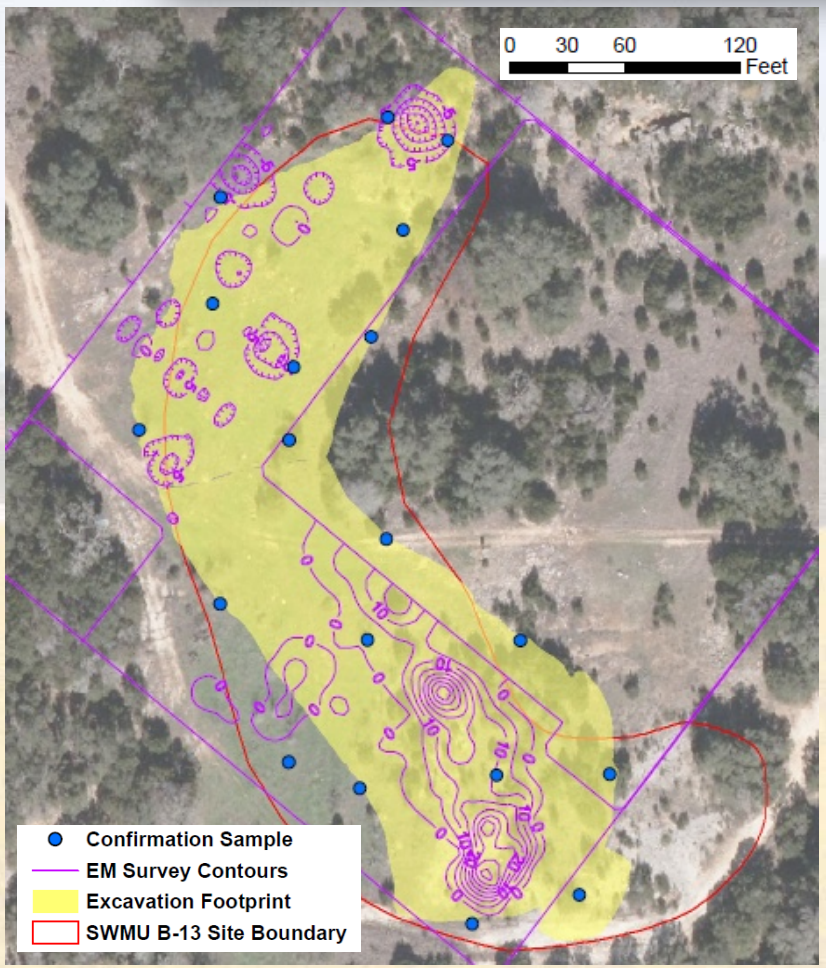
- First load: April 18
- Last load: June 18
- 42 roll-off loads = ~ 840 CYs of material
- Net total of 996,080 lbs (500 tons) of metal

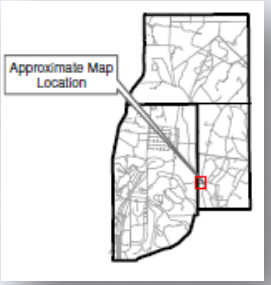
CLOSURE REPORT IN PROGRESS/REVIEW



SWMU B-13

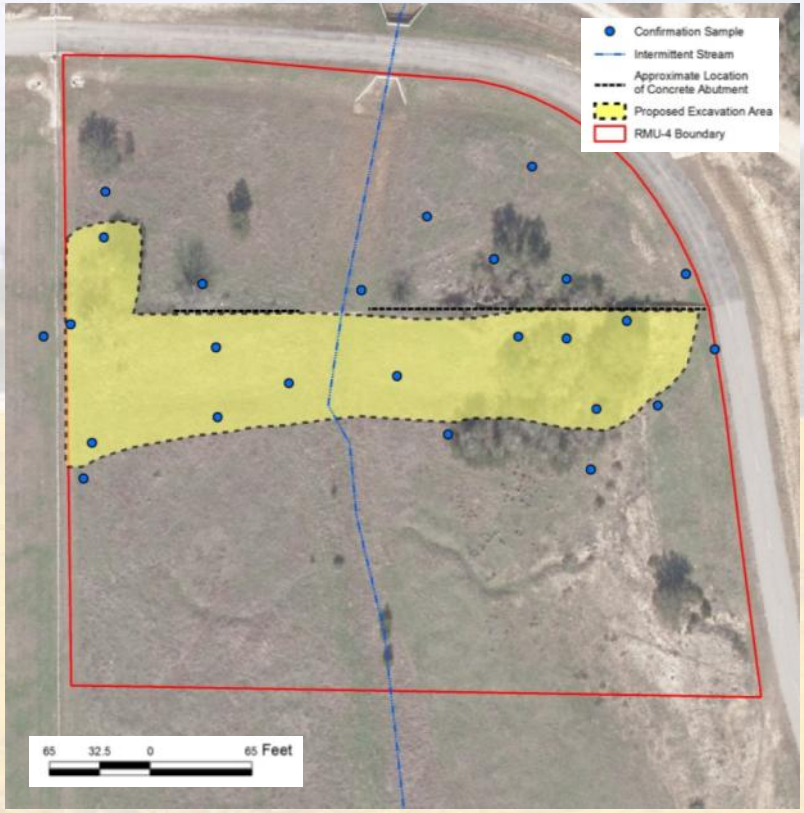
- Disposal area, 3 acres
- COCs: chromium, copper, lead, nickel, and zinc (removed)
- Progress to Date
  - Excavation completed: December 2013
  - Average depth of excavation: ~ 5-9 ft
  - 7,500 CY excavated
    - 5,000 CY transported to a NH Class 2 landfill (1,620 CY contained small amounts of non-friable transite asbestos)
    - 2,500 CY managed at East Pasture berm
  - RIR requesting NFA submitted to TCEQ April 15, 2013
- Next Steps
  - Awaiting TCEQ response
  - Convert site into wildlife water tank

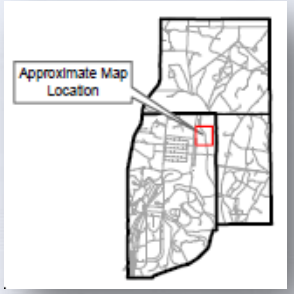




RMU-4

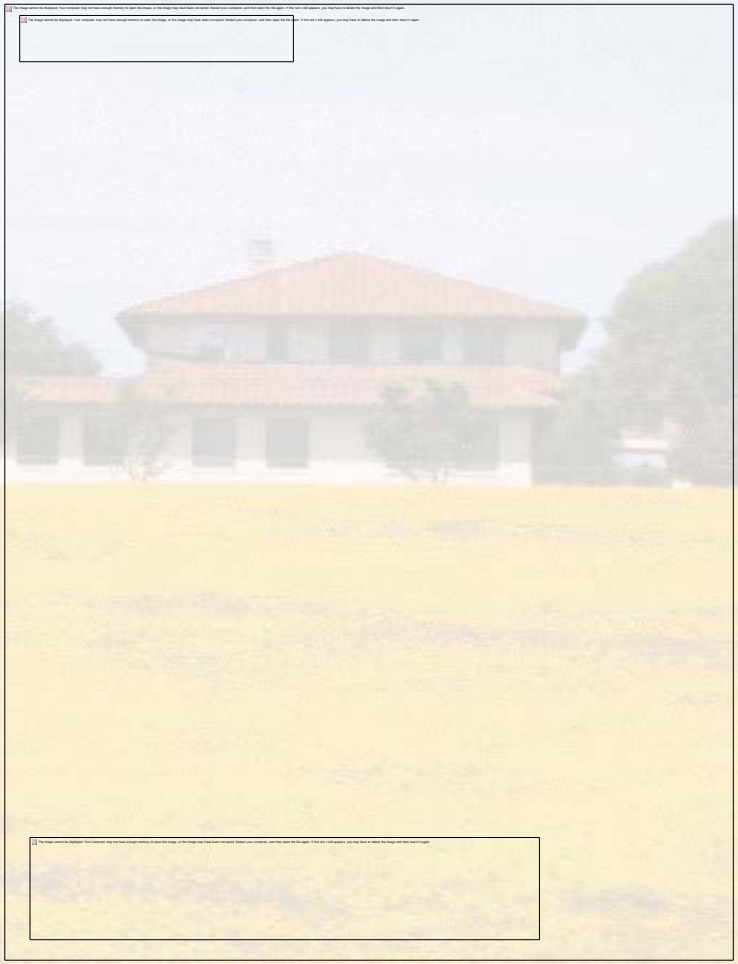
- Small arms range abutment, 1.6 acres
- COCs: copper, lead, and nickel (removed)
- Progress to Date
  - Excavation completed : April 2013
  - Average depth of excavation: ~ 2 ft
  - 4,480 CY excavated
    - 4,000 CY managed at the East Pasture berm
    - 160 CY of concrete material (from abutment) recycled at Teslar Concrete Recyclers
- Next Step
  - Submit RIR to TCEQ requesting NFA

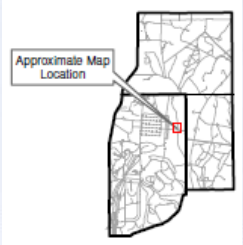




AOC-75

- Area with elevated mercury north of SWMU B-4, 1.2 acres
- COCs: barium, cadmium, and mercury (removed) ; 95% UCL of 66.2 mg/kg calculated for lead
- Progress to Date
  - Excavation completed: December 2012
  - Average depth of excavation ~ 1-2 ft within main footprint; ~ 5-7 ft within trench
  - 4,480 CY excavated
    - 4,000 CY managed at the East Pasture berm
    - 480 CY of soil mixed with styrofoam and electronic cabinets disposed of as Class 2 NH Waste at Covel Gardens
  - Geophysical survey along suspect trench area found no evidence of buried materials
- Next Steps
  - Submit RIR to TCEQ requesting NFA





RMU-3

- Rifle range, 0.5 acres
- COC: lead (removed)
- Progress to Date
  - Excavation completed – February 2013
  - Average depth of excavation ~ 1-3 ft
  - 4,200 CY excavated
    - 4,200 CY managed at the East Pasture berm (200 CY stabilized with PIMS)
  - RIR requesting NFA submitted to TCEQ on May 9, 2013
- Next Steps
  - Awaiting TCEQ response

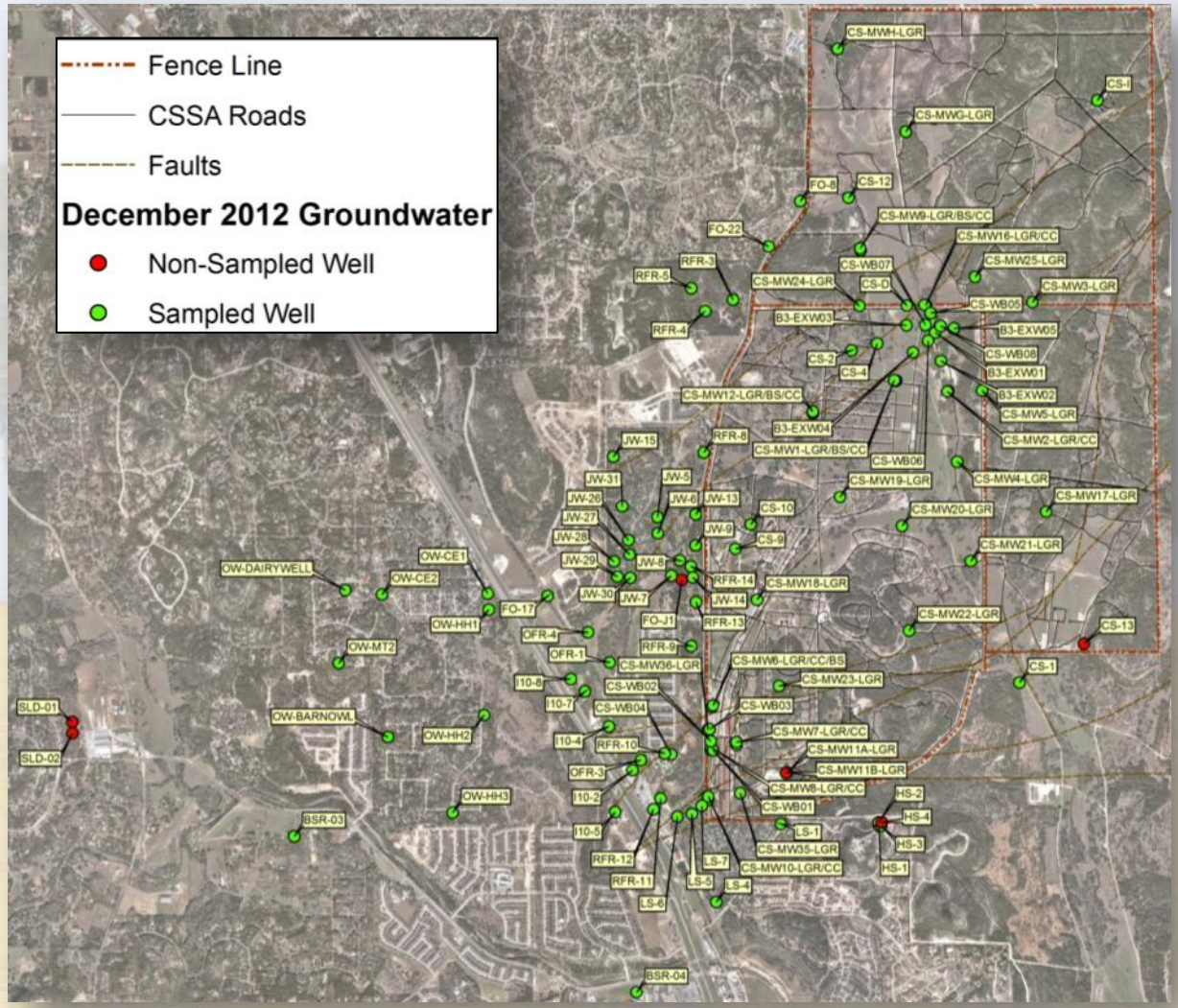
GROUNDWATER UPDATE

Groundwater Monitoring Program
Overview

- Quarterly Monitoring Program:
  - On-post since December 1999: 55 events
  - Off-post since September 2001: 48 events
- Wells include:
  - 45 On-post monitoring wells
  - 4 On-post drinking water supply wells
  - 2 On-post former drinking water wells
  - 4 Westbay®-equipped wells
  - 5 Bioreactor Extraction Wells
  - 63 Off-post private and public supply wells
- 6 off-post wells have GAC units due to past exceedances

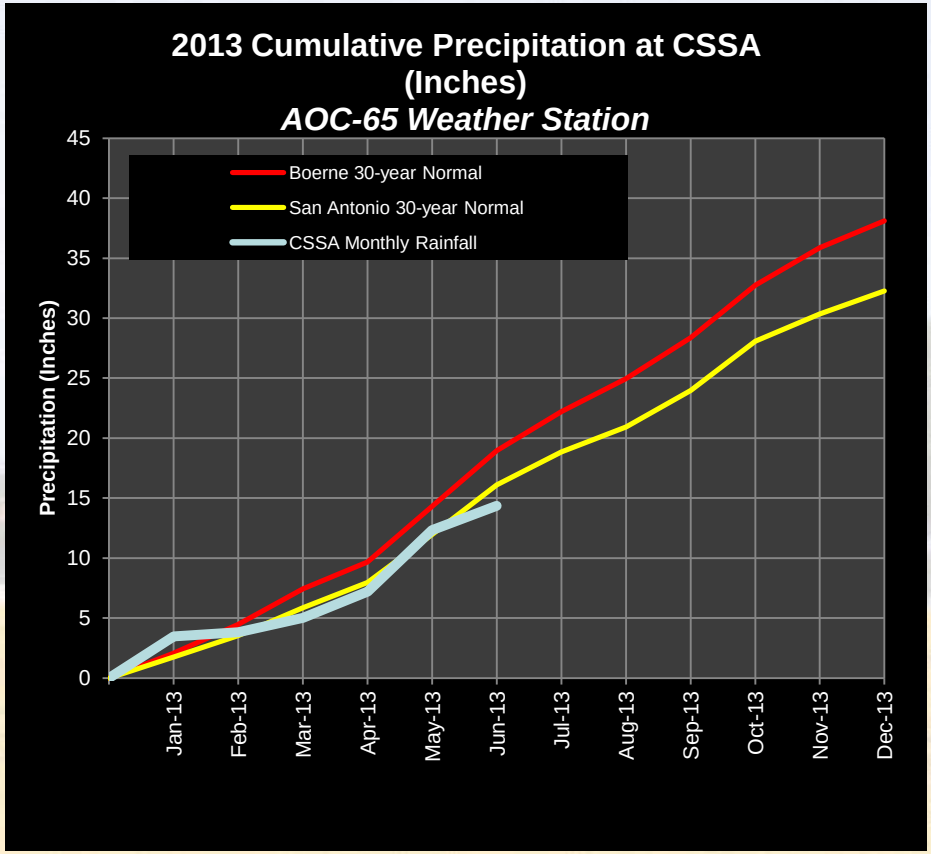
Groundwater Monitoring Program
Sampling Locations

- 11+ yrs of quarterly off-post monitoring.
- 13+ yrs of quarterly on-post monitoring.
- Sampling locations vary quarterly per DQOs and LTMO.
- Parameters: PCE, TCE, DCE, vinyl chloride
  (1,4-dioxane is not a COC)



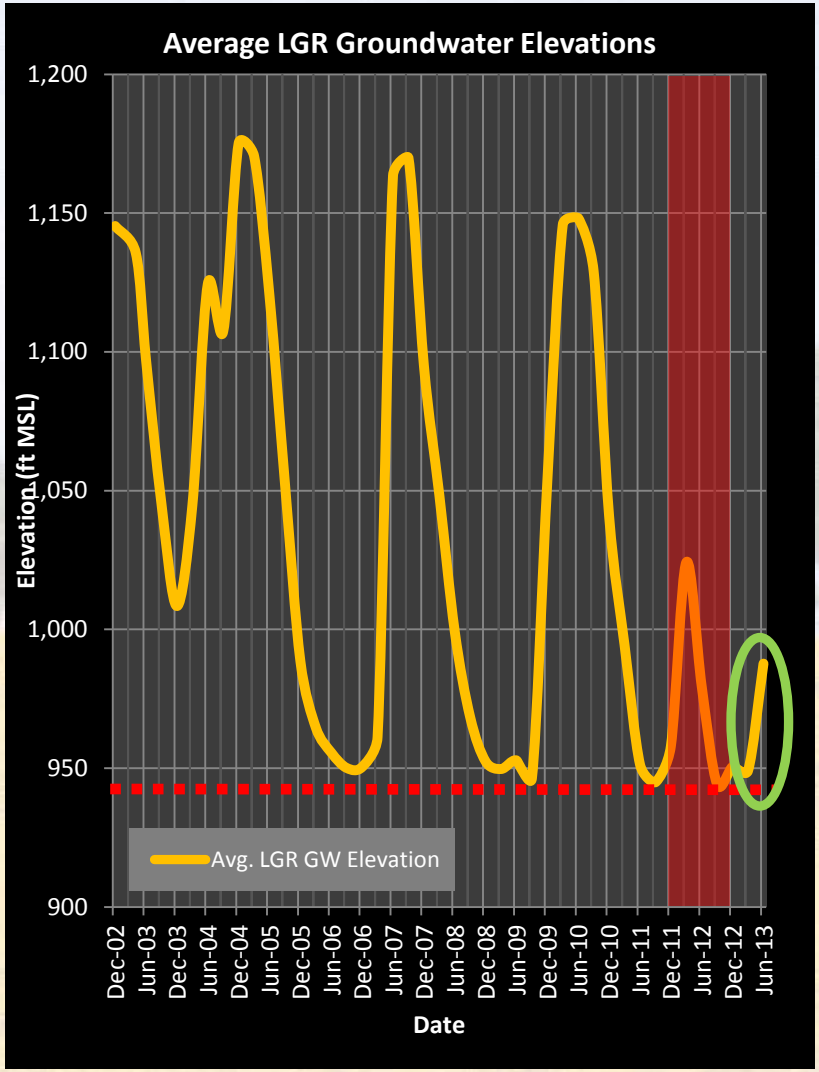
Groundwater Monitoring Program
Climatic Conditions

- In January 2013, CSSA was experiencing an *"abnormally dry"* season after recovering from an exceptional drought in 2012.
- Limited rainfall through April 2013 saw the region decline back into a *"severe drought"* stage.
- Over 7" of rain fell between May and June 2013, decreasing the current drought stage to *"moderate"*.
- Through June 19, 2013, CSSA has received 14.36" of rainfall, which is 4.6" behind the 30-year precipitation *"Normal"* for Boerne, TX.



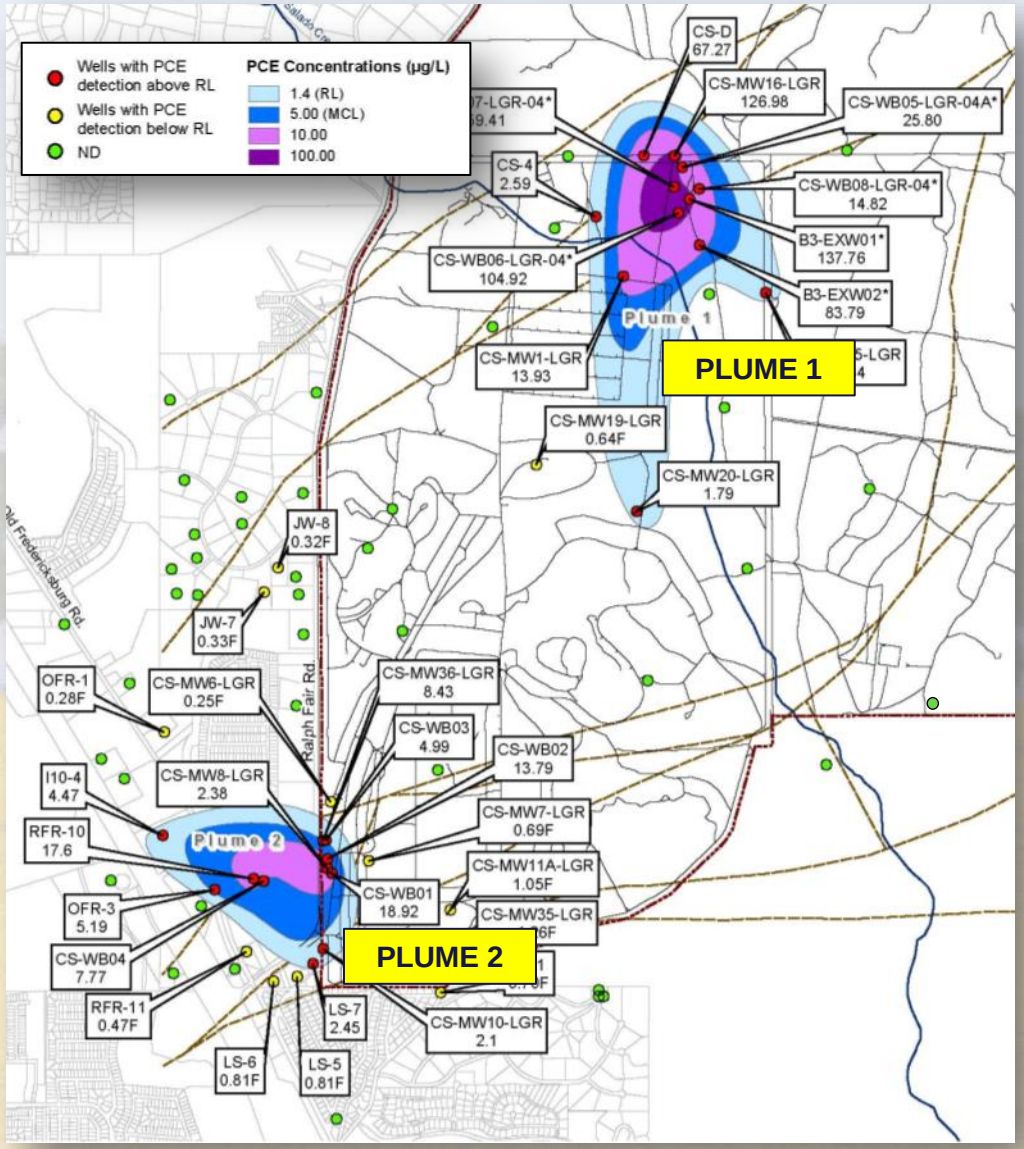
Groundwater Monitoring Program
Aquifer Conditions

- In the first quarter of 2012, the aquifer levels rebounded more than 66 feet, but then declined ~73 feet by the end of 2012.
- The average aquifer elevation remained essentially unchanged between December 2012 and March 2013.
- Increased rainfall between April and June 2013 resulted in significant aquifer rebound on the order of 44 feet.
- Note that the average aquifer elevation "bottoms out" near the top of the LGR production zone during droughts.



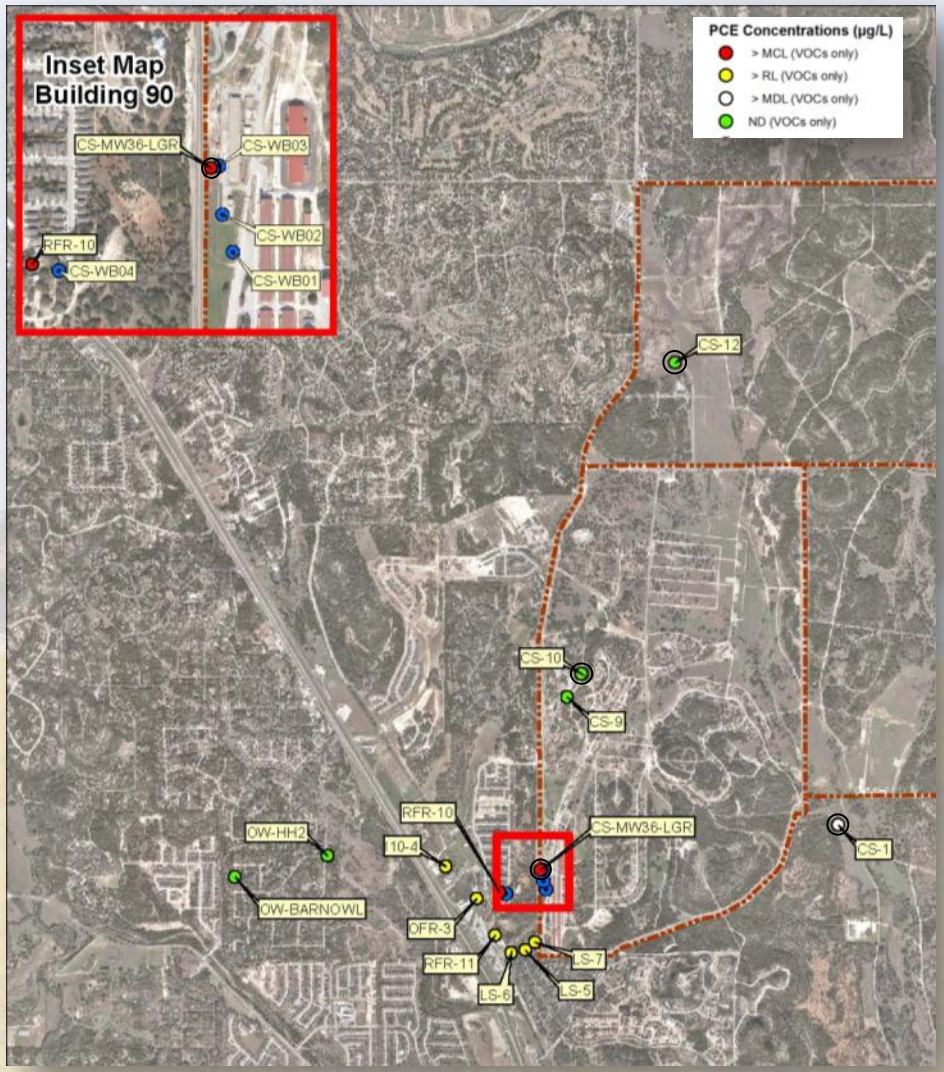
Groundwater Monitoring Program
General Facts

- **Plume 1** originates from SWMUs B-3 and O-1 in the Inner Cantonment.
- **Plume 2** originates from AOC-65 in the SW corner of CSSA.
- Concern about increasing trend at I10-4 west of CSSA (Plume 2) prompted additional sampling locations west of IH-10 (13 new wells since March 2011).
- The new DQOs and LTMO program (approved in 2010) went into effect in June 2011.
- A **"snapshot"** event (all LGR and off-post wells sampled) occurs every 9 months.
- December 2012 is the most recent **snapshot** event. September 2013 will be the next **snapshot** event.



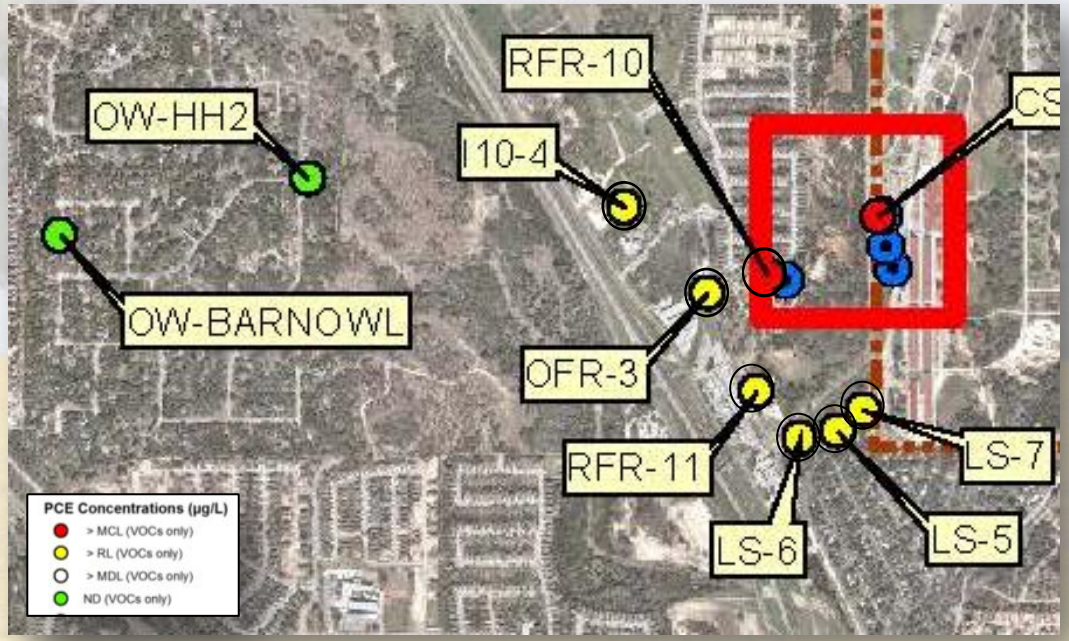
Groundwater Monitoring Program
March 2013 Results Overview

- This LTMO event included 5 On-post and 17 Off-post wells.
  - Supply wells CS-10 and CS-12 continue to be free of VOCs.
  - CS-1 had a trace detection of TCE at 0.18F µg/L. The last VOC detection at this well was in March 2010. Trace COC detections are not uncommon at CS-1 following a lengthy shutdown of the well.
  - All metals in supply wells were below ALs, MCLs, SCLs.
  - On-post well (CS-MW36-LGR) continues to exceed the MCL for PCE (26.75 µg/L) and TCE (65.01 µg/L). Highest concentrations measured since initial sampling in September 2011.



Groundwater Monitoring Program March 2013 Results Overview

- Only one off-post well (RFR-10) exceeded the MCL for PCE.
- I10-4 has not been above the MCL for PCE since June 2012.
- OFR-3 has not above the MCLs for PCE and TCE since August 2012.
- Semi-annual GAC maintenance, including a carbon exchange, too place in January 2013. The next GAC maintenance with carbon exchange is scheduled for July 2013



Groundwater Monitoring Program
June 2013 Overview

- In accordance with the LTMO schedule, 22 samples will be collected in June 2013.
  - 11 On-post monitoring wells
  - 3 Drinking water wells
  - 4 Westbay multi-port wells (37 zones)
  - 9 Off-post wells
- Additional baseline sampling for the TCEQ monitoring program for CS-13.
  - **CS-13:** Organics, Inorganics, BACT
  - **MW1-CC, MW2-CC:** VOCs, metals, BACT
  - **MW4-LGR, MW17-LGR, MW21-LGR:** VOCs, metals
- Validated results will be available in mid-July.

Groundwater Monitoring Program
LTMO Reduction

Supply Well CS-13

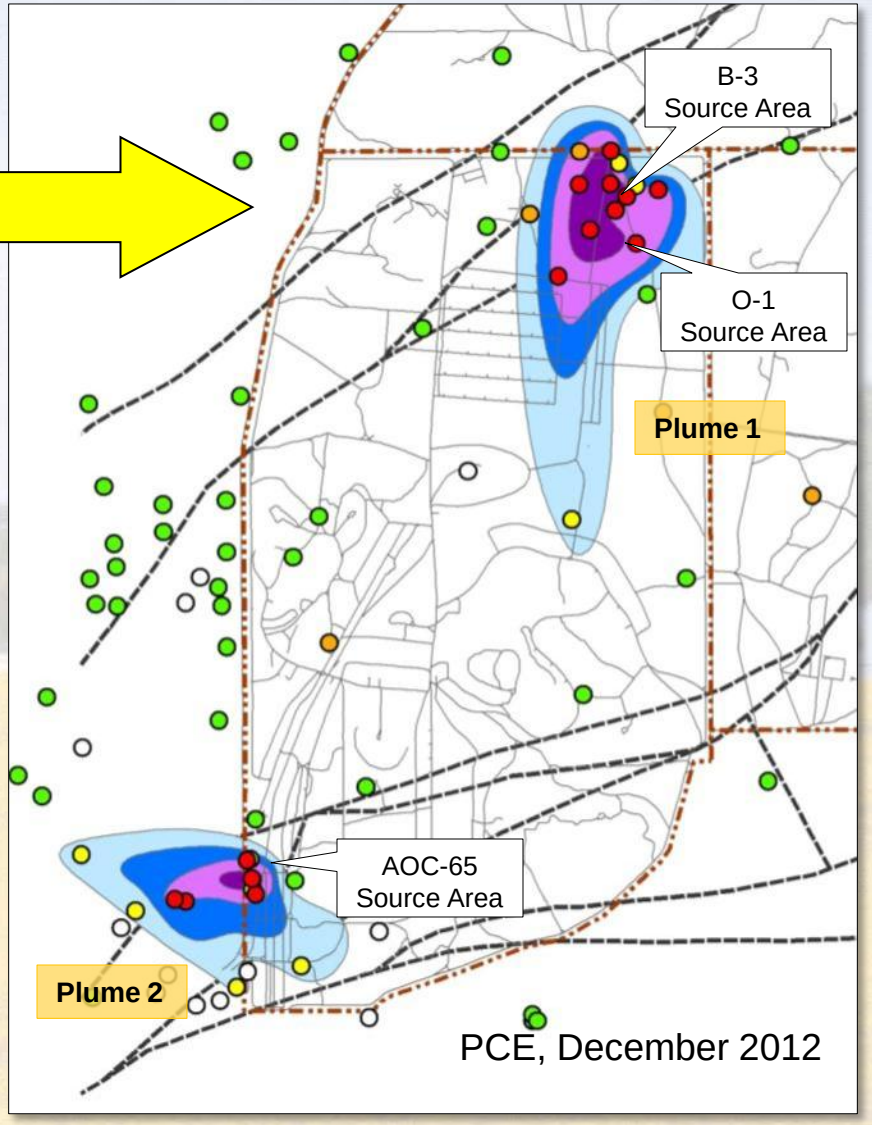
- Well was installed in Spring 2012 as a fire suppression well with the option to convert to public water supply if it met CSSAs DQOs.
- In April 2013, the TCEQ Water Supply Division approved the well for *"interim use."*
- The approval requested an additional pumping test on the final completed well.
- The pumping test was conducted on June 12-13, 2013 for 36 hours at a flowrate of 110 gpm.
- One round of sampling for VOCs, SVOCs, inorganics, and BACT was collected on June 17, 2013. Results are pending.
- Funding for new wellhouse will be available in FY2014.

TREATABILITY STUDY UPDATES

SWMU B-3 and AOC-65
Description

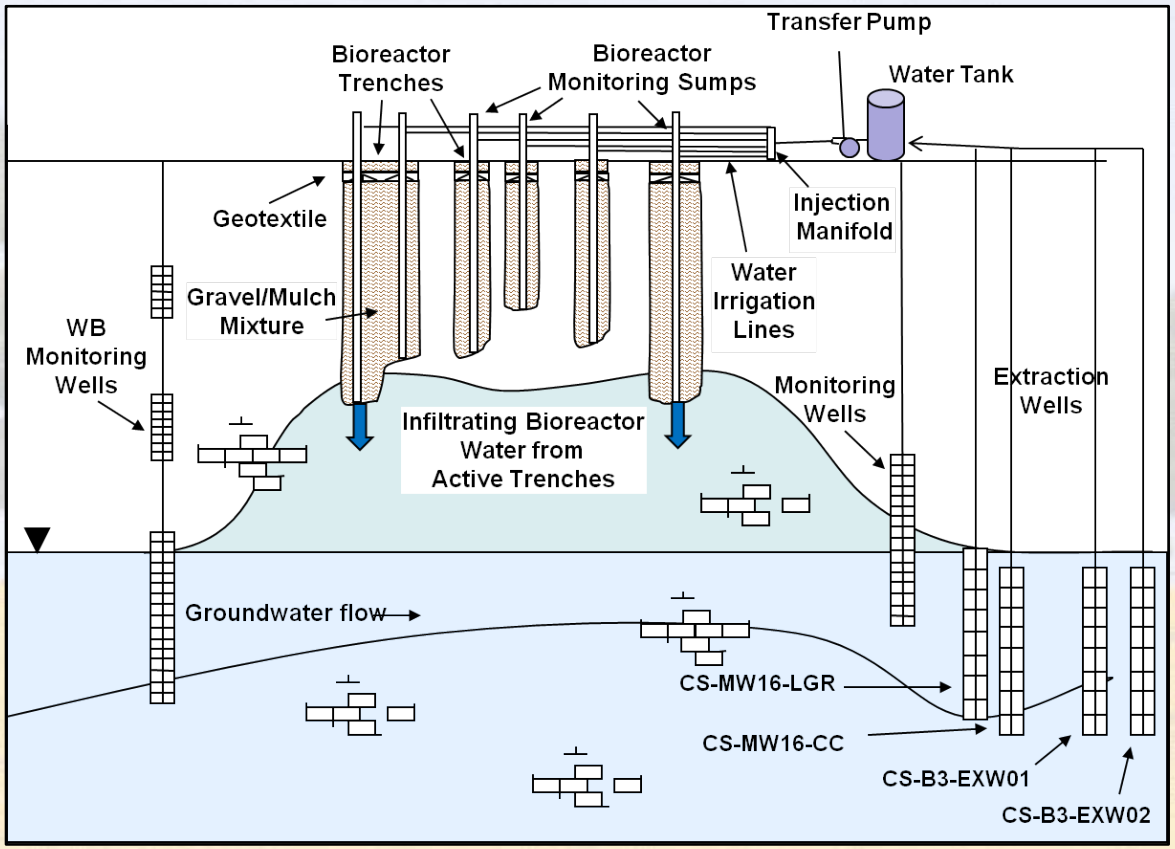
1. **SWMU B-3 Bioreactor:** Enhanced anaerobic bioremediation of chlorinated hydrocarbons in underlying fractured limestone at Plume 1.

2. **AOC-65 ISCO Treatment:** Destruction of chlorinated hydrocarbons in underlying fractured limestone at Plume 2.



B-3 Bioreactor
General Observations

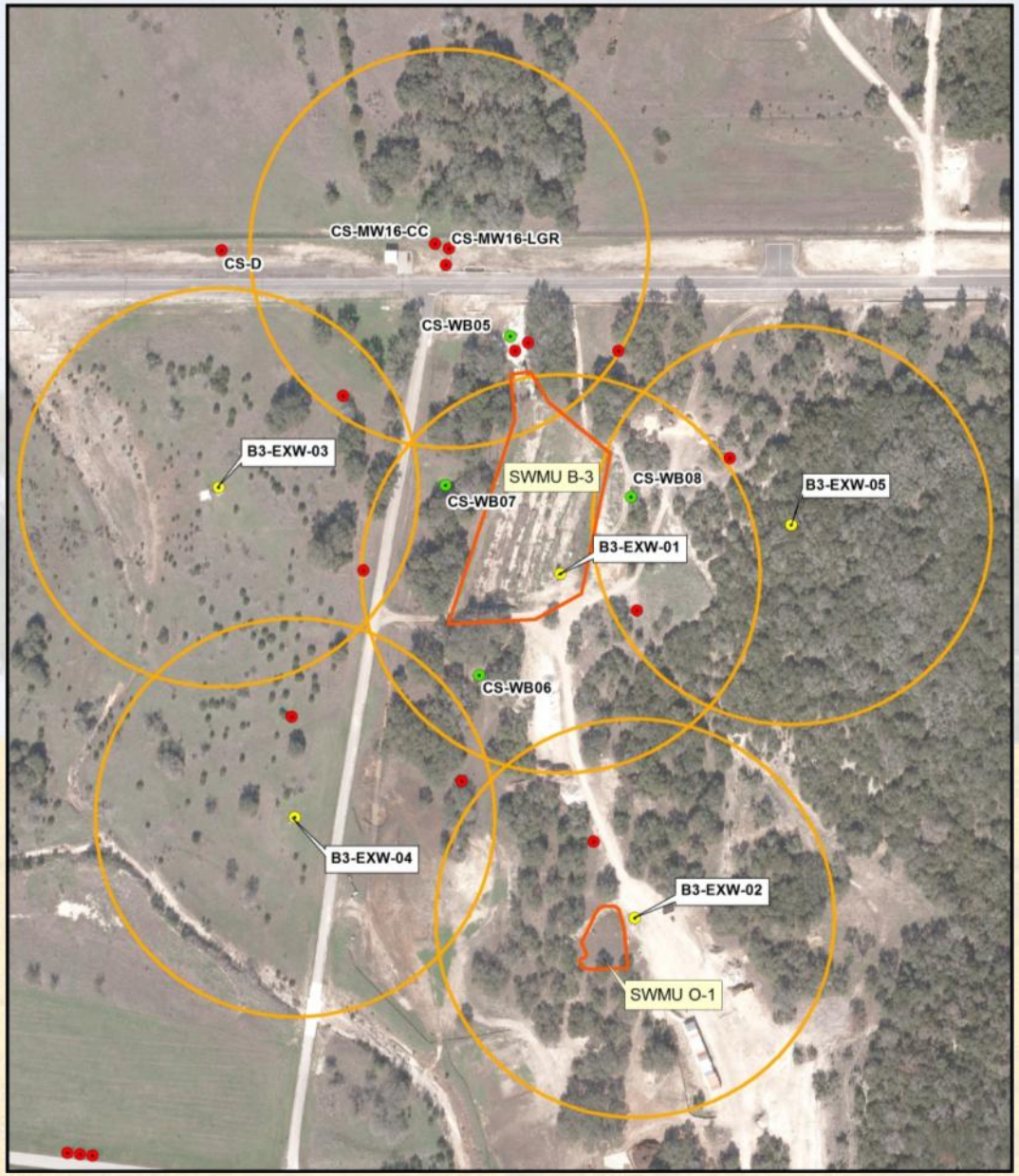
- Bioreactor is effectively treating approximately 50,000 gallons of injected contaminated groundwater per day in Trenches 1 and 6.
- Biotic degradation is occurring with biological degradation end products ethene, ethane, and CO_2 identified in surrounding UGR wells and LGR wells.
- Significant contamination likely remains in the fractured bedrock formation. Underlying VOC's are being mobilized.



Bioreactor Conceptual Diagram

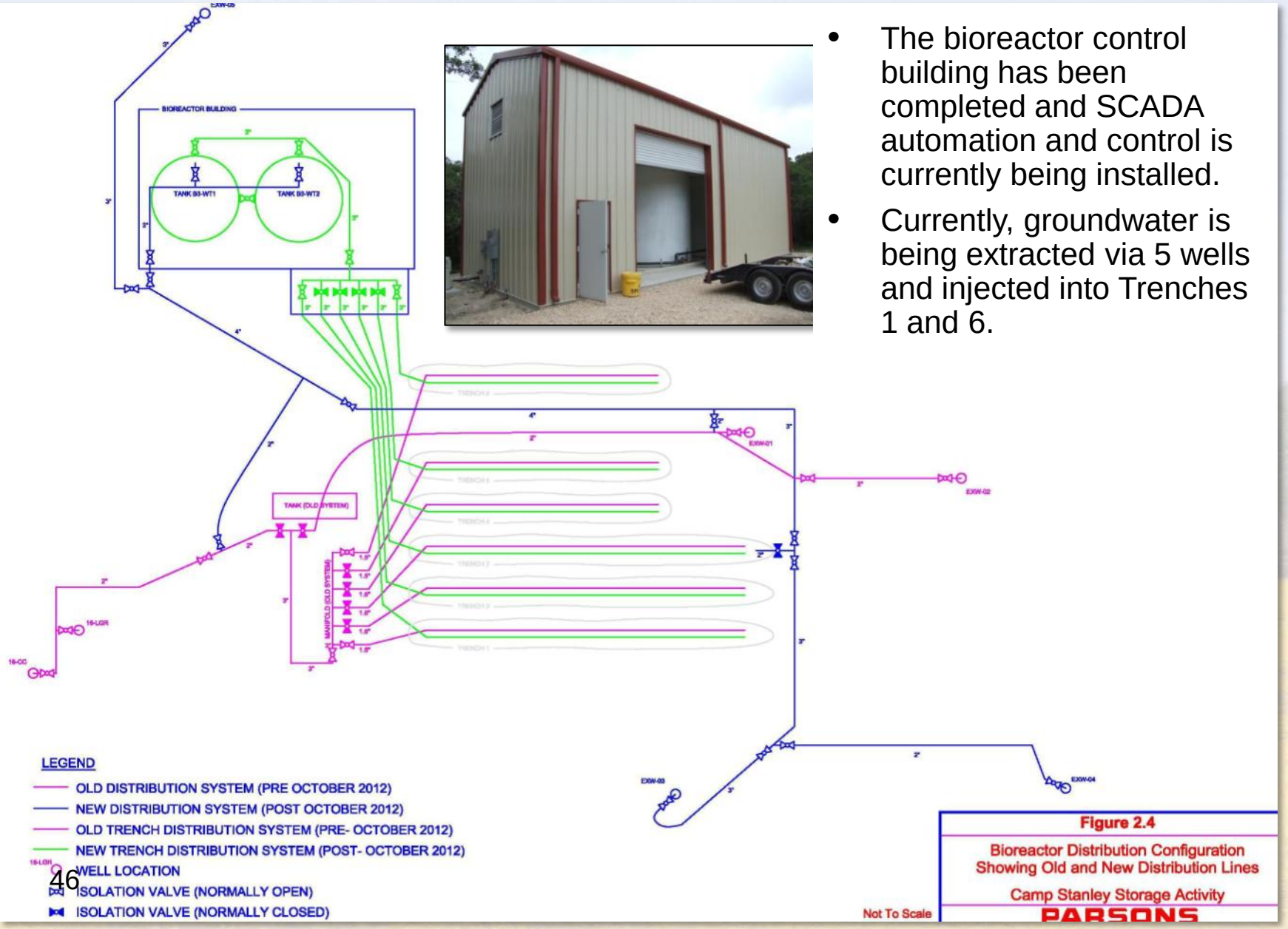
Recent Bioreactor Activities

- EXWs -03, -04, and -05 are operational and are contributing extracted water (20, 10, 10 gpm, respectively) to the bioreactor.
- EXWs -01 and -02 will be connected soon.
- MWs 16-CC and 16-LGR contribute ~15 and 10 gpm, respectively.



Recent Bioreactor Activities (cont.)

- The bioreactor control building has been completed and SCADA automation and control is currently being installed.
- Currently, groundwater is being extracted via 5 wells and injected into Trenches 1 and 6.



B-3 Bioreactor
Current Sampling Efforts

Regulatory Sampling
- VOCs
- TDS
- pH at injection site (field)

Regulatory Sampling Locations
- Injection Manifold (UIC) - Quarterly
- Trench Sumps - Semi-Annual
- WB-03B Zones - Semi-Annual

Performance Sampling
- MEE + CO_2
- Ferrous Iron
- Manganese
- Arsenic
- Total Organic Carbon
- Dissolved Organic Carbon
- Sulfide
- Sulfate and Chloride
- *Dehalococcoides*
- Dissolved Hydrogen

Performance Sampling Locations

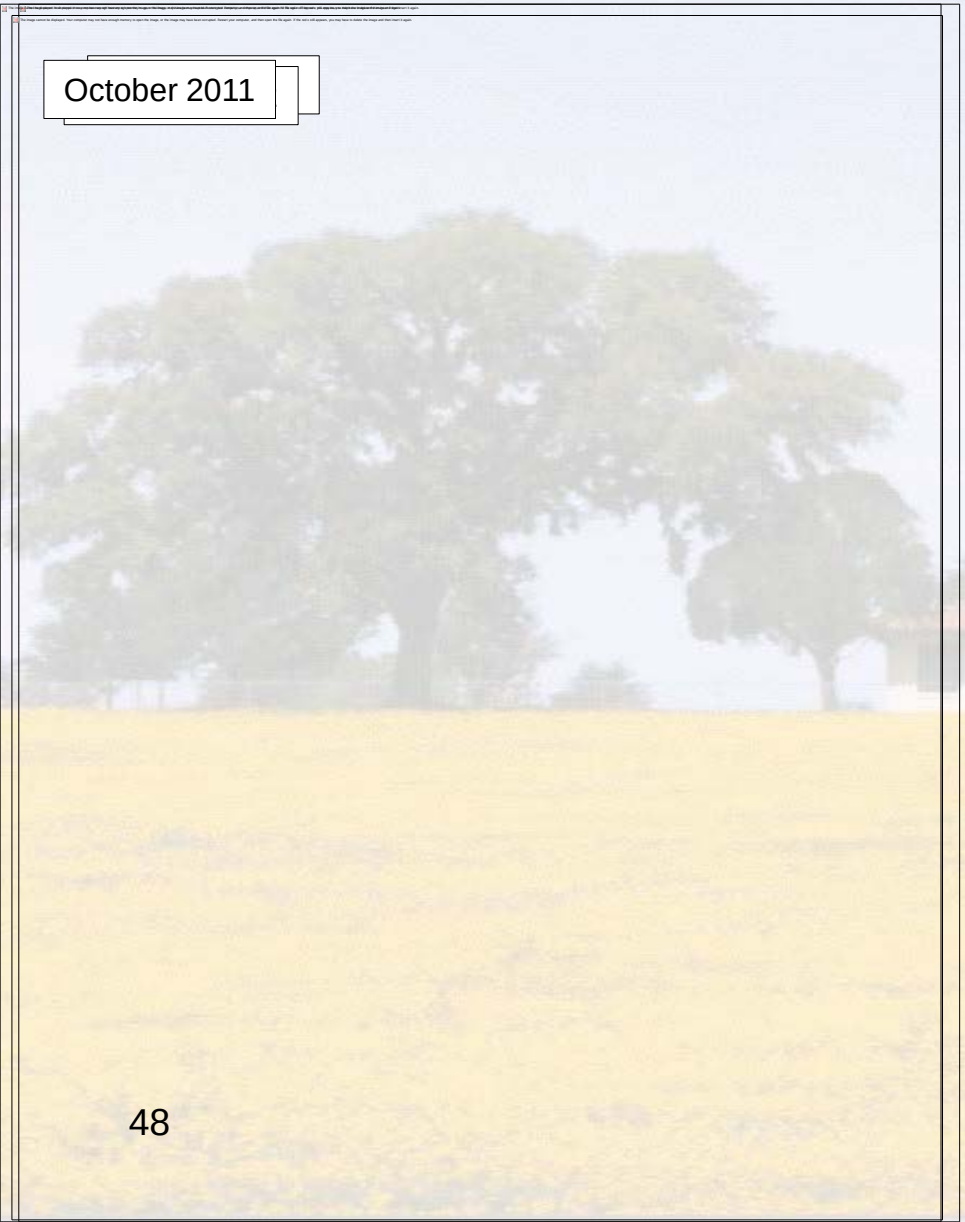
Frequency: Semi-Annual
- Trench Sumps (5)
- WB zones (27)
- Extraction Wells (7)
- LGR Monitoring Wells (4)
- UGR Monitoring Wells (9)

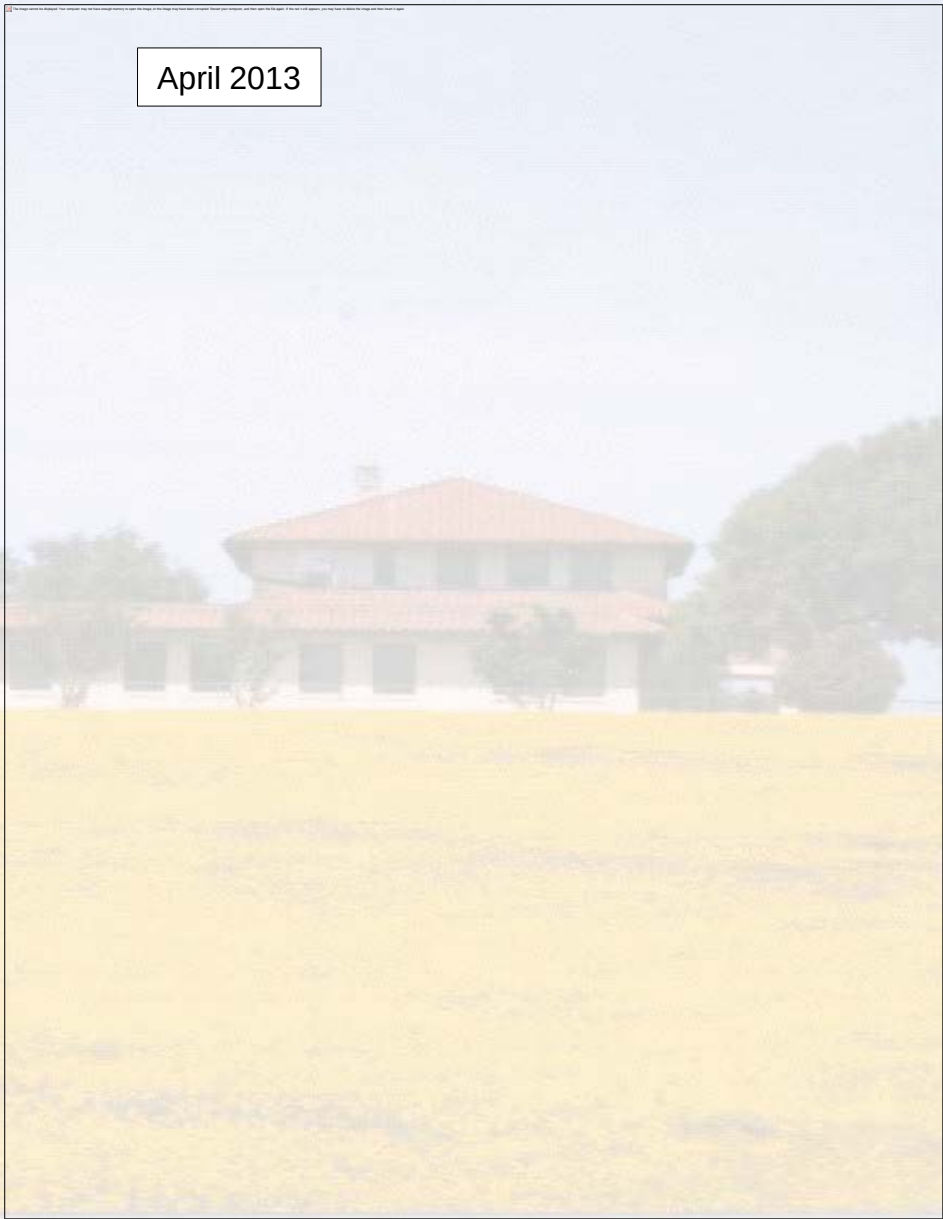
Trench Sump Field Parameters

Frequency: Monthly
- **pH**
- **DO**
- **Conductivity**
- **ORP**
- **Temp**
- **Water Level**

B-3 Bioreactor

UGR Observations – PCE and TCE





B-3 Bioreactor
UGR Observations – Dechlorination Products

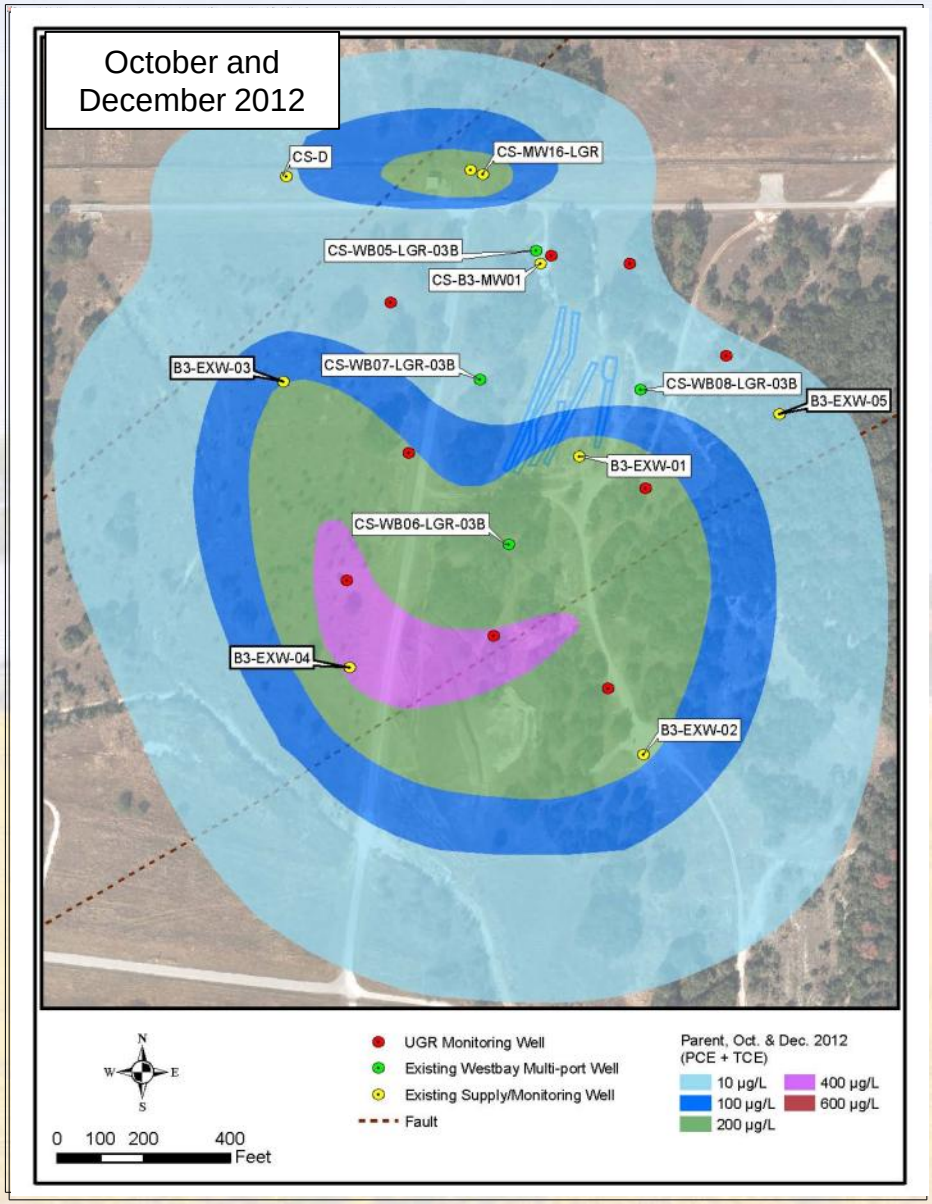
- Widespread presence of degradation products shows bioreactor influence.

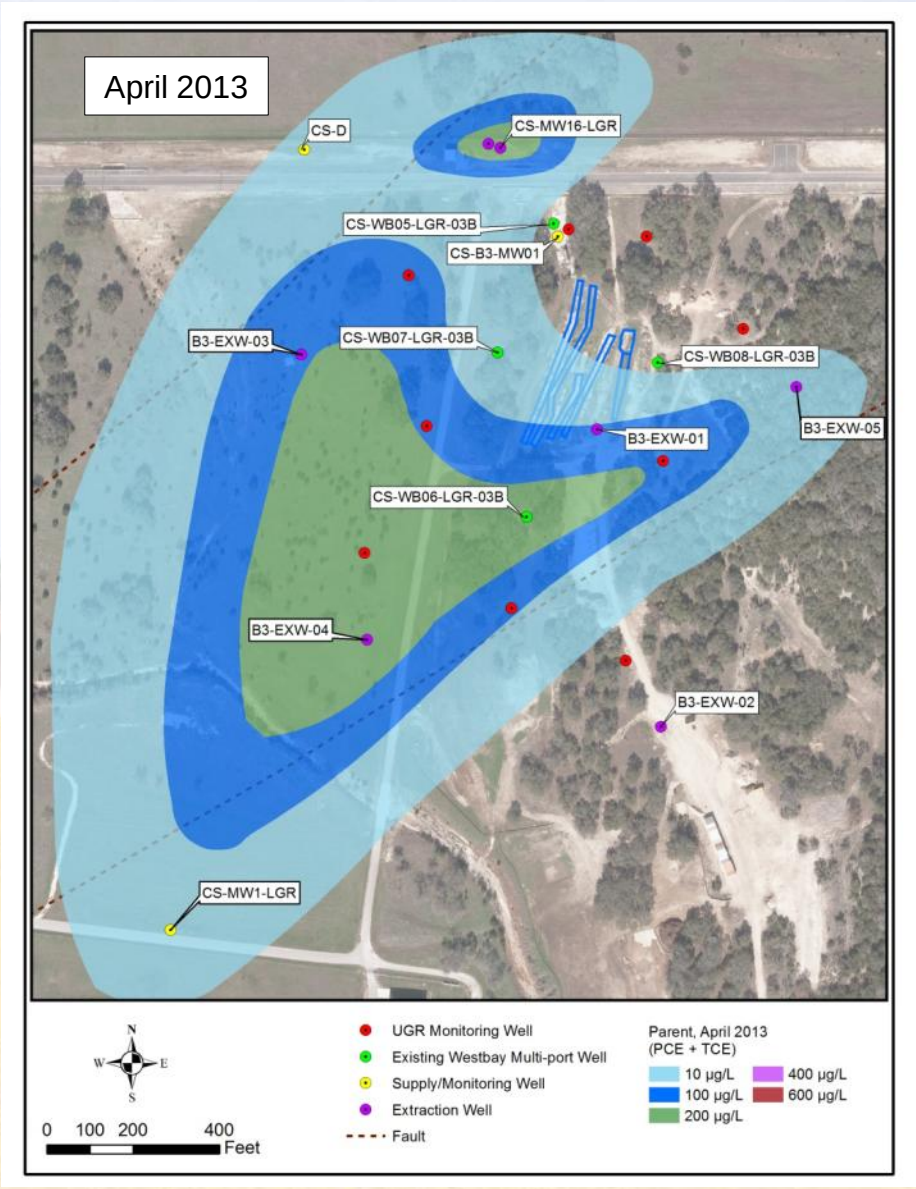
October 2011

April 2013

B-3 Bioreactor
LGR Observations – PCE and TCE

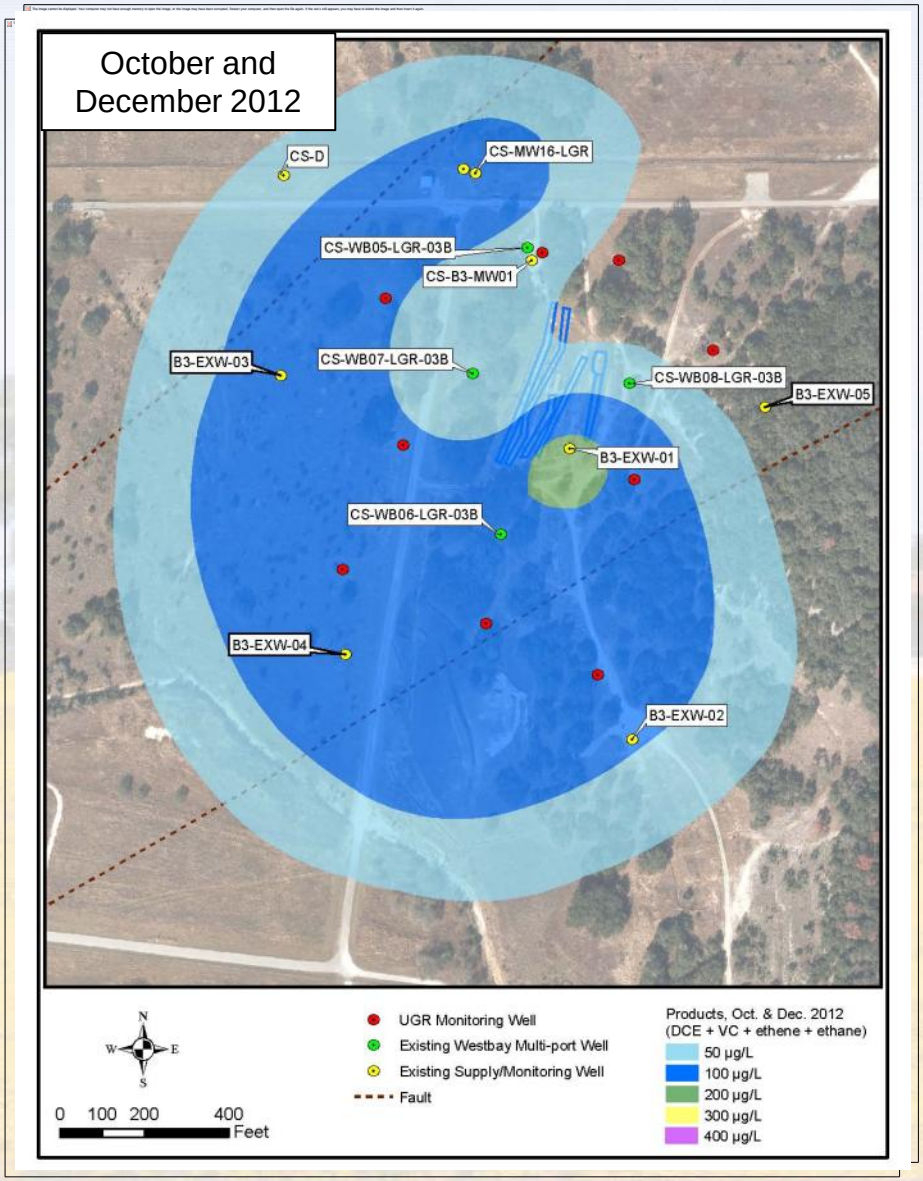
- Lack of PCE and TCE in the vicinity of CS-B3-MW01 reflect degradation associated with lactate injection in 2006.

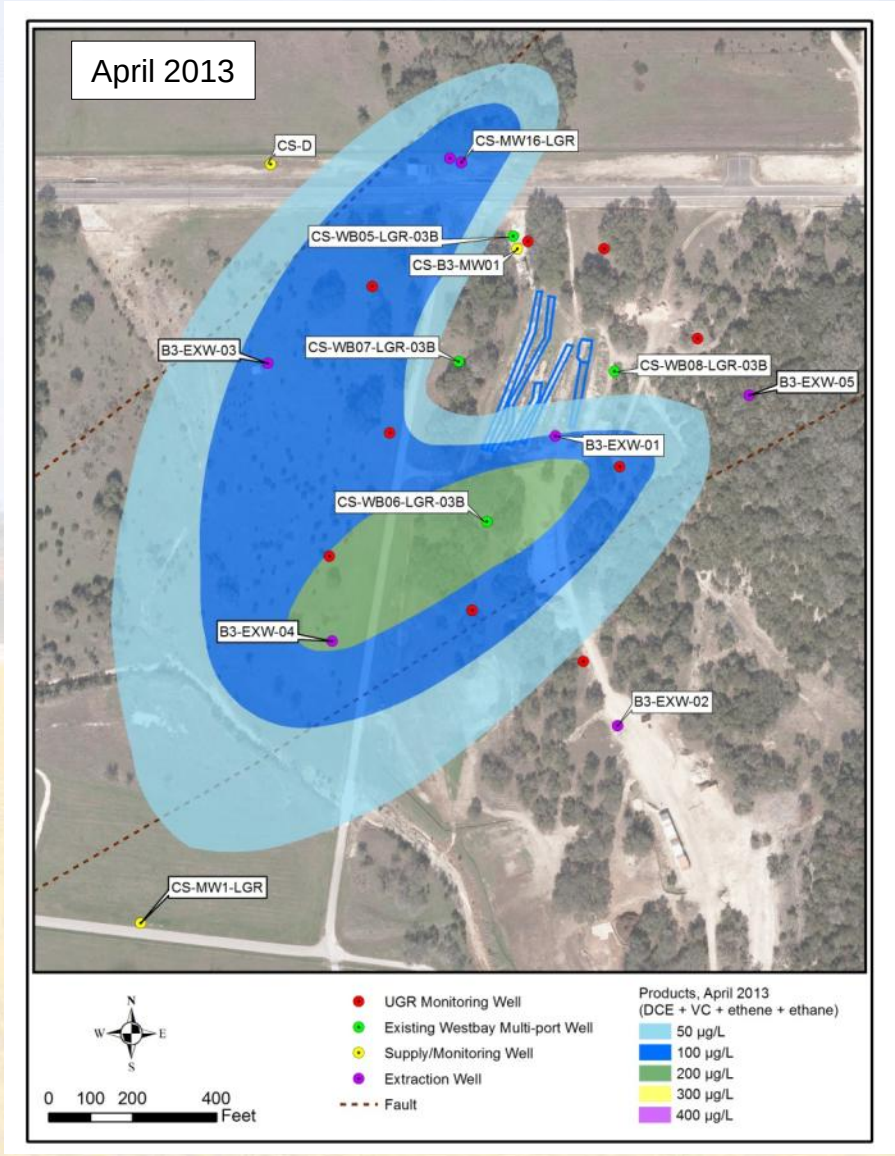




B-3 Bioreactor
LGR Observations – Dechlorination Products

- Moderate to low concentrations of *cis*-DCE are pervasive across the site.
- VC is detected at WB05 in LGR-04A and LGR-04B zones, WB07-LGR-01 and LGR-CS-B3-MW01 (86, 72, 11, and 16 µg/L, respectively),.
- Low concentrations of ethene are present in WB07 in LGR-01 and LGR-02, WB05 in LGR-04A and LGR-04B.





SWMU B-3 Bioreactor

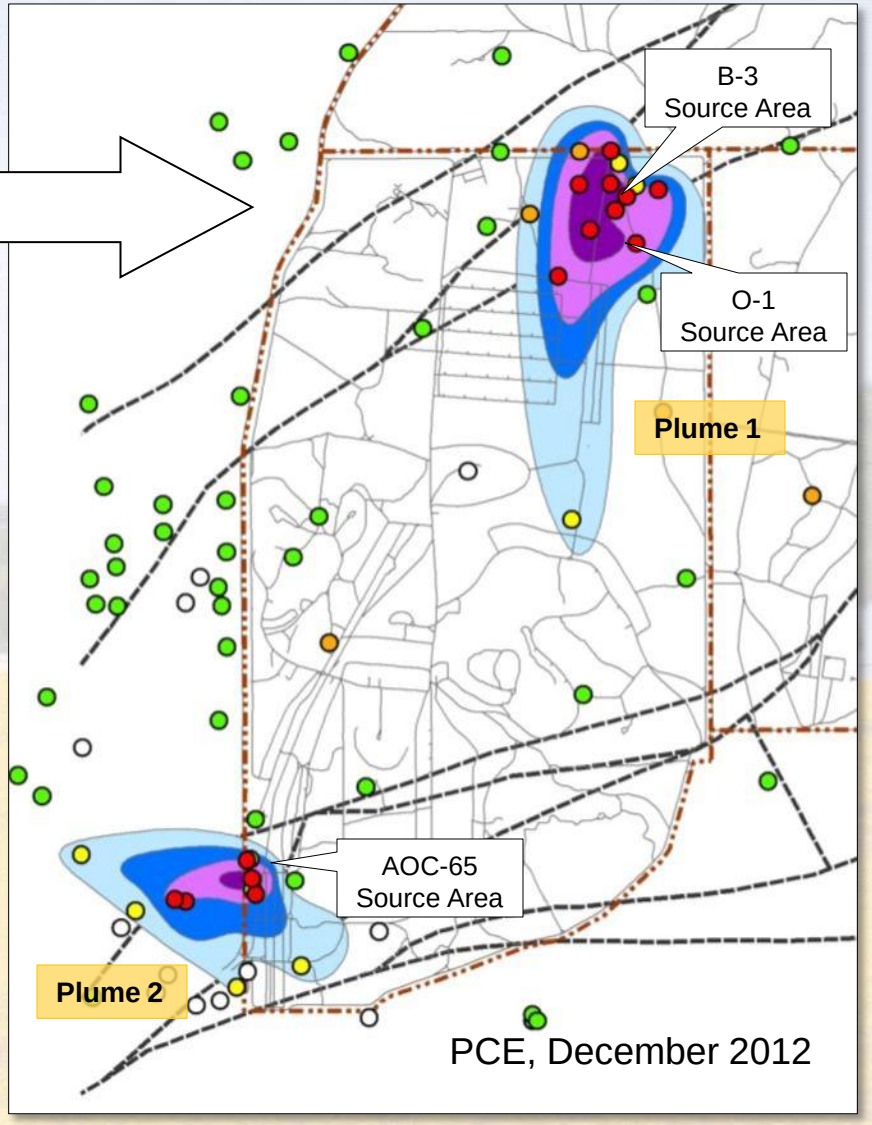
Next Steps

- Continue monitoring bioreactor.
- Complete SCADA control installation.
- Recharge remaining trenches with additional mulch/gravel mixture and install new injection lines.
- Complete electrical service to EXWs -01 and -02

SWMU B-3 and AOC-65
Description

1. **SWMU B-3 Bioreactor:** Enhanced anaerobic bioremediation of chlorinated hydrocarbons in underlying fractured limestone at Plume 1.

2. **AOC-65 Vapor Intrusion Study and *In-Situ* Chemical Oxidation:** Removal/destruction of chlorinated hydrocarbons in underlying fractured limestone at Plume 2.



AOC-65 Background

- AOC-65 consists of an area surrounding Building 90.
- Chlorinated solvent use was discontinued in 1995.
- Initial investigations identified groundwater plume (2) in 1999.
- Interim Removal Actions in 2001 excavated and disposed of ~1,300 CY of impacted soil media off-post.
- SVE Pilot Study initiated in 2002.
- Interim Removal Action in 2012 excavated and managed ~1,000 CY of impacted soil media on-post as Class 3 waste.
- SVE Pilot Study operations ceased in conjunction with commencement of ISCO treatability study (July 2012).
- A second round of ISCO injections into infiltration galleries, newly installed ISCO injection wells (IIW-01 through -04), and SIW-01 was completed June 2013.

AOC-65 Treatability Studies – *In situ* Chemical Oxidation (ISCO)

Activities since January 2013 :

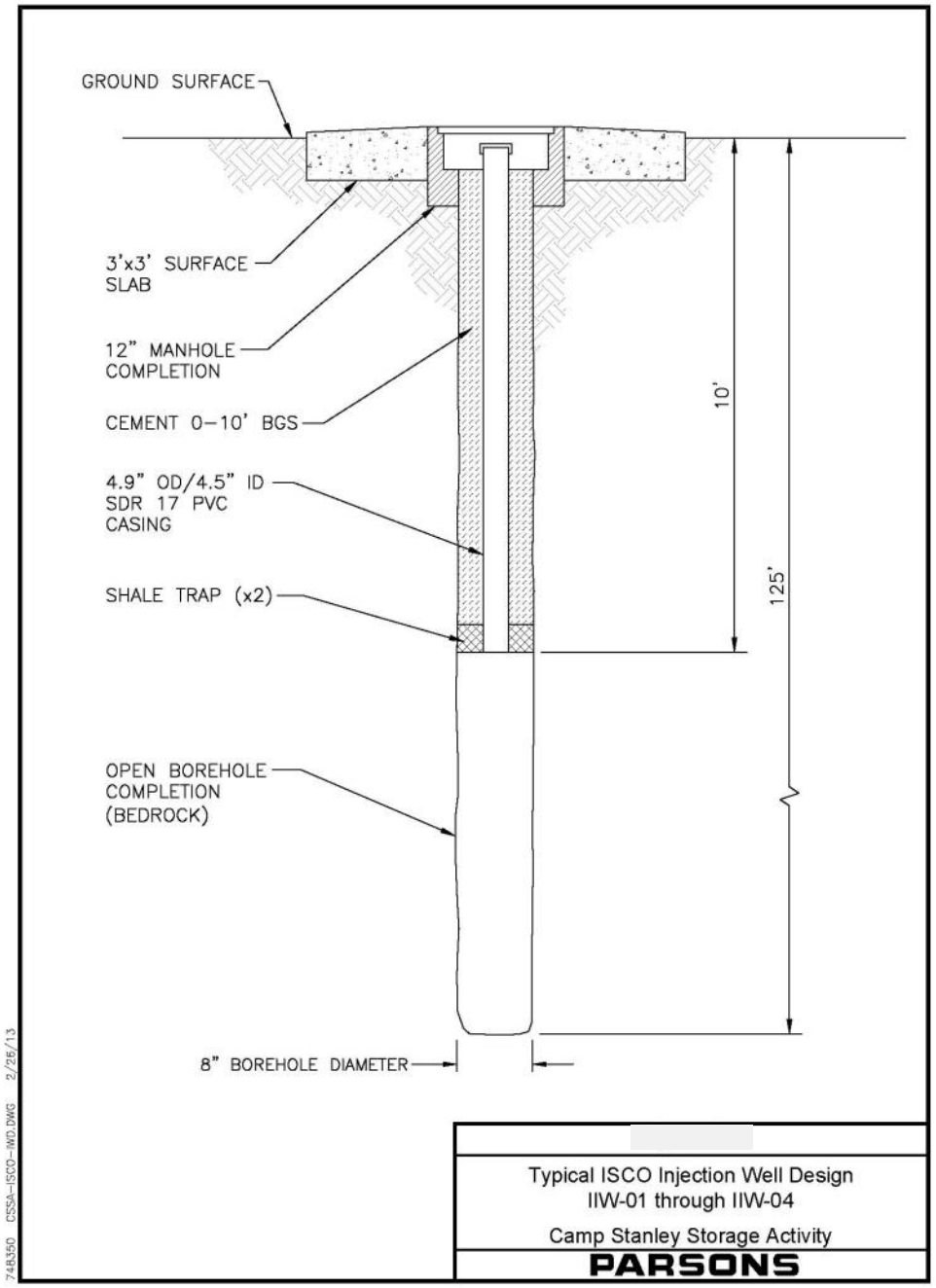
- Initiated Phase 2 of ISCO treatability study.
  - Installed 4 ISCO injection wells (IIWs).
  - Baseline sampling of all nearby on-post and off-post wells to establish groundwater chemistry condition prior to injection of ISCO chemicals.
  - Injected ~34,000 gallons of sodium persulfate/sodium hydroxide ISCO solution into ISCO injection wells (IIW-01 through -04), three infiltration galleries, and former steam injection well (SIW-01).
  - Completed ISCO 30-day performance monitoring following injections.
  - During and following injections, collected field parameters and field tested groundwater samples from selected monitoring wells to identify ISCO injection influence.

ISCO Infiltration Gallery Construction

- Each zone is comprised of ½” - sized quartz gravel and includes a 2” perforated HDPE line that runs the length of the trench and is separated from adjacent zones by a 1-foot thick layer of compacted clay.
- ISCO material was also injected at SIW-01, located in the former vat within Bldg. 90, and IIWs located along the western fenceline.

ISCO Injection Well Construction

- IIWs are designed with 8” open boreholes from 10’ bgs to maximize contact with the bedrock and fractures.
- IIWs terminate near a water-bearing zone at ~125’.
  - IIW-01 total depth = 117’
  - IIW-02 through -04 = 125’
- Temporary casing is currently installed within IIW-01 enabling a rig to resume drilling and re-complete the well at the intended total depth and/or develop the well further.



1-4

ISCO Treatability Study Phase 2 Injections

ISCO Treatability Study (Previous Results)

UGR PCE + TCE (µg/L)

Phase 1 Baseline sampling

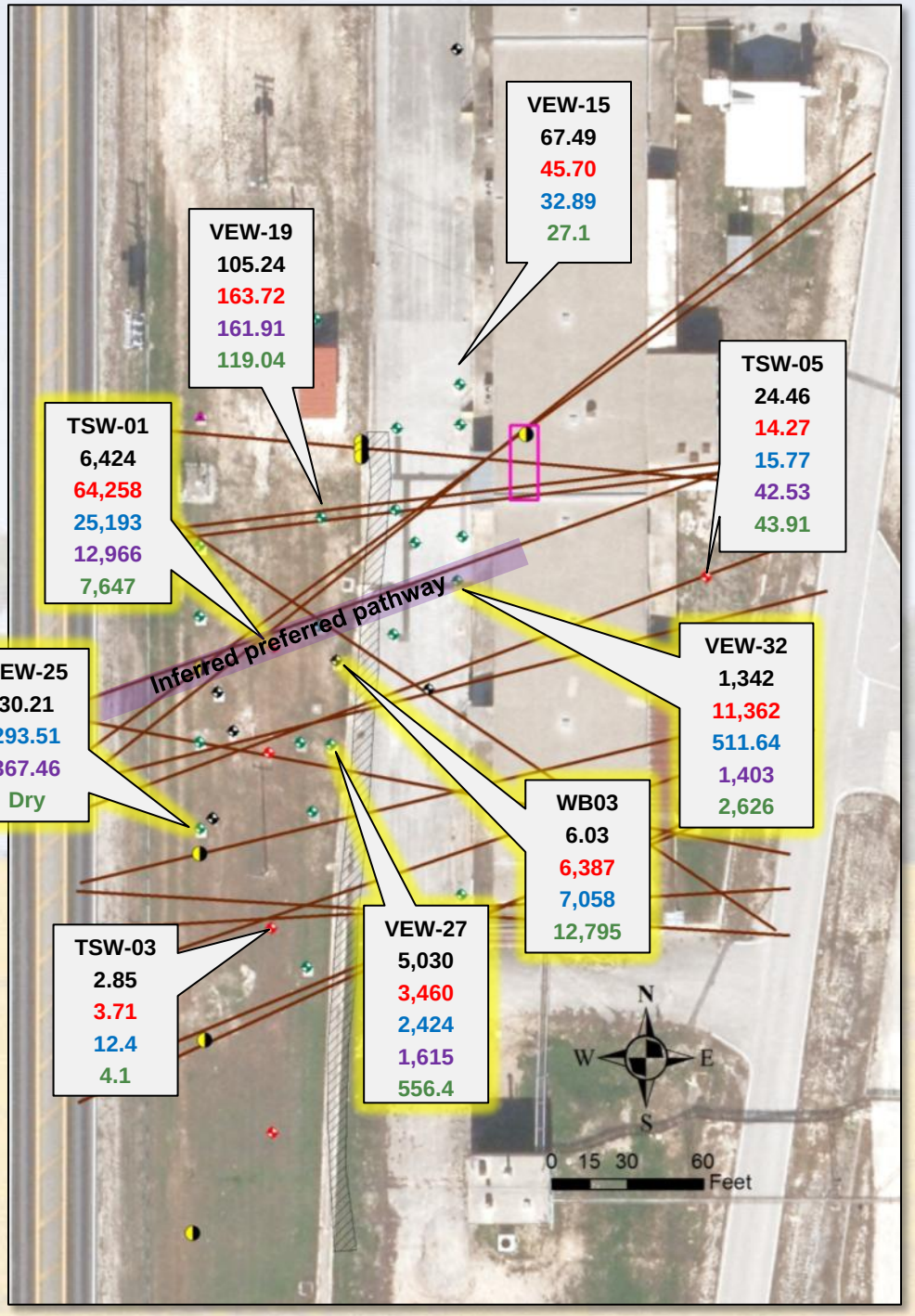
30-Day sampling

60-Day sampling

120-Day sampling

Phase 2 Baseline/240-Day sampling

Monitoring results suggest an overall mobilization of contaminants along preferred pathways.



- Monitoring Welll
- VEWs
- Peizometers
- Injection Well/SIW-01
- Treatability Study Well
- Trench
- Mapped Trench Fractures

ISCO Treatability Study (Previous Results)

UGR Metals (various) (µg/L)

Baseline sampling

15-Day sampling

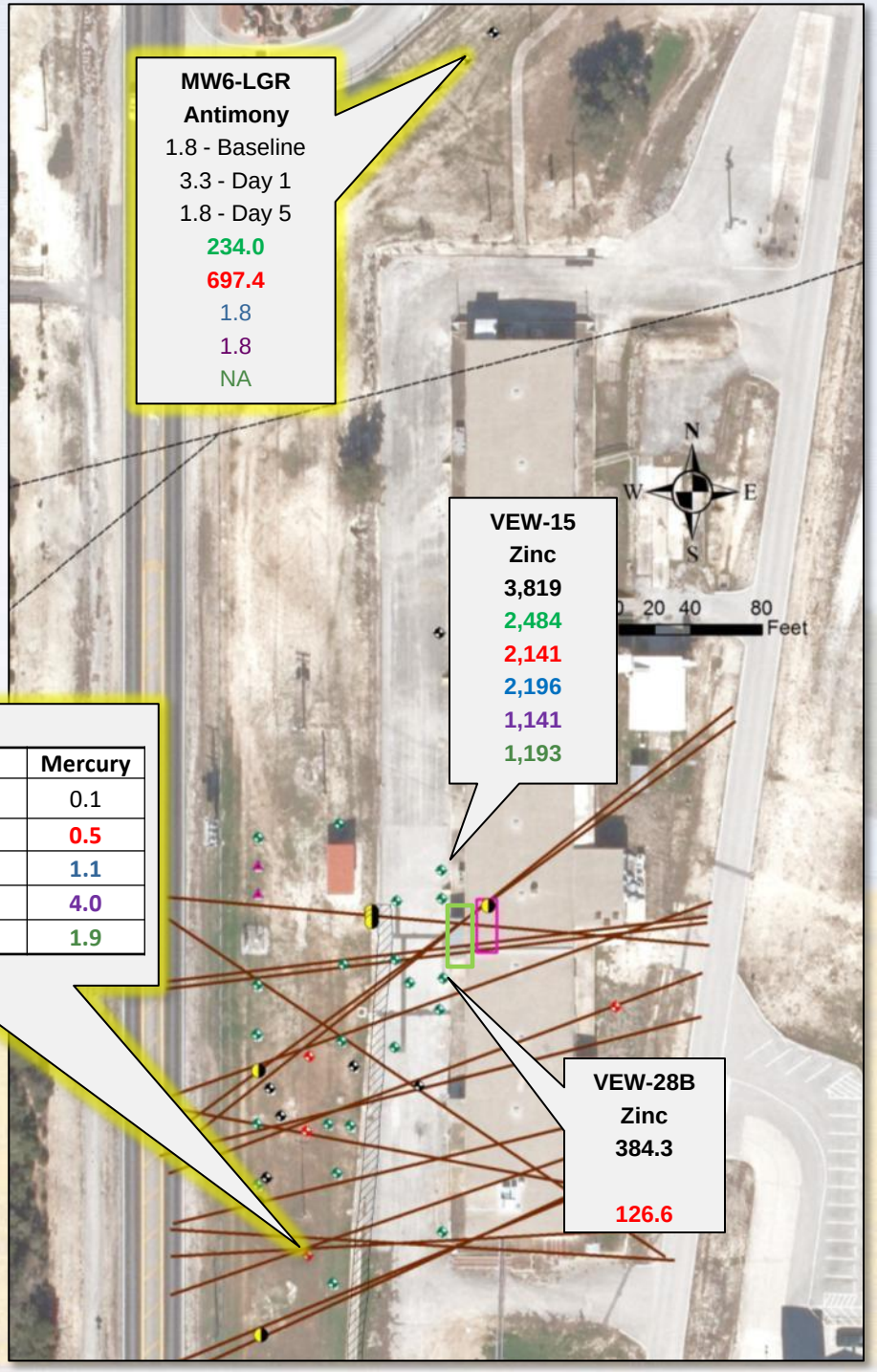
30-Day sampling

60-Day sampling

120-Day sampling

240-Day Sampling

Metals may be leached (mobilized) in areas where acids generated from ISCO reaction is not buffered by the alkaline material (NaOH).



TSW-03

Arsenic	Chromium	Nickel	Mercury
0.2	2.1	1	0.1
10.7	95.2	19.7	0.5
12.4	150	7.6	1.1
17.4	391.9	6.7	4.0
33.5	364.4	7.4	1.9

- Monitoring Welll
- VEWs
- Peizometers
- Injection Well/SIW-01
- Treatability Study Well
- Trench
- Mapped Trench Fractures
- Faults

ISCO Treatability Study (Previous Results)

UGR Oxidation Products Chloride and Sulfate (µg/L)

Baseline sampling

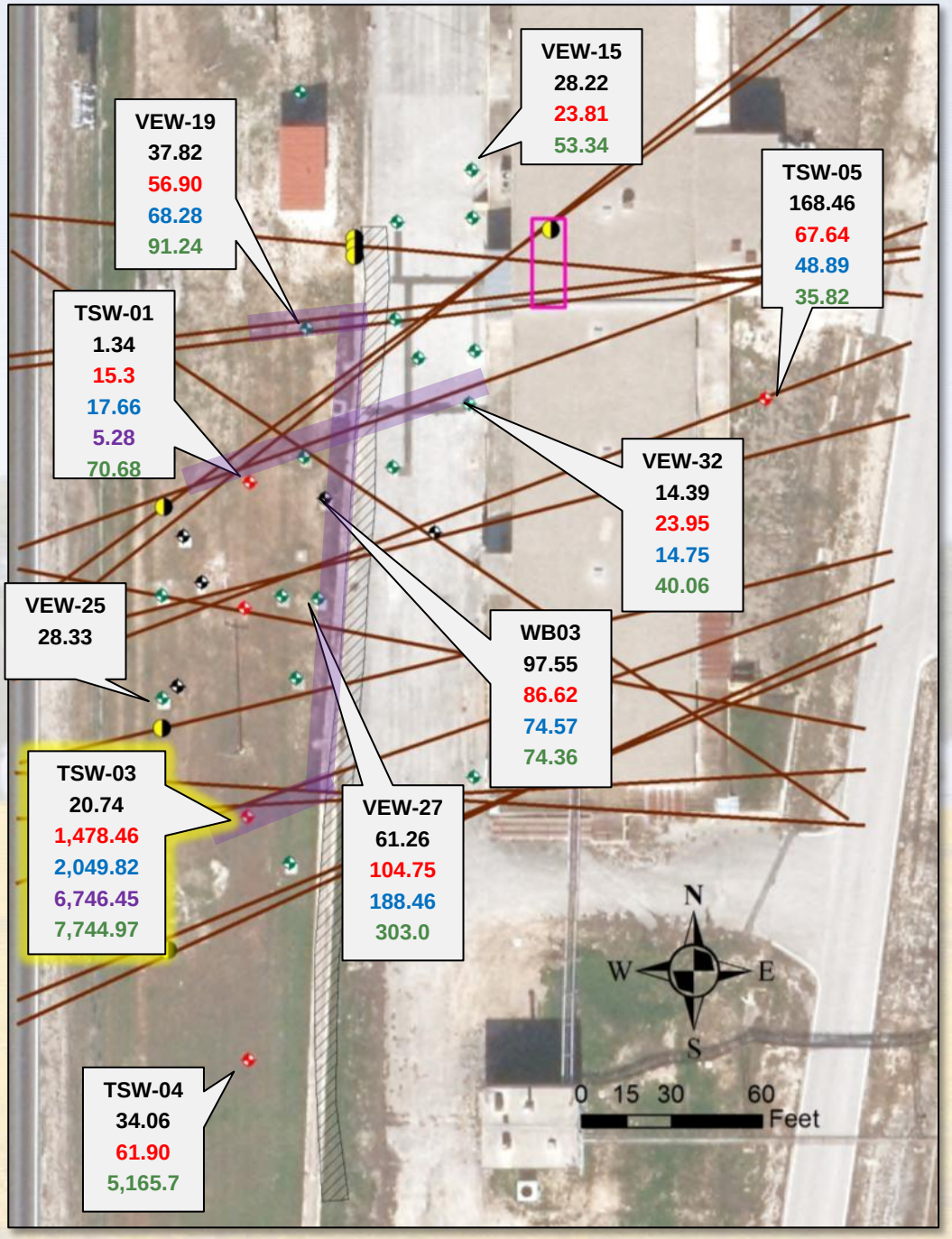
30-Day sampling

60-Day sampling

120-Day sampling

240-Day sampling

Salts precipitate as a byproduct of oxidation of chlorinated compounds in areas where metals are leached



- Monitoring Welll
- VEWs
- Peizometers
- Injection Well/SIW-01
- Treatability Study Well
- Trench
- Mapped Trench Fractures

ISCO Treatability Study (Previous Results)

LGR PCE + TCE (µg/L)

Baseline sampling

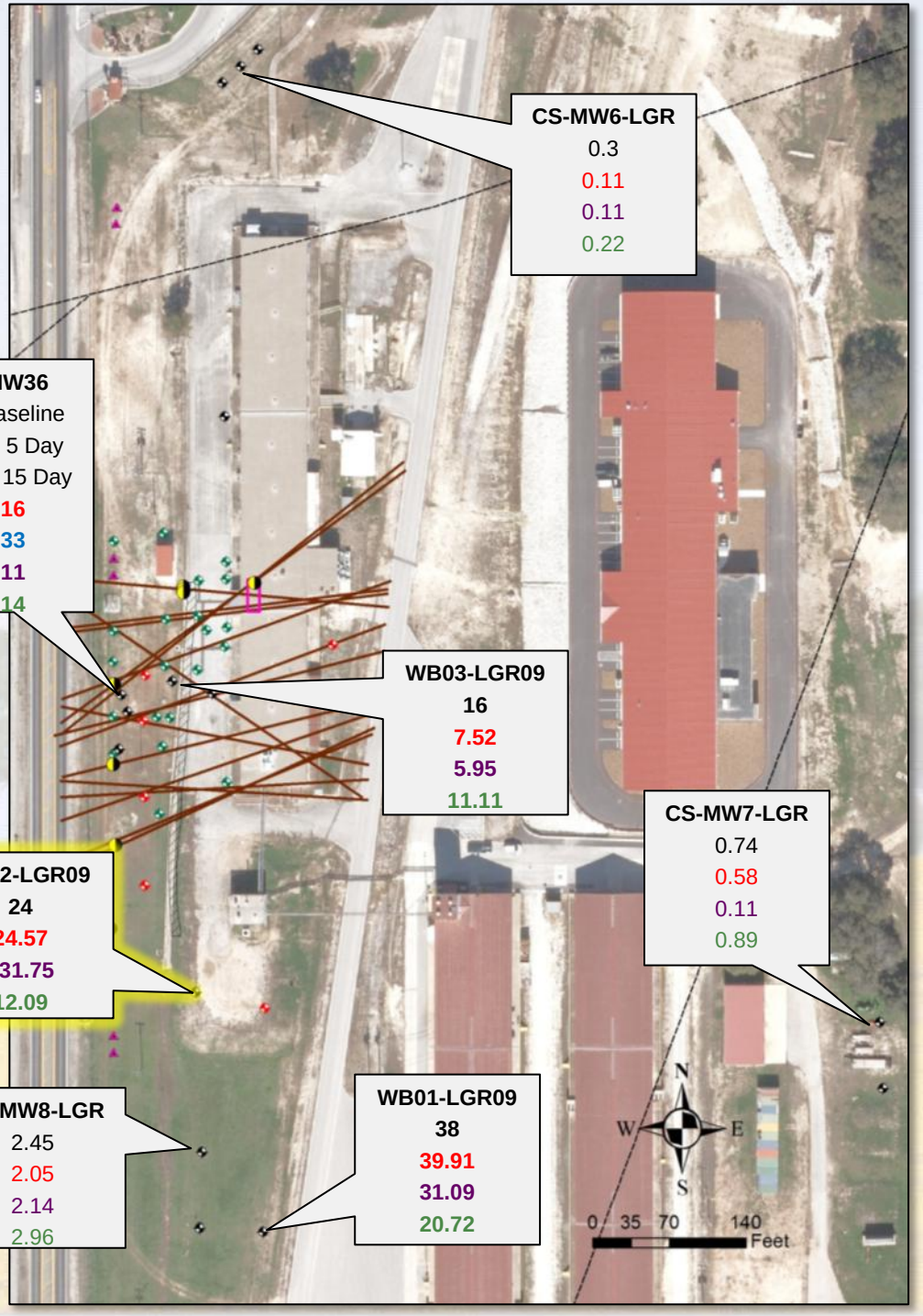
30-Day sampling

60-Day sampling

120-Day sampling

240-Day sampling

Monitoring results indicate vertical and lateral mobilization of contaminants.



Monitoring Welll
VEWs
Peizometers
Injection Well/SIW-01
Treatability Study Well
Trench
Mapped Trench Fractures
Faults

ISCO Treatability Study (Previous Results)

Off-Post LGR PCE + TCE (µg/L)

Baseline sampling

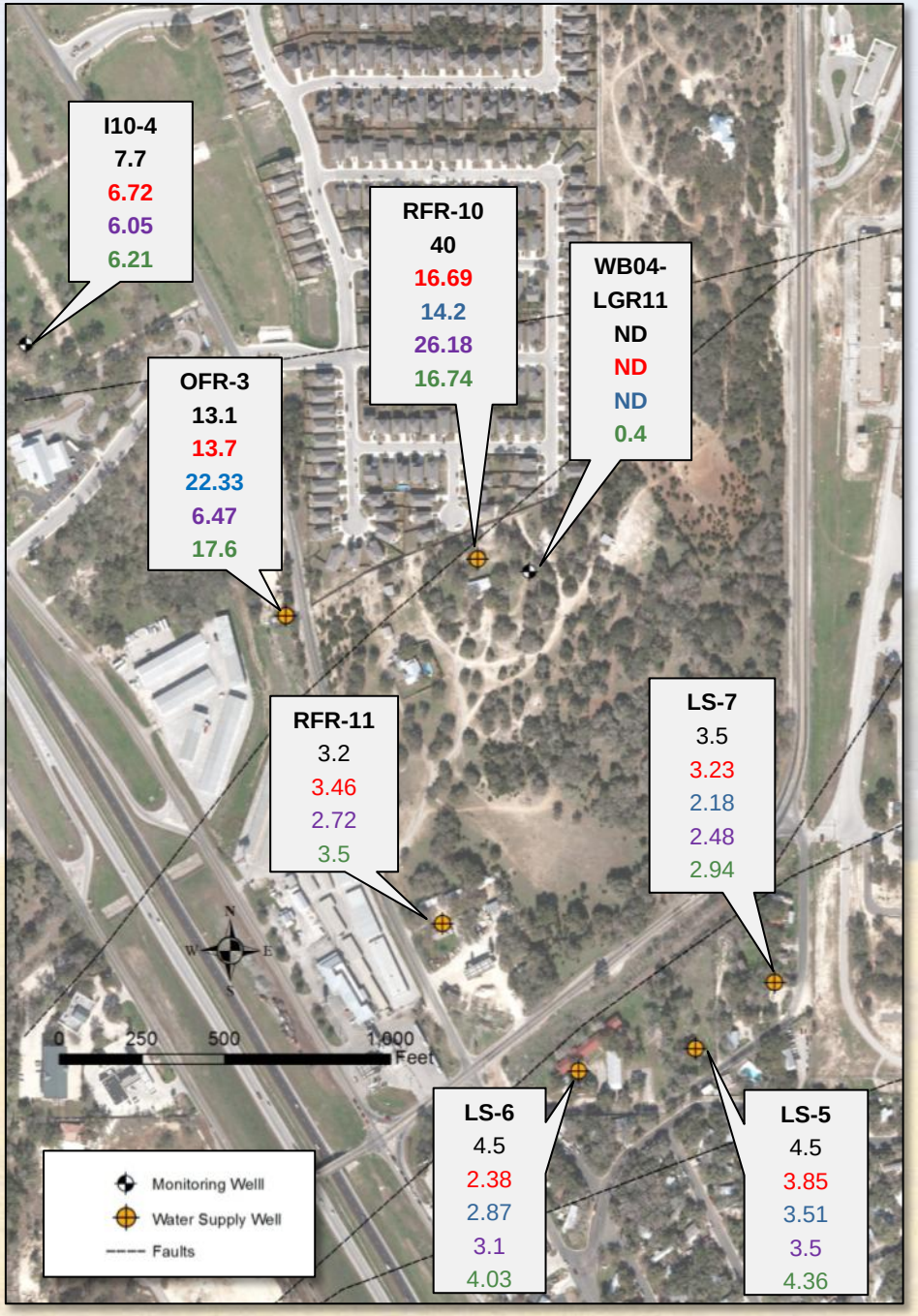
30-Day sampling

60-Day sampling

120-Day sampling

240-Day sampling

Monitoring results indicate little impact to VOC concentrations.



ISCO Treatability Study (Previous Results)

Off-Post Metals (various) (µg/L)

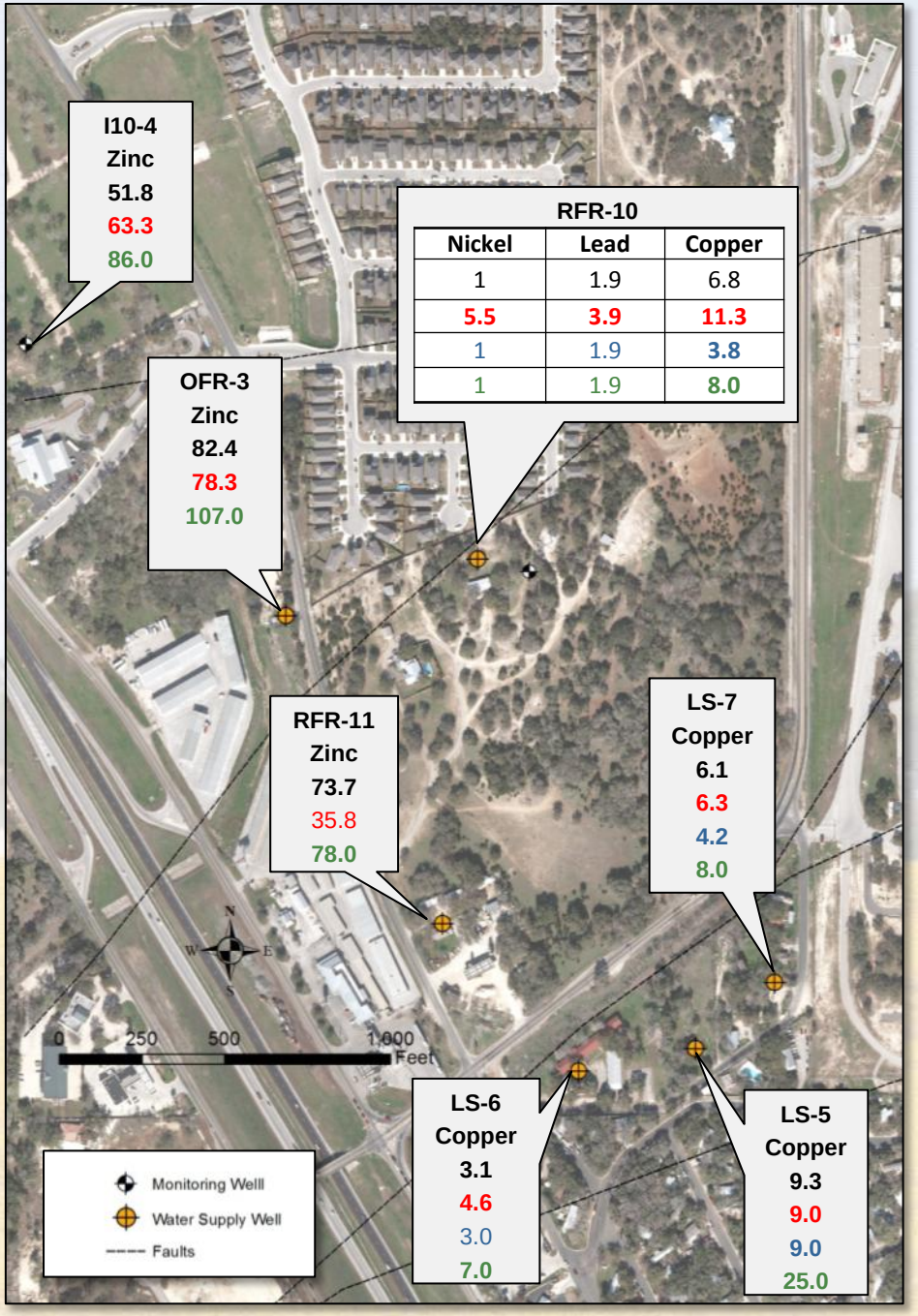
Baseline sampling

30-Day sampling

60-Day sampling

240-Day sampling

Monitoring results indicate little changes in metals concentrations.

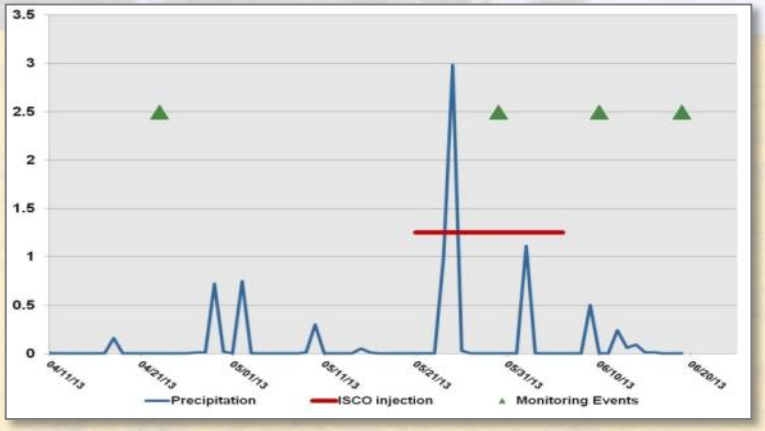


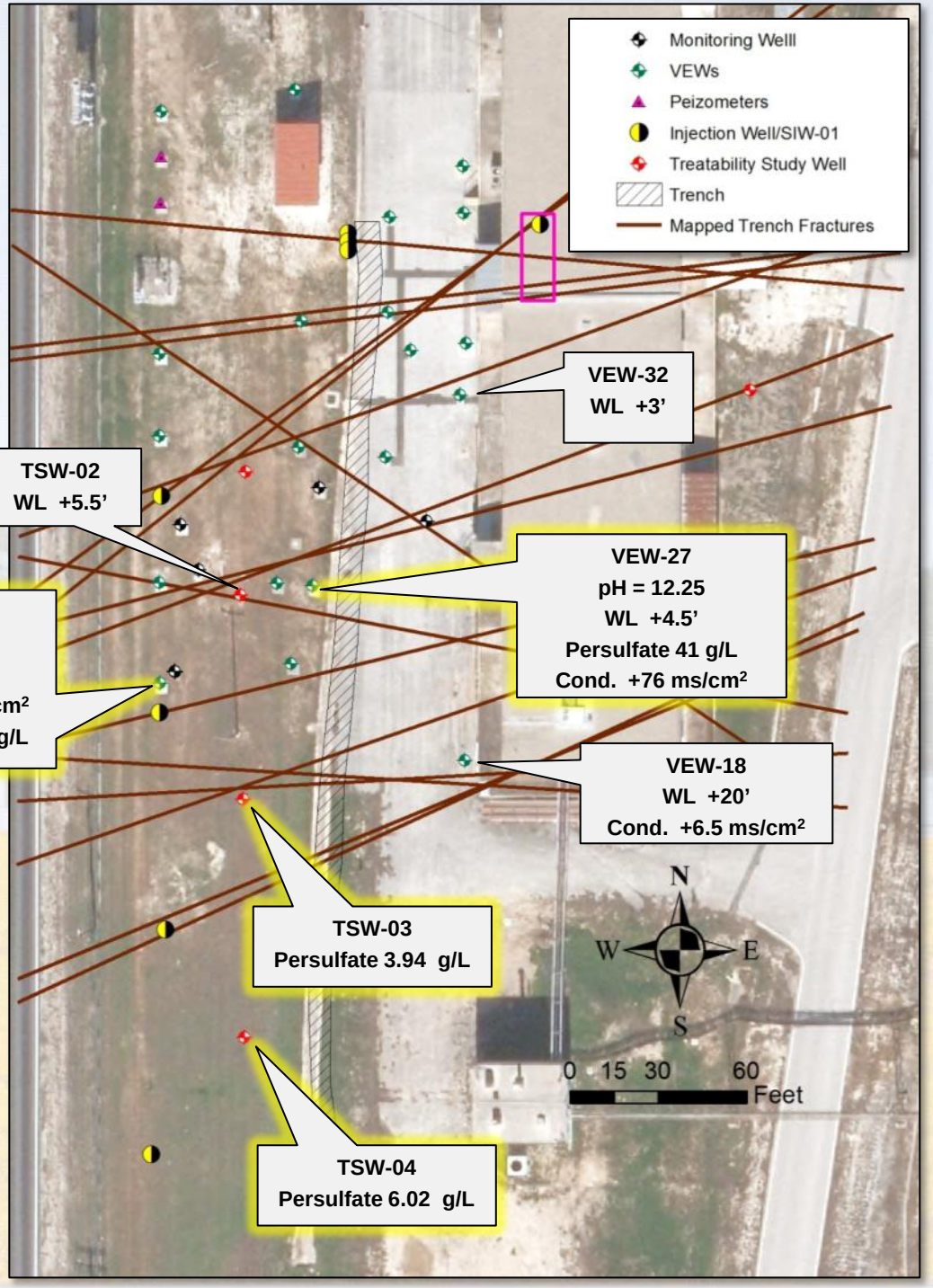
ISCO Treatability Study

Phase 2 Early Indications

Potential indicators of ISCO influence:

- Positive Identification of Persulfate (field test kit)
- Elevated pH
- Elevated Conductivity
- WL changes due to rain





AOC-65 ISCO Treatability Study
Next Steps

- Continue monitoring AOC-65 wells and monitoring points to determine effectiveness of treating source area.
  - Collect groundwater samples at selected on-post and off-post GAC wells for at 60-day and 120-day intervals.
    - Lab Analyses: VOCs, Chlorides/Sulfates and EPA Priority Metals
    - Field analysis: Water levels, pH, ORP, DO, temperature, and conductivity
  - Sample collection for field and laboratory analysis is expected to continue quarterly at selected on-post and off-post well following the 120-day event.
- Prepare ISCO Treatability Study Report

Vapor Intrusion - Overview

- USEPA recommended an off-post investigation through indoor air sampling in commercial/residential areas.
- CSSA proposed collection of indoor air within 9 off-post locations and 1 on-post location.
  - Samples were collected over a 24-hr period and were analyzed for PCE and TCE using level IV analysis via USEPA Method TO15 Selective Ion Monitoring (SIM).
  - Samples were collected from residences, enclosed crawl spaces, one full-time (24/7) occupied military building, and one water supply well enclosure.
  - Analytical results were compared with USEPA residential air RSLs for PCE and TCE (9.4 and 0.43 µg/m^3, respectively).

Applicable USEPA RSLs and TCEQ RBELs

	Groundwater MCL (µg/L)	EPA RSL (µg/m^3)	TCEQ $^{Air}RBEL_{Inh}$ (µg/m^3)	
PCE	5	9.4	64	cancer
			39	non-cancer
TCE	5	0.43	5.9	cancer
			2.1	non-cancer

November 2012 June 2012

Calculated Groundwater Concentrations for RSL or RBEL

	Groundwater MCL (µg/L)	EPA RSL (µg/L)	TCEQ $^{Air}RBEL_{Inh}$ (µg/L)	
PCE	5	8.19	55.8	cancer
			607.5	non-cancer
TCE	5	0.67	5.1	cancer
			3.3	non-cancer

Calculated Groundwater Concentrations = (Indoor Air Concentration (µg/m^3) / Attenuation factor (0.0015)) / (Henry's Law Constant (unitless) * Conversion factor (1000 L/m^3))

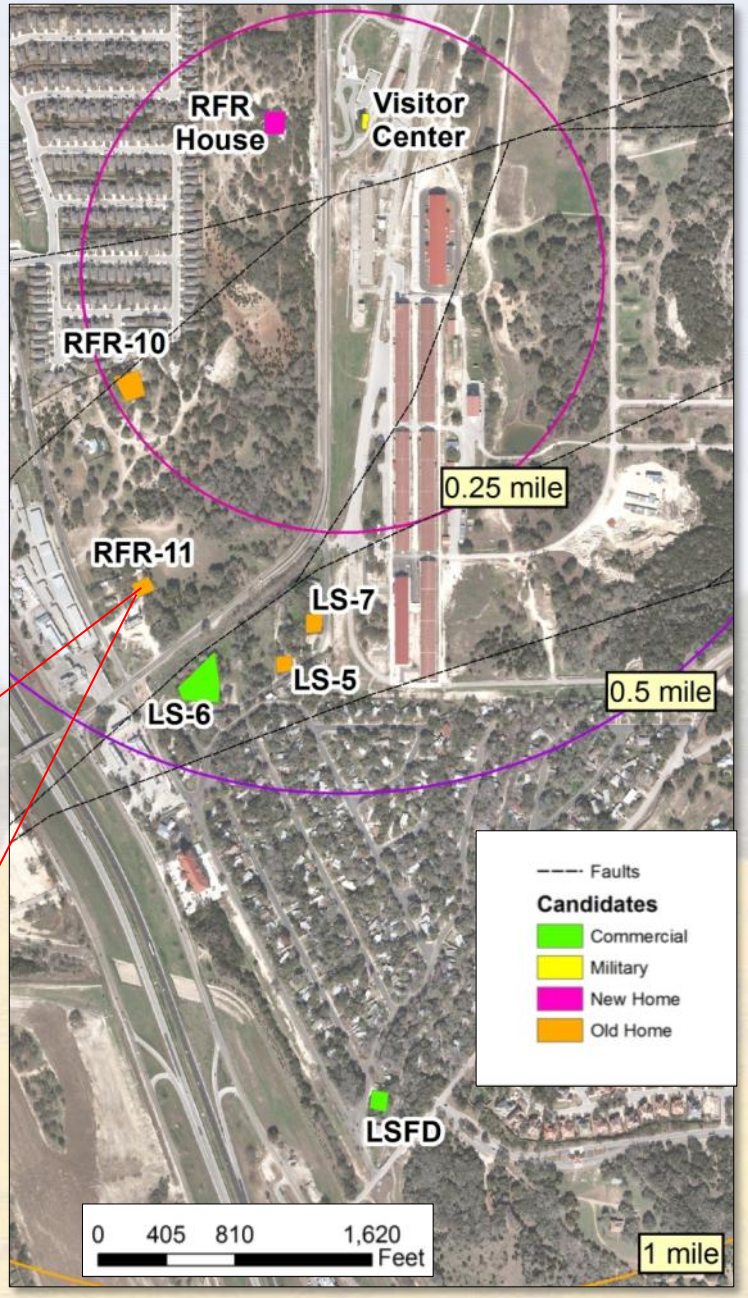
Where; Indoor Air Concentration = RSL or RBEL, and Henry's Law Constant = 0.428 and 0.765 for TCE and PCE, respectively

Vapor Intrusion
Results

Indoor Air Samples collected during February 2013.

- Samples collected from commercial, military, and residential homes; including new home and older pier and beam residential homes.
- Well owners near RFR-10, RFR-11, LS-5, and LS-7 included multiple sample locations from onsite structures.
- All results are below USEPA RSLs.

VOC Compound	Sample Identification	Result ($\mu g/m^3$)	RSL ($\mu g/m^3$)
Trichloroethene (TCE)	LS-5 House	Non-detect	0.43
	LS-6 House	Non-detect	
	LS-7 House 1	Non-detect	
	LS-7 House 2	Non-detect	
	RFR House	Non-detect	
	RFR-10 House 1	0.035 F*	
	RFR-10 House 2	0.028 F*	
	RFR-11 House	Non-detect	
	RFR-11 Well House	0.039 F*	
	Leon Springs FD	Non-detect	
	CSSA Visitor Center	Non-detect	
Tetrachloroethene (PCE)	LS-5 House	0.051 F*	9.4
	LS-6 House	0.042 F*	
	LS-7 House 1	0.080 F*	
	LS-7 House 2	0.67	
	RFR House	0.26	
	RFR-10 House 1	0.069 F*	
	RFR-10 House 2	0.27	
	RFR-11 House	0.91 F*	
	RFR-11 Well House	6.7	
	Leon Springs FD	0.052F	
	CSSA Visitor Center	0.15F	



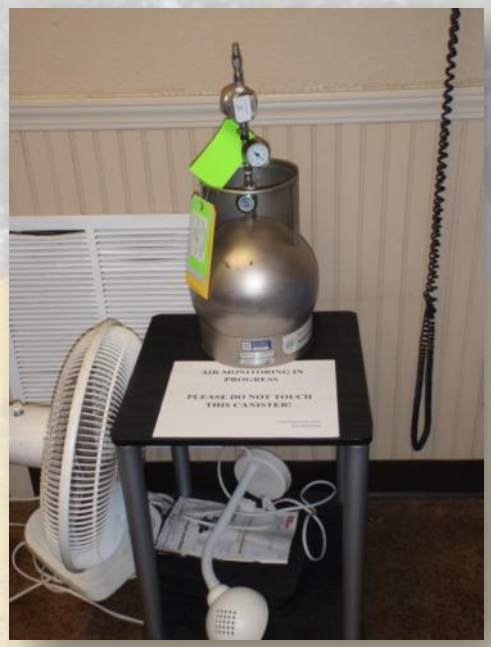
The F qualifier indicates the value is estimated.

Vapor Intrusion

Recent and Next Steps

- A letter describing results was sent to each investigation participant.
- Summary of results included in Annual Fact Sheet.
- Present findings in Risk Assessment and at next public meeting.

Sample Location for RFR-11 House



Sample Location for Leon Springs Fire Department

Sample Location for RFR-11 Well House

RISK ASSESSMENT

Interim/Stabilization Measures

- AOC-65 and SWMU B-3 source removal
- GAC filtration for off-site drinking water wells
- Long-term groundwater monitoring

RCRA Facility Investigation

- All AOCs and SWMUs soon to be closed under RRS and TRRP except:
  - AOC-65 & SWMU B-3: Treatability studies
  - Four sites in active range

Corrective Measures Study

The purpose of the CMS is to identify and evaluate cleanup alternatives (corrective measures). Corrective measures will be completed or implemented/in place at all AOCs and SWMUs by the time the CMS is required (120 days after the RFI Report is approved by EPA).

Corrective Measures Implementation

RCRA §3008(h) Order

Interim Remedial Actions and Treatability Studies

- Soil contamination sites closed under RRS and TRRP (except those in active range)

- Two groundwater contamination source areas are being remediated:
  - SWMU B-3: Excavation, bioreactor
  - AOC-65: Excavation, ISCO

- Remaining groundwater contamination plume addressed with:
  - Continuation of quarterly long-term monitoring
    - Has been monitored since 1999
    - Over 120 wells in program
    - Geostatistical evaluations and monitoring optimizations in 2004 and 2009
  - Continuation of maintenance (and additional installation, if necessary) of GAC units
    - Currently six off-post water supply wells have GACs

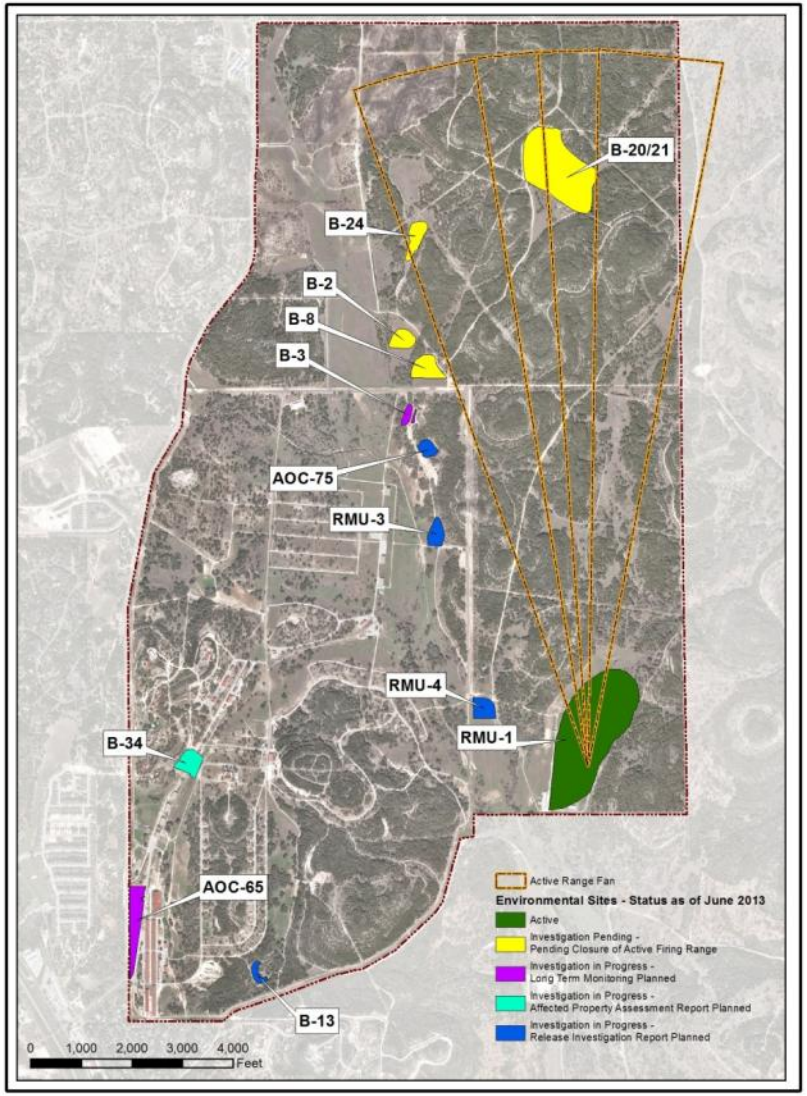
CSSA Risk Assessment
RCRA §3008(h) Order

"*Sixty (60) days after the RFI Report is approved, the Respondent shall submit to EPA for review and approval a screening risk assessment or, if necessary, a baseline risk assessment for the potential human health and environmental risks posed by the site in the absence of any remedial action.*"

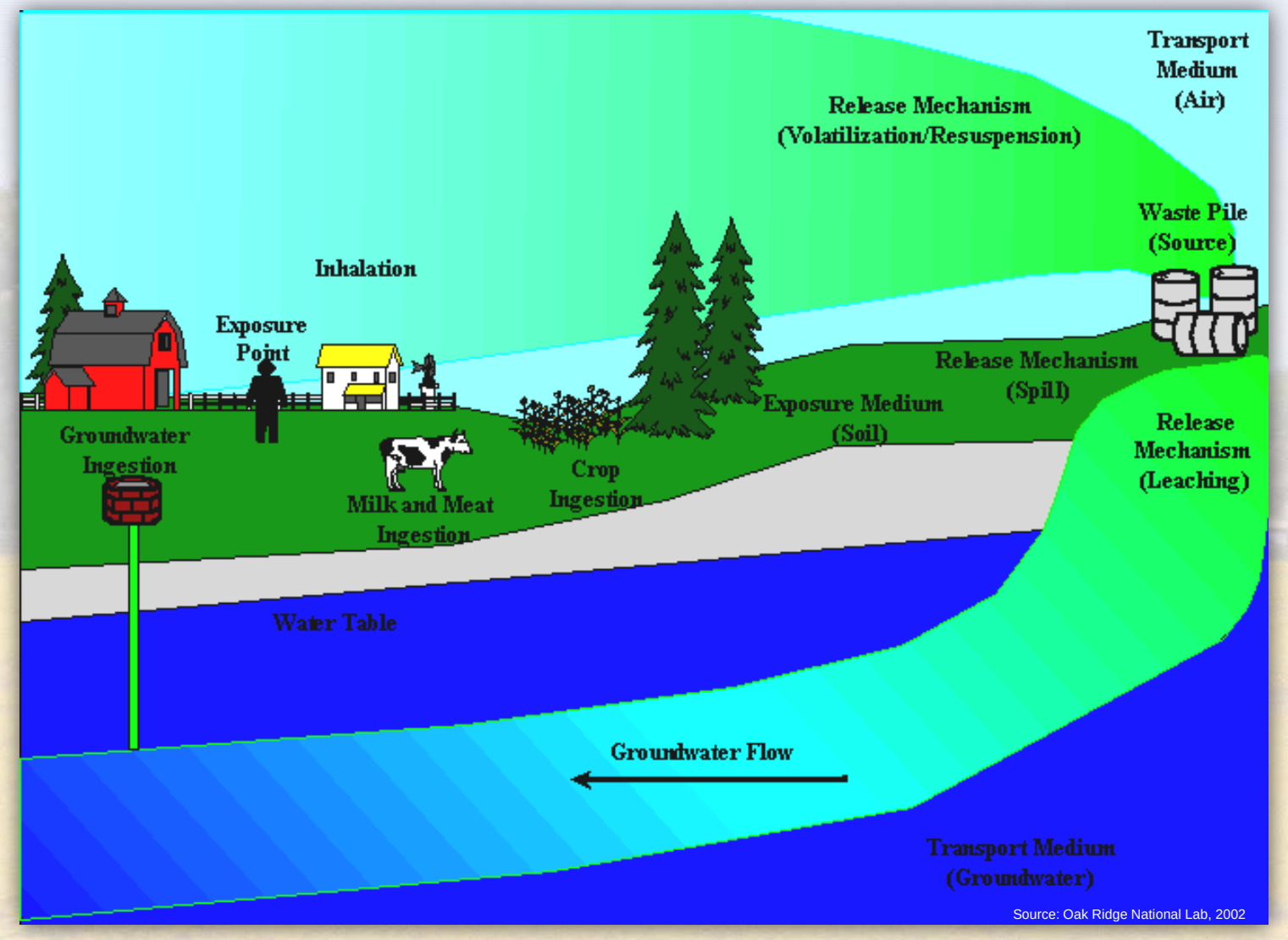
- *For human health risks this effort will involve the following components: 1) contaminant identification; 2) exposure assessment; 3) toxicity assessment; and 4) risk characterization.*
- *For ecological risks the effort will include the following components: 1) problem formulation; 2) exposure assessment; 3) ecological effects assessment; and 4) risk characterization.*

Risk Assessment
Proposed Approach

- Media of Concern
  - Groundwater
  - Soil
    - Closed sites: no further evaluation
    - Open sites
      - No risk associated with the ingestion of game
      - Currently no other complete soil exposure pathways



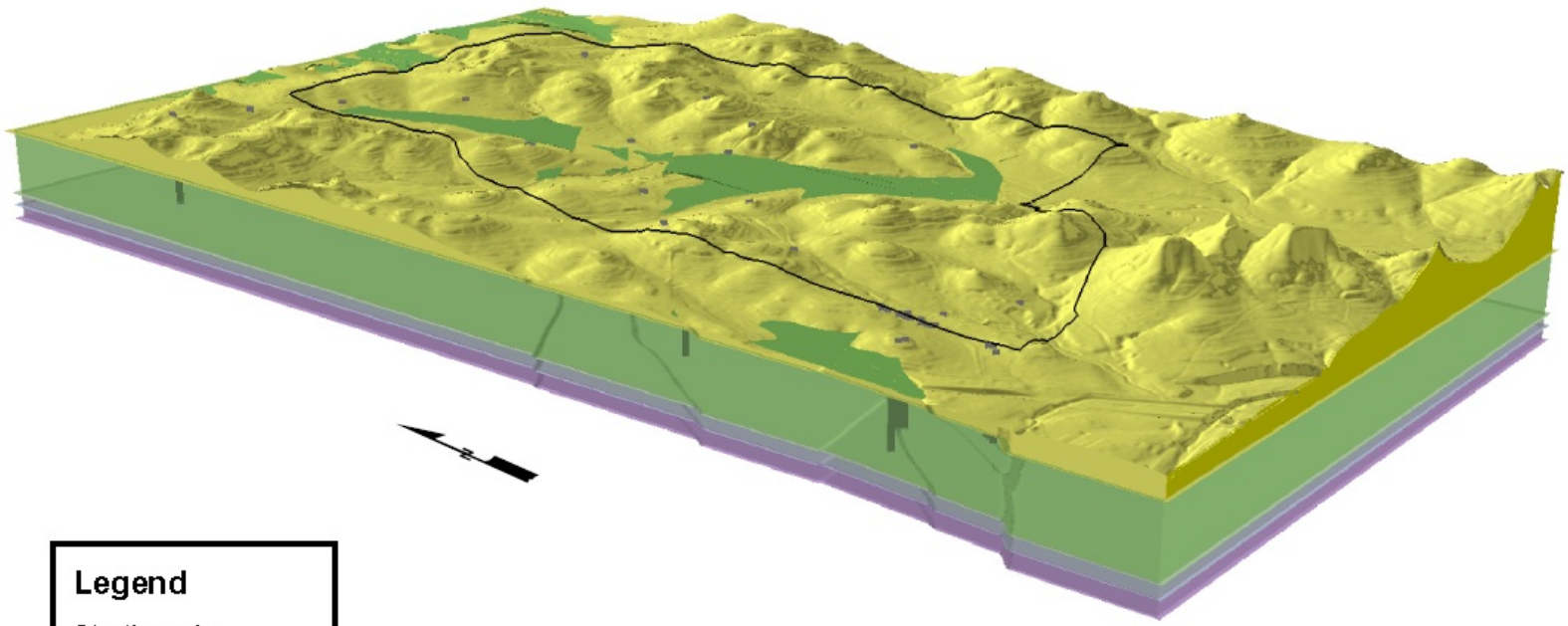
Conceptual Site Model



Source: Oak Ridge National Lab, 2002

Conceptual Site Model
Overview of Hydrogeologic Setting

- Most of CSSA is situated on a thin outcrop of Upper Glen Rose (UGR) Limestone.
- In the CSSA vicinity, the UGR contains temporal and discontinuous perched water zones that are highly mineralized with sulfates and chlorides, and are generally less desirable water sources.
- Underlying Lower Glen Rose (LGR) Limestone and the underlying Cow Creek (CC) Limestone comprise the Middle Trinity Aquifer, which is the primary drinking water aquifer in the area. The Bexar Shale (BS) is an aquitard between the two units.
- Limestone is fractured and mildly karstic, which dictates groundwater flow and occurrence.
- Private and supply drinking water wells in the Middle Trinity Aquifer.



Legend

Stratigraphy

- Upper Glen Rose
- Lower Glen Rose
- Bexar Shale
- Cow Creek

Vertical Exaggeration: 5X

Combined Stratigraphic Model of CSSA

PARSONS

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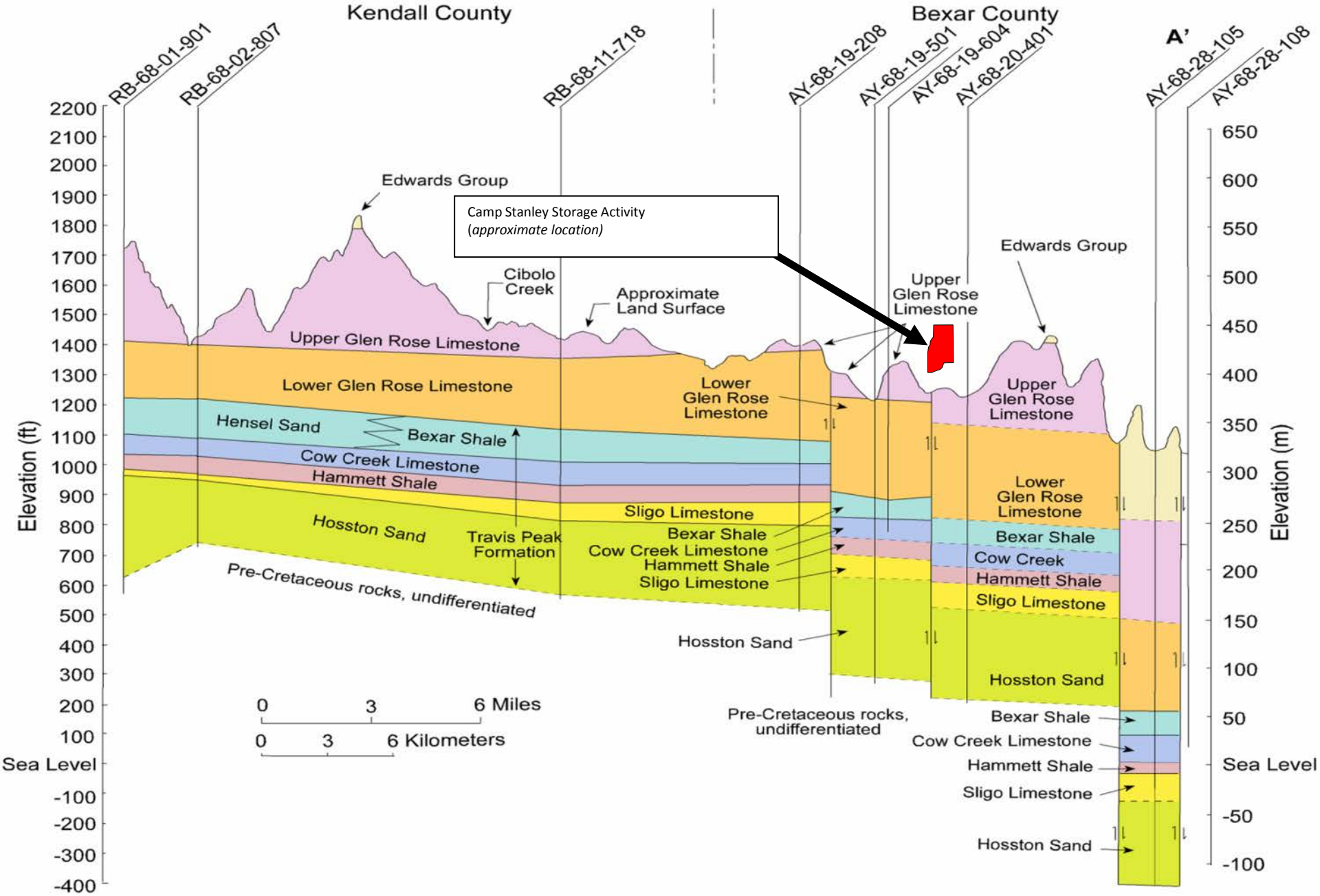
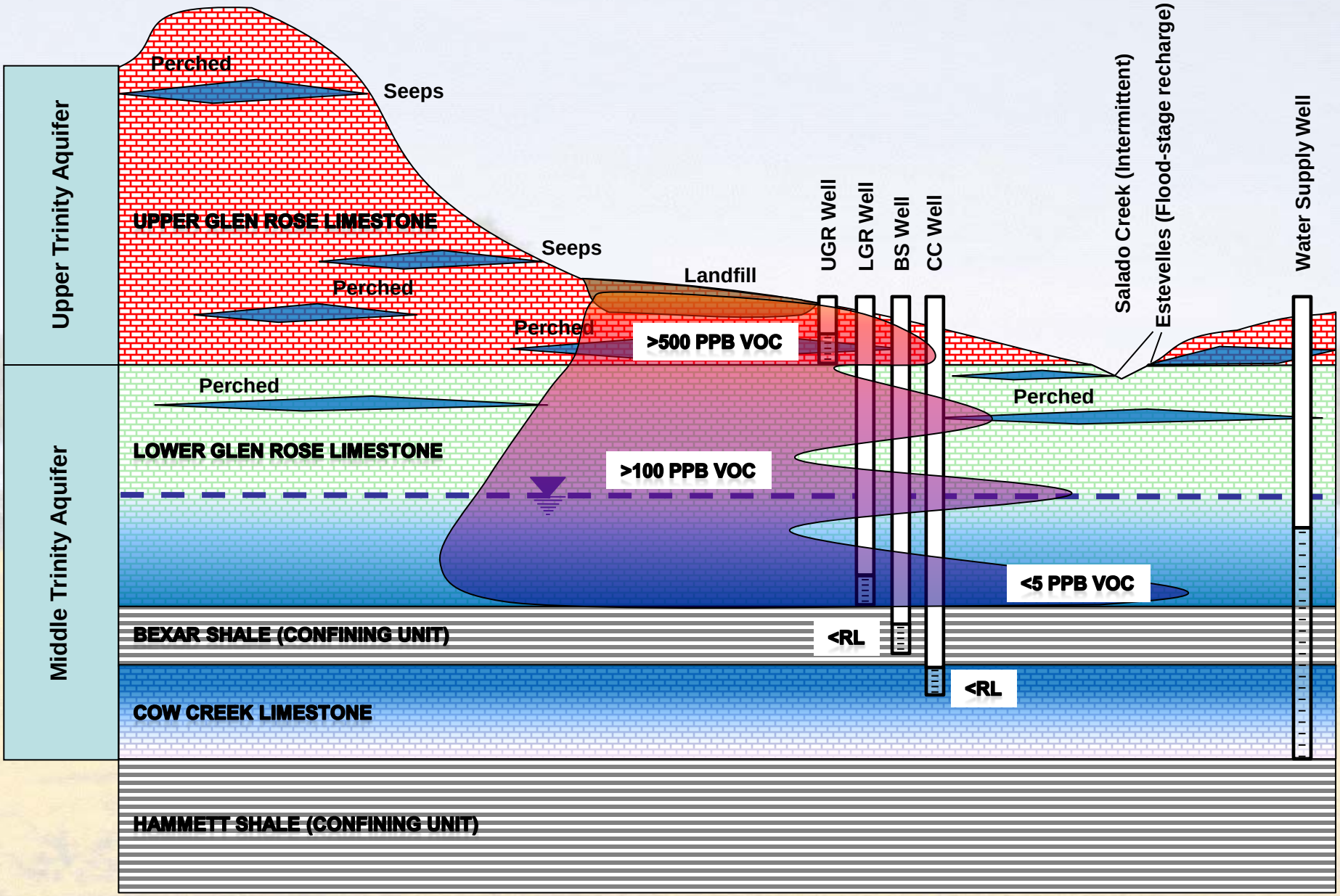
Environmental Setting



CSSA Hydrogeologic Conceptual Site Model



Groundwater/Surface Water Interaction

- Groundwater/Surface Water interaction is insignificant because:
  - Intermittent nature of releases
    - Releases occur only during significant rainfall and have only infrequently been observed
  - Dilution during rain events
    - During events when groundwater would be released to surface water, the stream flow is so high that the contribution of groundwater to surface flow is low
  - Aeration of surface water would allow volatile contaminants to volatilize from surface water

Risk Assessment Process

Data Evaluation and COPC Identification

Exposure Assessment

Toxicity Assessment

Risk Characterization

COPC Identification

- Short list of COPCs identified in groundwater based on extensive past investigations since 1994, approved by project team:
  - Tetrachloroethene
  - Trichloroethene
  - *cis*-1,2-Dichloroethene
  - *trans*-1,2-Dichloroethene
  - 1,1-Dichloroethene
  - Vinyl Chloride
  - Lead
  - Mercury

Data Evaluation

- Data set for risk assessment:
  - Temporal
    - Use the 10 most recent samples for each well
      - Represents current conditions
      - Max detected, 95% UCL if data allow
  - Spatial
    - All wells vs. subset of wells
    - Drinking water supply wells

Exposure Assessment

- Residential Land Use
  - On-site and off-site
  - Vapor intrusion evaluated
    - No COPCs detected in air
  - No complete exposure pathways to uppermost aquifer (UGR)
  - No complete exposure pathways associated with B-3
- Occupational Receptors
- GW/SW Interaction

Toxicity Assessment

- Standard USEPA hierarchy of toxicity values

Risk Characterization

Ratios of Site Concentrations to Medium-Specific Criteria

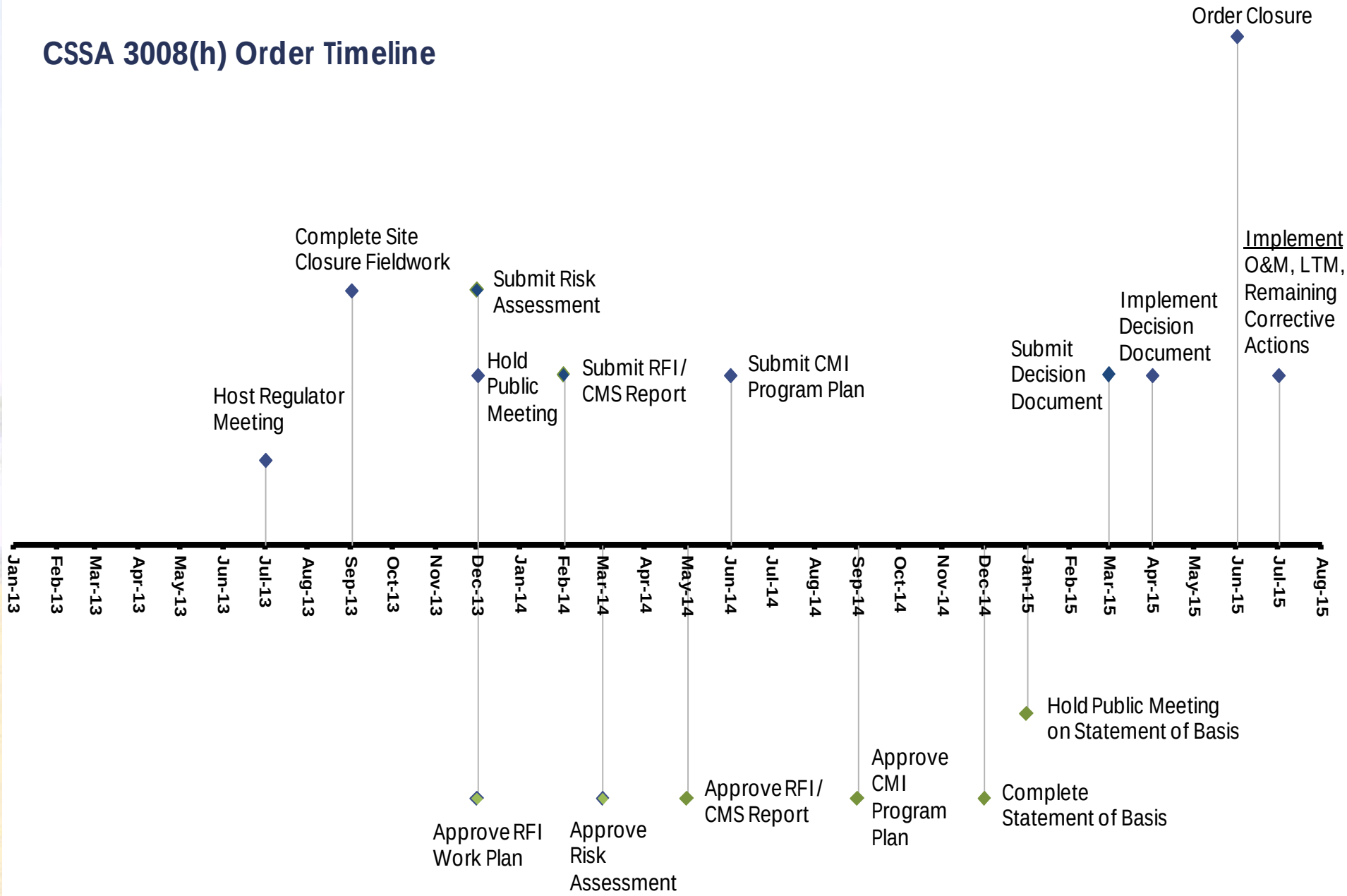
(MCLs/PCLs vs RSLs)

<u>OR</u>

Quantify Risk per RAGS Risk Calculations

CLOSURE PATH FOR EPA ORDER

CSSA 3008(h) Order Timeline



Discussion Topics

- Risk assessment approach
- LTMO – schedule for next update
- December 2013 public meeting
- Future regulator meetings
- 5-Year Reviews

CSSA Meeting Sign-In

June 27, 2013

Name	Organization	Phone
Julie Burdey	Parsons	512-719-6062
Scott Pearson	PARSONS	512-657-5797
Adrien Lindley	Parsons	512-560-9145
Laura Marbury	Parsons	512.719.6855
GREG LYSSY	EPA	214 665 8317
KIRK COULTER	TCEQ	512 239-2572
Jorge Salazar	TCEQ	210-403-4059
Gina	CSSA	
Steve Rembish	Parsons	512.719.6067
Alethea Tsui-Bowen (phone)	EPA	