Meeting Minutes

Subject: Environmental Program Status Update

Date: July 29, 2010

Time: 9:30 am – 1:30 pm

Place: Camp Stanley Storage Activity, Boerne, Texas

Attendees:

Name	Organization	Telephone
Gabriel (Gabe) Moreno-Fergusson	CSSA	230.431.0288
Glaré Sanchez	CSSA	210.698.5208
Wayne Elliott	USACE	817.886.1666
Greg Lyssy	USEPA	214.665.8317
Kirk Coulter	TCEQ	512.239.2572
Sonny Rayos	TCEQ	512.239.2371
Jorge Salazar	TCEQ	210.403.4059
Nora McGuire	TCEQ (intern)	210.403.4024
Lacy Guaderrama	TCEQ (intern)	210.403.4020
Susan Beez-Cozull	Noblis	210.403.5410
Bob Edwards	Noblis	210.408.5552
Julie Burdey	Parsons	512.719.6062
Laura Marbury*	Parsons	512.719.6855
Scott Pearson*	Parsons	512.719.6087
Ken Rice	Parsons	512.719.6050
Mark Rigby	Parsons	801.553.3350
Chris Beal	Portage	210.336.1171
Russ Cason	Weston	210.308.4338
Mike Chapa	Weston	210.330.2570
Jennifer Peters	Weston	210.308.4300

**Meeting Minutes prepared by Parsons*

The topics of discussion are briefly outlined below. The PowerPoint presentation, which provides a full overview of the issues presented at the meeting, is available in Attachment 1.

Topic Discussed:

1. **Site Investigation Status Update**

   a. **SWMU B-4** Russ Cason (Weston) gave an overview of the recent exploratory investigation at four trenches ranging in depth from 10 to 12 feet. This included the collection of surface soil samples from the impacted areas and the use of pothole excavations to help delineate the extent of the trenches. Barium, cadmium, copper, lead, mercury, nickel and zinc were the only COCs exceeding critical PCLs. The vertical extent of COCs exceeding PCLs appears to be limited to 0 to 0.5 feet below grade for affected surface soils and 1 to 2 feet below the trench bottoms. See slides for investigation results, conclusions, and next steps.

   b. **AOC-64 and SWMU B-71** Mike Chapa (Weston) outlined previous remediation and investigative efforts at the site. All COCs greater than Tier 2 PCLs and Ecological Risk Benchmark Screening Values (0-0.5 feet) have been removed, and both sites have been vertically delineated to background levels. The APAR document is to be submitted in September 2010 with a "No Further Action" (NFA) recommendation based on post-removal conditions. See slides for full overview.

      Discussion: Glare Sanchez (CSSA) requested the status of the AOC-63 APAR from Sonny Rayos (TCEQ). Mr. Rayos will check. CSSA would like feedback prior to the submittal of additional APARs.

   c. **AOC-67 and AOC-68** Julie Burdey (Parsons) presented a status update for the AOCs. Both of these sites meet the requirements for NFA. A Release Investigation Report (RIR) for these sites was submitted on June 30, 2010. Recently, contaminated sand pipe bedding has been discovered in the vicinity of AOCs 65/68, and will be addressed in an upcoming project. See slides for more detail.

      Discussion/Decision: Ms. Sanchez explained how CSSA is looking to put a new sewer line trench in the area of AOC-67 but is concerned that there is not a closure report for the site. Greg Lyssy (EPA) and Mr. Rayos gave approval for CSSA to move forward with effort, as long as Health and Safety concerns were addressed.

   d. SWMUs B-15 and B-16 Ms. Burdey gave an overview of the site history. Approximately 1,400 cubic yards were excavated from the Northern Trench in March 2010. Trench contents included munitions debris, target vehicles, scrap metal, and a drum labeled "PCE". Thirteen

samples were collected for the CSSA 9 metals and TPH; only zinc exceeded comparison criteria in 2 instances. Ten samples were also collected for VOCs, including beneath the PCE drum. All VOC results were non-detect. Approximately 2,500 cubic yards are estimated to remain in two other trenches. See slides for the results of the most recent investigation and next steps.

e. **SWMUs B-2 and B-8** Ms. Burdey outlined the most recent soil sampling effort involving the hand-held x-ray fluorescence (XRF) sampling instrument. Sampling results were presented in addition to a statistical comparison of the XRF data to samples sent for laboratory analysis. Statistical correlation between lab and field data correlate by more than 80 percent for lead and zinc target compounds. The next steps involve determining the best course of action for the sites:

1) *Removal/closure with RIR;*
2) *Removal followed by NFA APAR using Tier 2 criteria; or*
3) *NFA APAR with Tier 2 criteria. See slides.*

f. **SWMUs B-20/21 and B-24** Ms. Burdey outlined the latest effort at the SWMUs involving an exploratory investigation of the lateral extent of MEC contamination outside the original SWMU boundaries. Both sites have also been scored using the MEC Hazard Assessment protocol. Both site scored as high hazard levels based on the assessment (B-20/21 = Hazard Level 1 and B-24 = Hazard Level 2). A perimeter investigation confirmed that munitions debris extend past the Hazardous Fragment Distances anticipated for each site. Next steps are outlined on the slides.

2. Treatability Studies Status Update

a. **AOC-65 Soil Vapor Extraction Pilot Study** Ken Rice (Parsons) outlined the previous and most recent soil vapor monitoring results, including the results of the indoor air vapor monitoring. PCE concentrations of approximately 1 ppbv are present at the property fenceline west of Building 90. PCE concentrations inside Building 90 are below the TCEQ Risk Screening Level (RSL) for indoor air, but are above the 2010 EPA RSL. Additional samples will be collected both inside and outside of AOC-65. The SVE system continues to operate. Parsons is currently conducting a Technology Assessment to identify enhancements to the remedial action, including steam injection. See slides for additional data.

Discussion: Regarding the high levels of PCE detected in Bldg 90 air with the SVE unit turned off, Gabe Moreno (CSSA) suggested the concrete floor and wood furniture as possible sources. Mr. Lyssy added that the concrete flooring is old and could act as a continuing source. He explained that it would be possible to collect core samples of the wood furniture. He also indicated that laboratory detection levels would most likely be possible for such samples.

In regards to the proposed additional air quality sampling (see slides), Mr. Lyssy agreed that amending the current work plan to include the additional sampling would suffice.

b. **SWMU B-3 Bioreactor Pilot Study** Mr. Rice outlined the status of the study. Nine new shallow UGR wells and one new LGR extraction well have been installed. The wells east of the Bioreactor have elevated concentrations of PCE/TCE compared to those to the west of the Bioreactor. The new wells north of the Bioreactor have the greatest concentration of microbial degradation products (vinyl chloride and ethylene). See slides for more detail.

c. **Noblis Treatability Studies Status Update** Bob Edwards (Noblis) gave an overview of Noblis' specialized studies investigating opportunities for optimizing/enhancing contaminant degradation and biogeochemical pathways of degradation related to the Bioreactor Pilot Study. Susan Beez-Cozull (Noblis) outlined the results of the recent soil data collection at SWMU B-3. Noblis presented data that depicted the complexity of contaminant degradation models occurring at the Bioreactor, which include manganese, reduced iron, and sulfate-reducing bacteria pathways. Noblis postulated that the introduction of manganese, lactate, and acetate could enhance the degradation of PCE/TCE. See slides for further information.

3. Groundwater Monitoring Update

a. **Basewide Monitoring Events** Scott Pearson (Parsons) discussed the results of the most recent monitoring efforts conducted in March and June 2010. No unexpected results were collected during either of those sampling events. Detailed discussions were held about the concentrations "spikes" that were observed at CS-4 and I10-4 that were noted in December 2009. Those spikes had attenuated by June 2010. At CS-4, the event may have been related to the Bioreactor Flood Test. At I10-4, the concern is that an off-post "slug" of contamination is migrating westward past the well. A location for a new well off-post to investigate will be a focus in a future project.

b. **LTMO Update** Mr. Pearson also gave an overview and update on the Long-Term Monitoring Optimization (LTMO) program for CSSA groundwater wells. The recommendation is to further align all on/off-post wells on a 9-month "snapshot" event as the base case monitoring frequency, and decrease the amount of quarterly and semi-annual sampling. He also presented upcoming work and the geologic modeling effort currently underway by the US Geological Survey (USGS), and are included in the slides.

4. Document Submittal

Ms. Burdey led a discussion of the regulator's preferred format for submitted documents.

Discussion: Mr. Lyssy prefers electronic format. Kirk Coulter (TCEQ) also prefers electronic format for final deliverable however would like hard copies for documents needing review or that will be regularly referenced. Mr. Coulter clarified that the TCEQ document submittal requirements of one copy for Central Records, and one copy for the TCEQ Regional Office must be also be followed.

5. Next Meeting Date

Decision: Meetings will continue to be semi-annual with the next one tentatively planned for early January timeframe.

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ATTACHMENT 1

MEETING PRESENTATION SLIDES

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Camp Stanley Storage Activity Status Update

July 29, 2010

Agenda

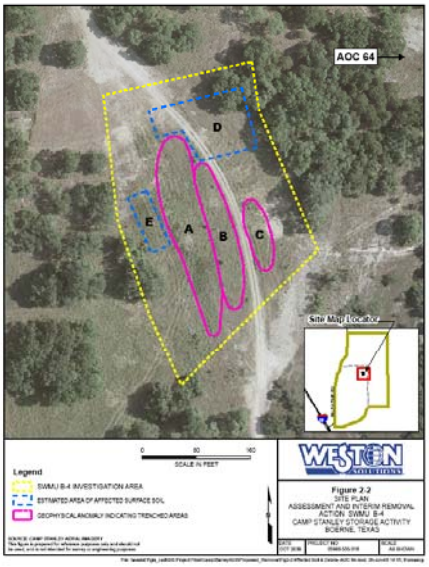
- Site Investigation Status Update
  - SWMU B-4
  - AOC-64/SWMU B-71
  - AOC-67/68
  - SWMU B-15/16
  - SWMUs B-2/B-8
  - SWMUs B-20 and B-24
- Treatability Study Update
  - AOC-65
  - SWMU B-3
- Groundwater Monitoring Update
- Document Submittal

SITE INVESTIGATION STATUS UPDATE

SWMU B-4

SWMU B-4 Historical Data

- **Disposal trenches used before 1990's**
  - Three trench-like anomalies identified
- ***Subsurface Soil in Areas A, B and C:***
  - Metals in limited samples from trenches exceed background and Tier 1 RALs.
- ***Surface Soil in Areas D and E:***
  - Ba, Hg and Zn exceeded background, Tier 1 RALs, or eco- risk.
- **Conclusions**
  - Assess affected surface soil areas.
  - Confirm waste characteristics and extent of contamination in trenches.

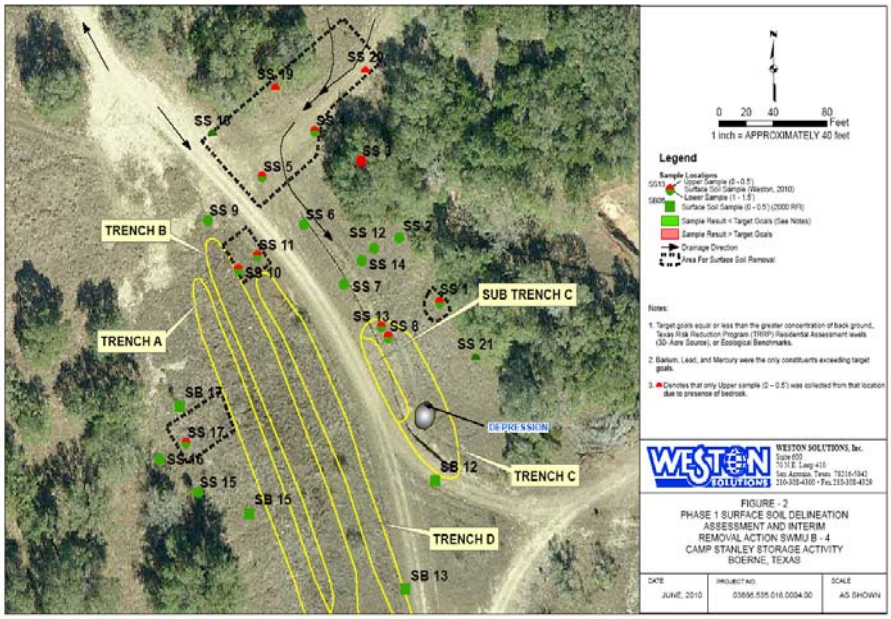


SWMU B-4 Exploratory Phase

- Collected surface soil samples from impacted areas (0-0.5 feet and 1.0 to 1.5 feet).
- Used test pits and lateral excavations to identify:
  - Trench lengths and depths.
  - Determine landfill materials and COC concentrations.
  - Sampling from trench bottoms for initial assessment of vertical extent.
  - Estimate waste and excavation volumes for IRA.

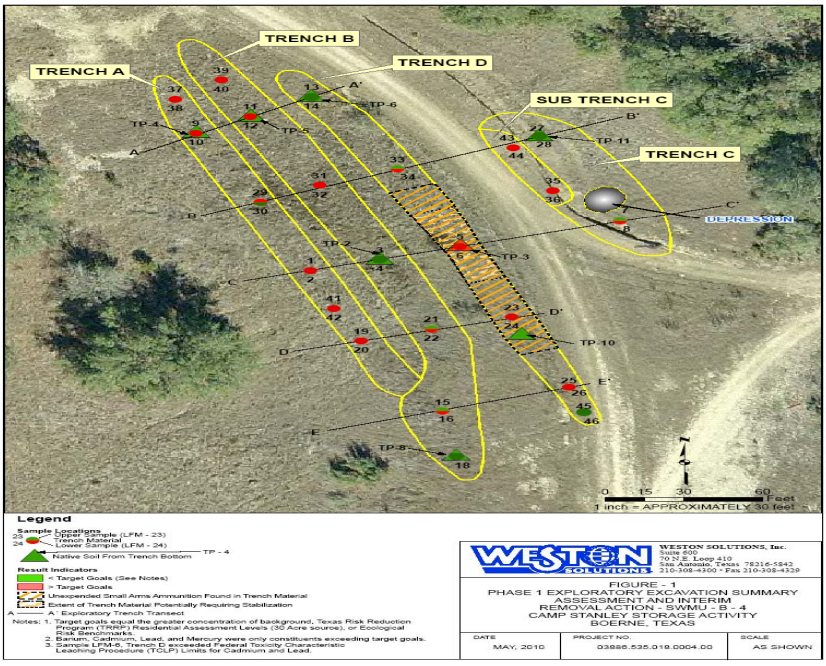
Results of SWMU B-4 Exploratory Phase

- Surface Soil
  - Ba, Pb, and Hg exceeded background and/or Tier 1 RALs.
  - Exceedances only in upper 0.5 foot interval (except Hg at SS3).
  - Additional delineation of Hg in northern portion of site.



Results of SWMU B-4 Exploratory Phase

- Exploratory Trenching Results
  - Four trenches found, 10 to 12 feet deep:
    - Munitions debris
    - Unexpended small arms ammo (Trench D)
    - Vehicle parts
    - Misc metal debris, plastic sheeting, etc.
  - VOCs, SVOCs, and explosives less than Tier 1 RALs.
  - Metals - Ba, Cd, Cu, Pb, Hg, Ni, and Zn greater than Tier 1 RALs.
  - TCLP limit for Pb and Cd exceeded in one sample (LFM 6) in lower layer trench material of Trench D.
  - Native soil below trench bottoms: Hg exceeded background and Tier 1 RAL in LFM 6 from Trench D.



Assessment Conclusions

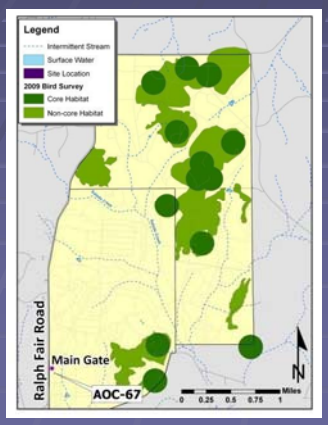
- Ba, Cd, Cu, Pb, Hg, Ni, and Zn were the only COCs exceeding critical PCLs in surface soil and trenches.
- Vertical extent of COCs exceeding critical PCLs appears to be limited to:
  - 0 to 0.5 feet below ground surface for affected surface soil; and
  - Subsurface soil 1 to 2 feet below the trench bottoms.
- Most impacted soil meets non-hazardous waste criteria. TCLP exceeded at one location in Trench D.

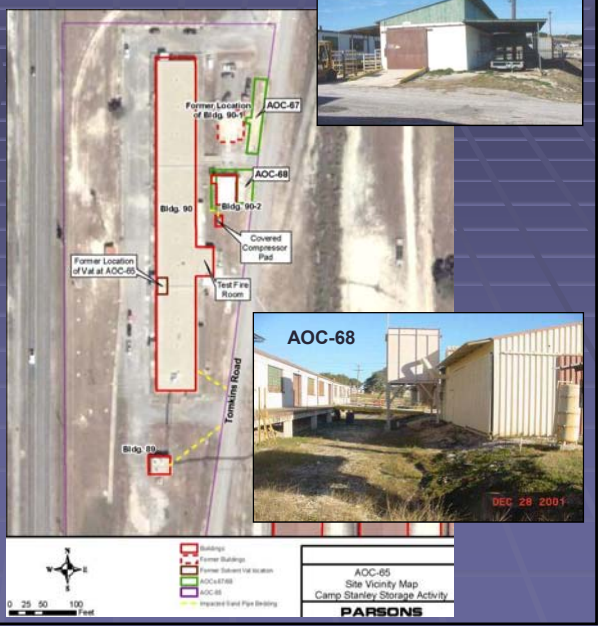
SWMU B-4 IRA Phase

- Perform additional surface soil delineation for Hg.
- Remove affected surface soil down to 1 foot.
- Remove and dispose trench soil and debris, treat as necessary to non-hazardous criteria.
- Sift small arms ammo from Trench D. CSSA to dispose of ammo.
- Confirmation Sampling
  - COC List: Ba, Cd, Cu, Pb, Hg, Ni, and Zn.
  - Sample frequency: 1 per 50 feet of sidewall and trench floor.

AOC-67/68

- AOC-67: Former Bluing Facility
- AOC-68: Wheelabrator



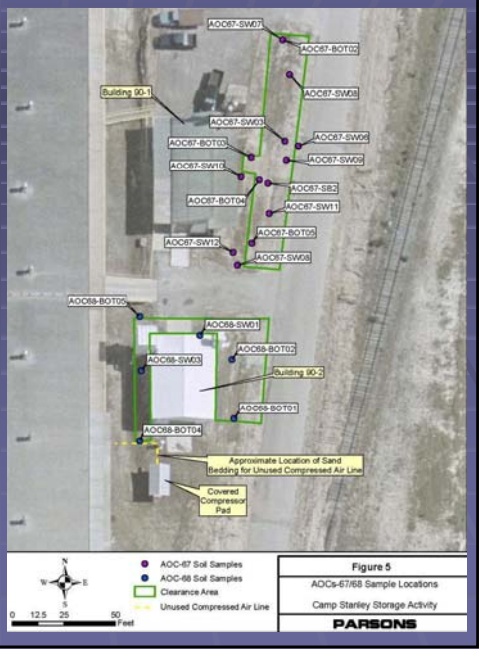


AOC-64/SWMU B-71

- All COCs > Tier 2 PCLs Removed.
- All COCs > Ecological Risk Benchmark Screening Values at 0-0.5 ft Removed.
- Sidewall and Floor Samples Analyzed for VOCs, SVOCs, Metals and Explosives.
- Vertical Delineation of Inorganic COCs to Background at Both Sites.
- N-Nitrosodiphenylamine near RL in 2 of 4 Floor Samples at SWMU B-71.
  - Observed Concentrations of 0.0132J and 0.0191J mg/kg (Tier 1 PCL 1.4 mg/kg).
- Benzene near RL in 1 of 5 Floor Samples at AOC 64
  - Observed Concentration of 0.0015 mg/kg (Tier 1 PCL 0.013 mg/kg).
- APAR:
  - NFA Based on Post-Removal Conditions.
  - To be Submitted for TCEQ Review September 2010.

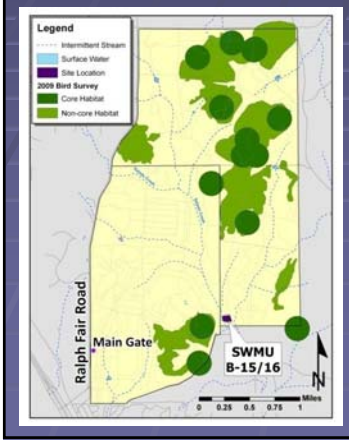
AOC-67/68

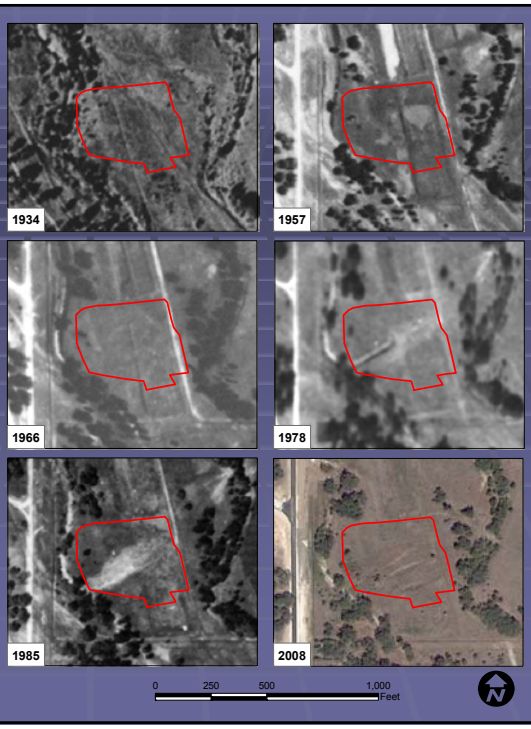
- Previously agreed that AOC-67/68 would be closed, but surrounding AOC-65 remains open
- AOC-67/68 meets requirements for no further action.
- Investigations near AOC-68 uncovered metals-impacted (lead and cadmium) sand pipe bedding underlying a compressed air line.
- Release Investigation Report (RIR) submitted June 30, 2010.
- Contaminated sand pipe bedding at AOC-65 to be addressed in upcoming project.



SWMU B-15/16

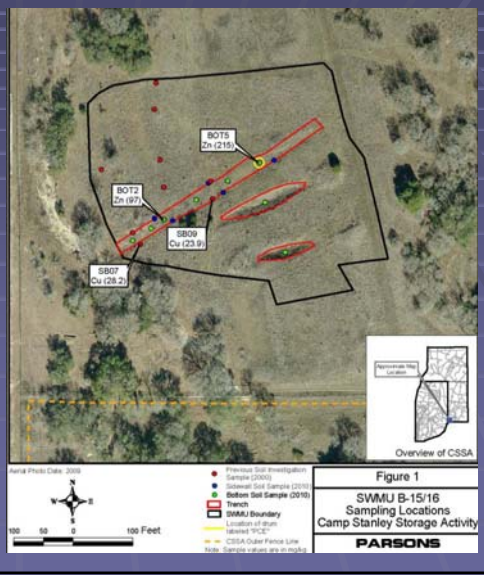
- Disposal trenches used in late 1970s





SWMU B-15/16
Disposal Trench Area: ~3.5 acres

- Previous investigation results indicate only copper slightly above background.
  - Samples SB07 and SB09 collected during initial RFI conducted in March 2000.
- All other investigation samples collected during 2000 RFI contained CSSA metal concentrations below background levels.



SWMU B-15/16
Current Investigation Results

- Excavated about 1,400 CY of soil material / metal debris from northern trench in March 2010.
- Trench contained mostly metal debris, including:
  - Munitions debris
  - One drum with PCE label
  - Target vehicles
  - Weapons mounts
  - Miscellaneous scrap metal
  - Tires
- Two additional trenches estimated to contain ~2,500 CY remain.

Debris from Excavation of North Trench

SWMU B-15/16
Photos

Debris - Large Tires

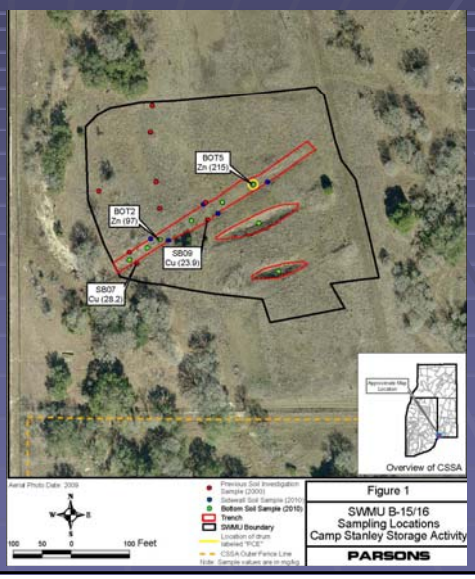
PCE Drum located within North Trench

Munitions Debris – Stokes Mortar and Flares

North Trench Excavation

SWMU B-15/16 Sample Results

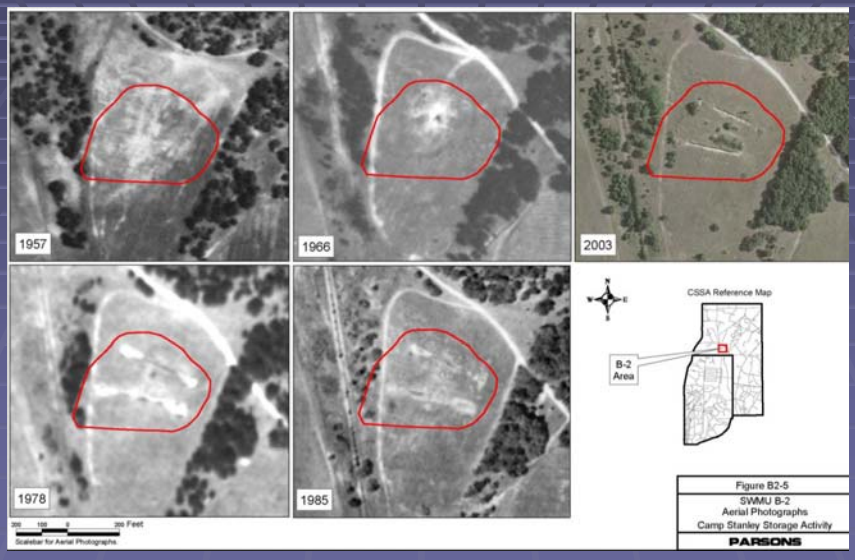
- 13 soil samples collected for CSSA 9 metals, and TPH analysis.
  - Zinc elevated above background criteria at two bottom sample locations (BOT2 and BOT5).
- 10 soil samples collected for VOCs analysis, including sample directly underneath PCE drum.
  - All VOC and TPH analysis were non-detect.
- 4 soil samples collected for waste characterization analysis.
  - Impacted soil media meets Non-Hazardous waste criteria.



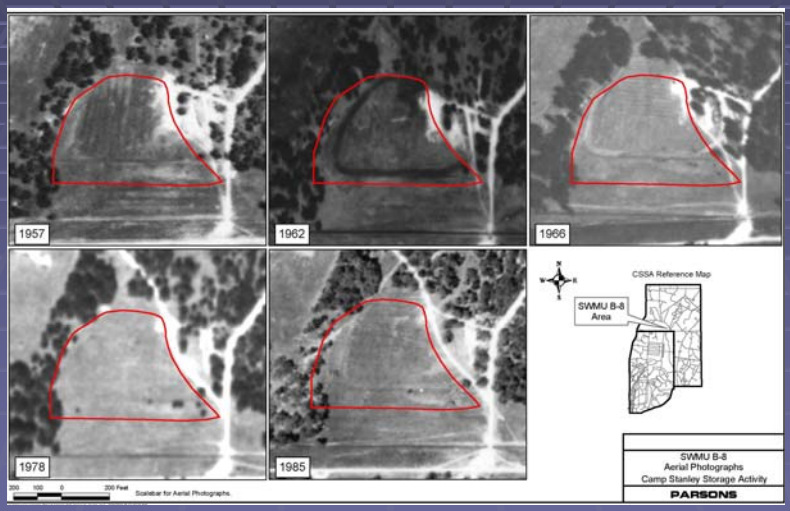
SWMU B-15/16
Next Steps

- Remove munitions debris from all current and expected excavated soil matrix.
  - Anticipate the need for segregation efforts similar to those accomplished at SWMU B-3 removal.
- Recycle munitions and metal debris at an authorized metal recycling facility.
  - MD expected to be recycled at certified facility authorized to manage material.
  - Scrap metal recycled at local salvage facility.
- Remove impacted soil media for proper disposal or use as range maintenance material within east pasture.
- Collect confirmation samples upon completion of all excavation activities.
- Complete closure reporting requirements through an APAR or RIR, as necessary.

SWMU B-2
Disposal Trench Area: ~2.6 acres



SWMU B-8
Former Burn Area: ~6.1 acres



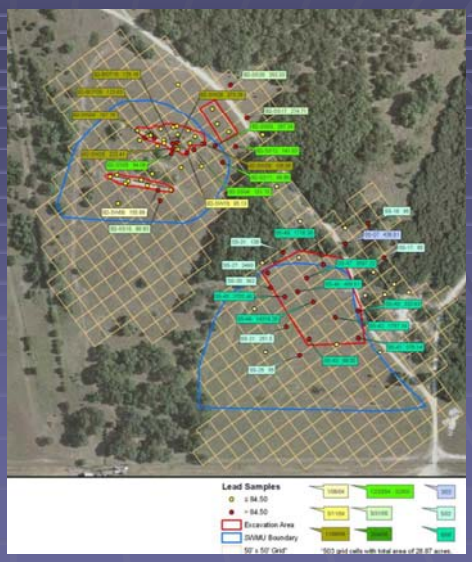
SWMUs B-2 and B-8

- SWMU B-2
  - Disposal trenches
  - Waste and soil (2,300 CY) excavated and disposed between 9/2003 and 3/2008;
- SWMU B-8
  - Reportedly used as a burn site during 1950's
  - Contaminated soil (2,500 CY) excavated between 3/2008 and 3/2009 for use as range berm maintenance soil at CSSA's East Pasture Range.
- Persistent above-background lead levels at both sites and barium, copper and zinc at SWMU B-8.

SWMU B-2 Excavation/Sifting - September 2003

SWMUs B-2 and B-8

- Previous analytical results of investigation samples after removal actions indicate lead concentrations remain above background criteria but below Tier 2 criteria.
- Grid sampling using x-ray fluorescence analyzer (XRF) to determine extent of remaining metal-contaminated soils throughout B-2 & B-8 area conducted in May and June 2010.

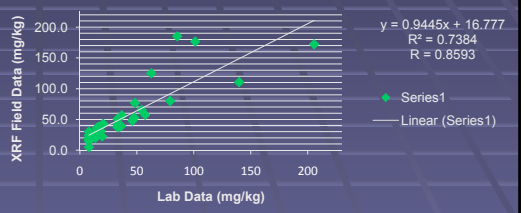


Status of Site Investigations

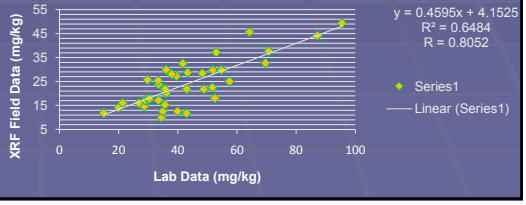
SWMUs B-2 and B-8

- Grid sampling to determine extent of remaining lead-contaminated soils throughout area using XRF analyzer with 10% of XRF samples collected for laboratory analysis.
- Preliminary results of lab data versus XRF data indicate very good correlation between lead and zinc less so for copper and barium.

Linear Correlation of Lead for Field XRF and Lab Data

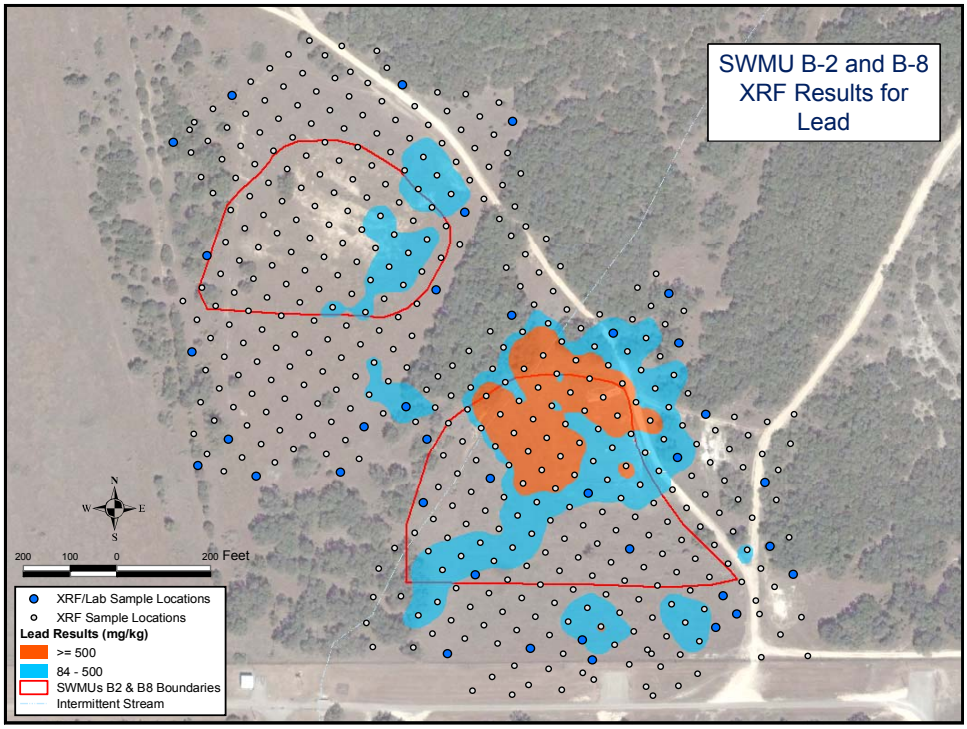


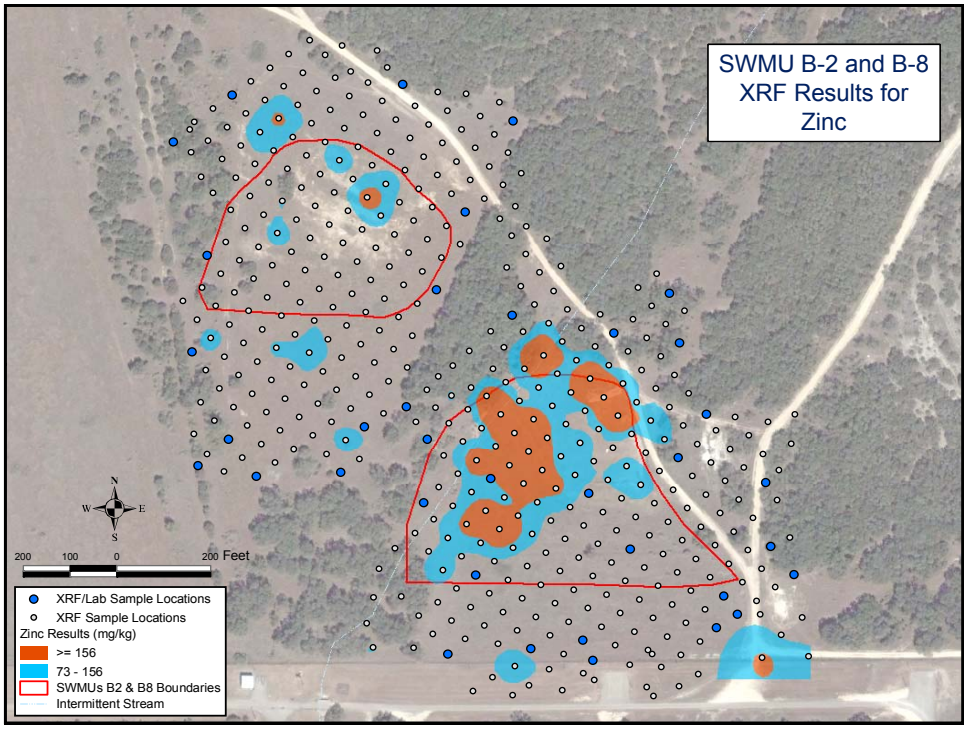
Linear Correlation of Zinc for Field XRF and Lab Data

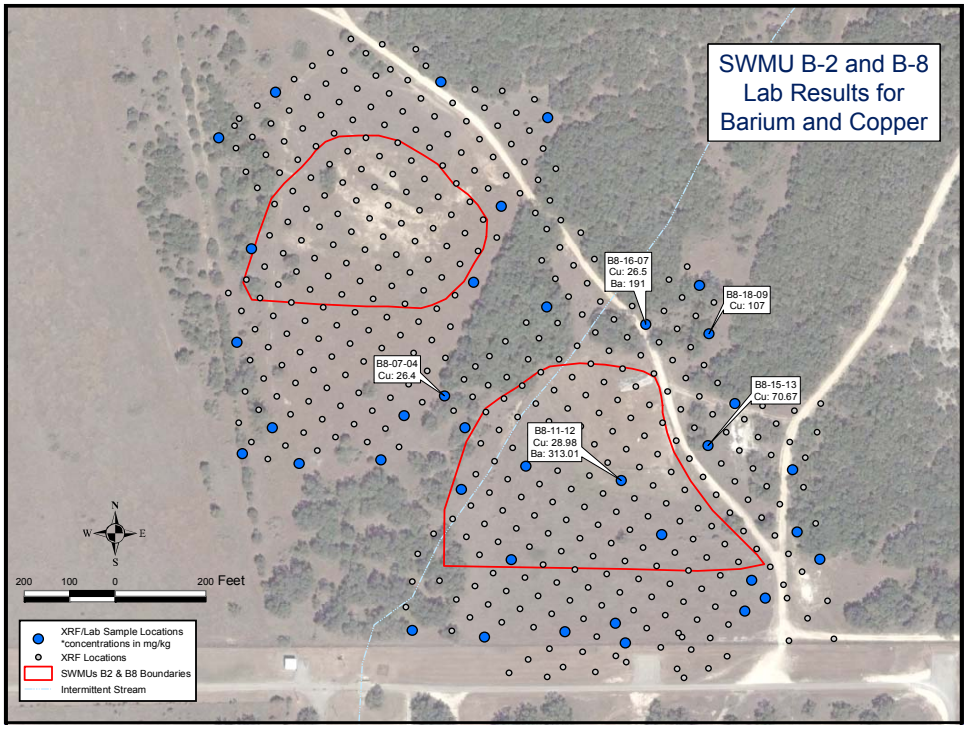


SWMU B-2 and B-8
Next Steps

- Combine sites for future work/closure activities due to proximity and similarity of contaminants.
- Determine cost of closure options including:
  - Additional removal and closure with RIR.
  - Additional removal followed by No Further Action APAR using Tier 2 criteria.
  - No Further Action APAR with Tier 2 criteria.
- Collect confirmation samples upon completion of all excavation activities as necessary.
- Complete closure reporting requirements through an APAR or RIR as necessary.




SWMU B-2 and B-8
XRF Results for
Zinc
N
W
E
S
200 100 0 200 Feet
XRF/Lab Sample Locations
XRF Sample Locations
Zinc Results (mg/kg)
>= 156
73 - 156
SWMUs B2 & B8 Boundaries
Intermittent Stream

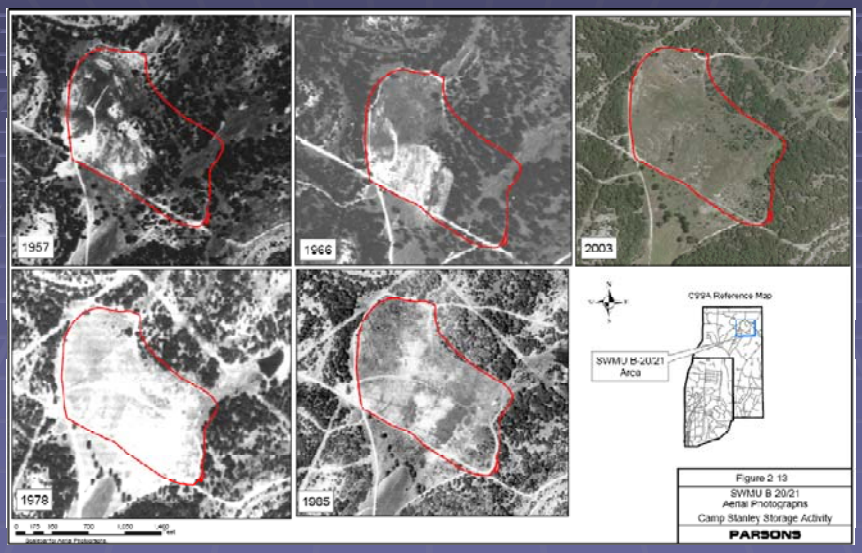

SWMU B-2 and B-8
Lab Results for
Barium and Copper
B8-16-07
Cu: 26.5
Ba: 191
B8-18-09
Cu: 107
B8-07-04
Cu: 26.4
B8-15-13
Cu: 70.67
B8-11-12
Cu: 28.98
Ba: 313.01
N
W
E
S
200 100 0 200 Feet
XRF/Lab Sample Locations
*concentrations in mg/kg
XRF Locations
SWMUs B2 & B8 Boundaries
Intermittent Stream

North Pasture Sites Update (SWMU B-20/21 & B-24)

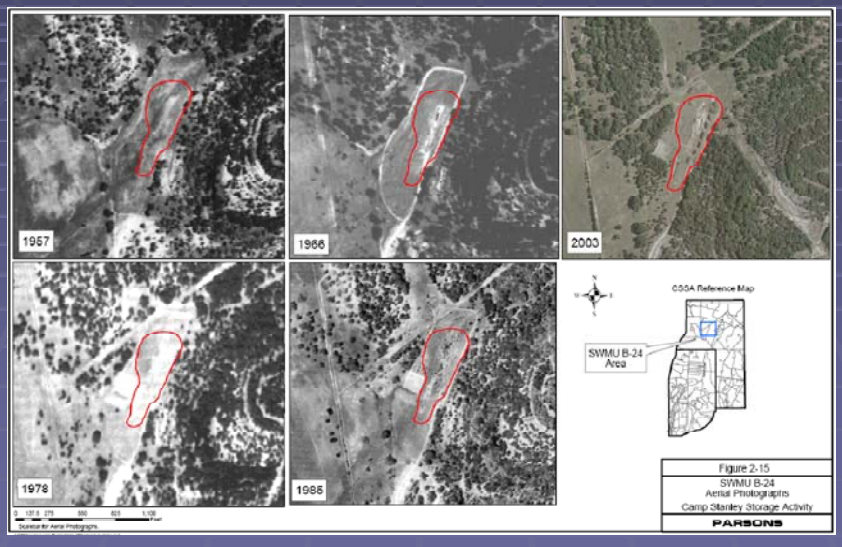
SWMU B-20/21 and B-24

Goal for both SWMUs is site closure with necessary land use controls to ensure personnel safety.

SWMU B-20/21
Open Burn/Open Detonation Area: ~33.5 acres



SWMU B-24
Waste Trenches: ~5 acres



SWMU B-20/21
MEC Findings

Over 1,300 surficial and subsurface MEC items found including:

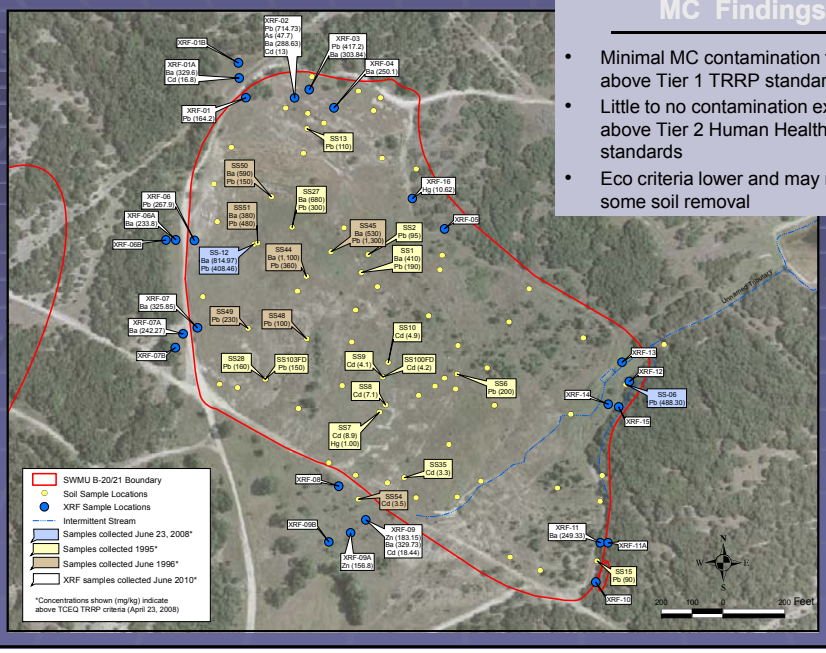
- Small arms ammunition
- Projectiles: 20, 30, 40, 57, 60, 66, 75, 90, & 120mm (~55%)
- Mortars including 60mm, 81mm, 107mm, 3" Stokes, 4" Stokes (~3%)
- 20-lb fragmentation bombs (~5%)
- Hand grenades (~3%)
- Anti-personnel and anti-tank mines (~1%)
- 2.75", 3.5", 66mm, and 5" rockets (~2%)
- Miscellaneous demolition materials including blasting caps, fuzes, etc. (~30%)
- ❖ Three BLU antipersonnel bomblets (cluster bomb submunitions)

In summary:

- **Wide variety of items**
- **Very small items (20 mm projectiles)**
- **High risk items (BLU antipersonnel bomblets)**

SWMU B-20/21
MC Findings

- Minimal MC contamination found above Tier 1 TRRP standards
- Little to no contamination expected above Tier 2 Human Health TRRP standards
- Eco criteria lower and may require some soil removal



SWMU B-24
MEC Findings

Over 1,500 surficial and subsurface MEC items found including:

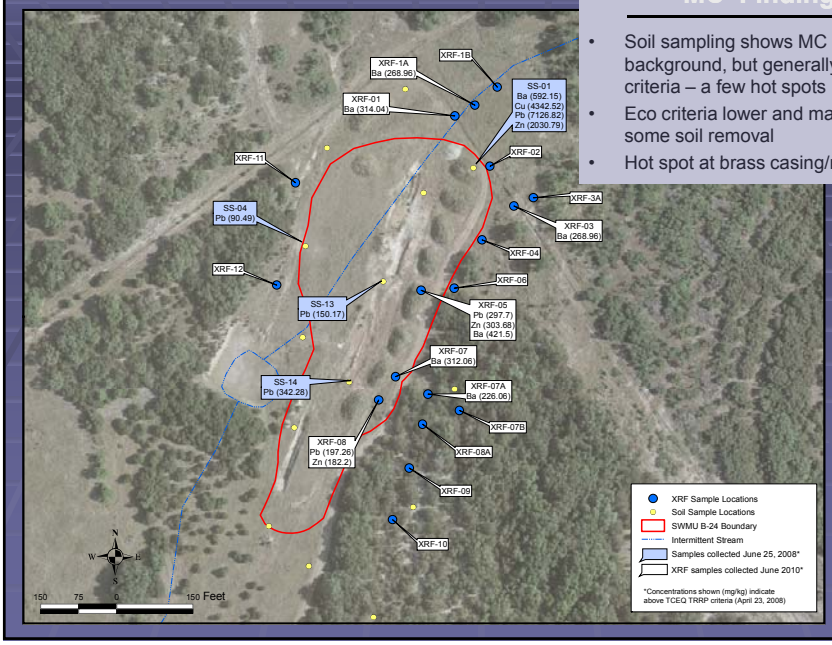
- Small arms ammunition
- Projectiles ranging from 20mm to 75mm (~95%)
- Hand grenades (~3%)
- Various fuzes (~2%)

In summary:

- **Majority small arms and 20mm**
- **Occasional hand grenades require higher level of safety precautions**

SWMU B-24
MC Findings

- Soil sampling shows MC above background, but generally below Tier 2 criteria – a few hot spots
- Eco criteria lower and may require some soil removal
- Hot spot at brass casing/rock pile



SWMU B-20/21 and B-24
Bottom Line

- Soil sampling shows MC above background, but generally below Tier 2 criteria – a few hot spots
- 2009 Geophysical survey shows many anomalies located throughout; many more at B-20/21
- High Hazard Levels (based on MEC Hazard Assessment):
  SWMU B-20/21 is Hazard Level 1
  SWMU B-24 is Hazard Level of 2
- At B-24: majority of MEC found is 20mm and small arms ammunitions. Hand grenades also present. Hazardous Fragment Distance (HFD) is 234 feet – based on 75mm projectile
- At B-20/21: Wide variety of items, including antipersonnel bomblet. HFD is 398 feet - based on 5" rocket

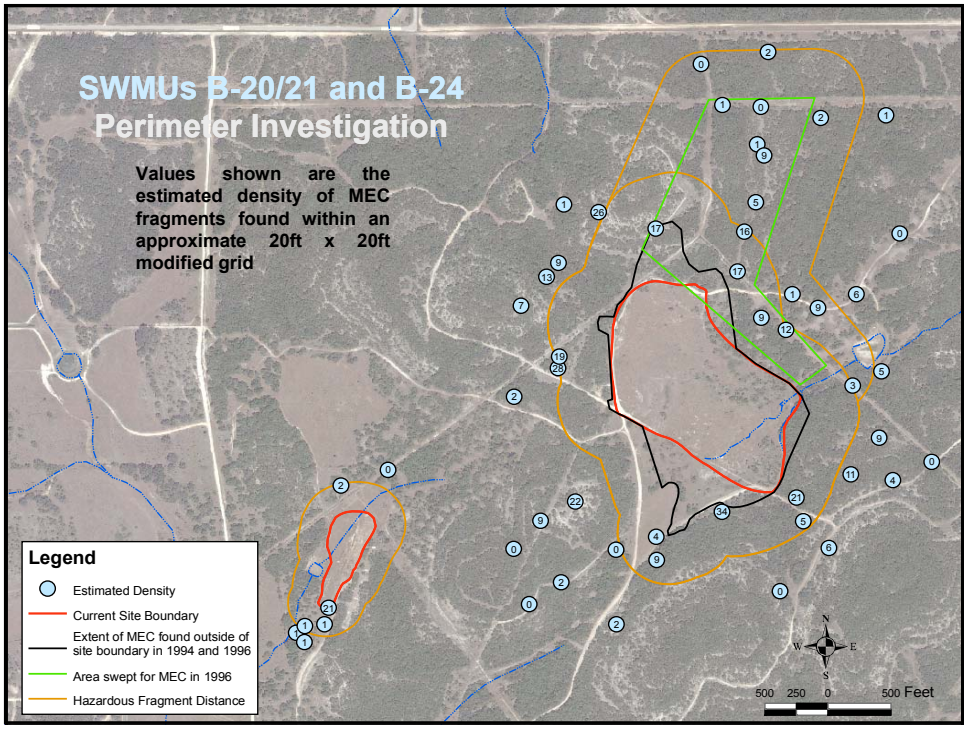
SWMUs B-20/21 and B-24
Remedial Action Alternatives

Remedial Action Alternative	B-20/21 Change to Hazard Assessment		B-24 Change to Hazard Assessment		Relative Costs	Addresses MC issue
	Score	Level	Score	Level		
No Action	840	1	770	2	Low	No
Access Restriction	800	2	730	2	Low	No
Remediation * Surface Removal	575	3	505	4	High	No
Surface Removal with Access Restriction	535	3	465	4	High	No
Removal to Depth	445	4	375	4	High	Yes

*** costs estimates for full scale removal effort at SWMU B-20/21 range from $14 to 35 million.**

SWMUs B-20/21 and B-24 Next Steps

- MC Contamination
  - Prepare an APAR using TRRP Tier 2 PCLs:
    - provides a comprehensive overview of extent of MC contamination
    - develops recommendation(s) for future environmental management of the area
- MEC Contamination
  - APAR not applicable
  - Delineation of extent of MEC contamination still necessary in order to implement land use controls

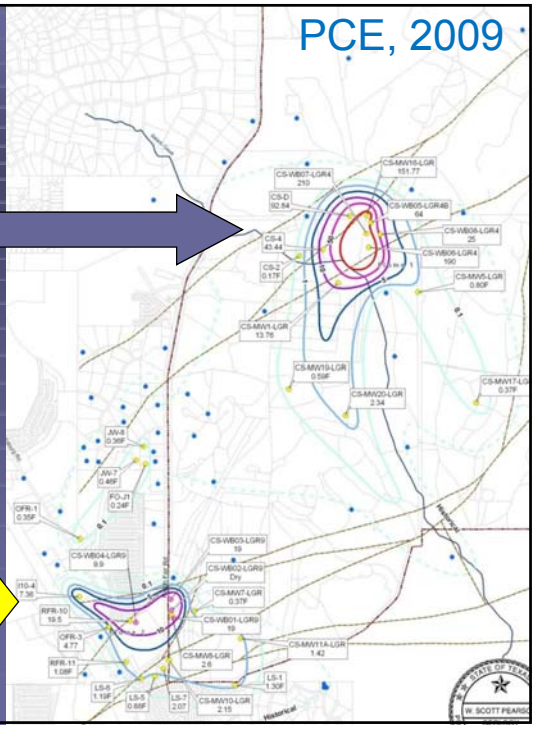


TREATABILITY STUDIES STATUS UPDATE

CSSA Pilot Studies Description

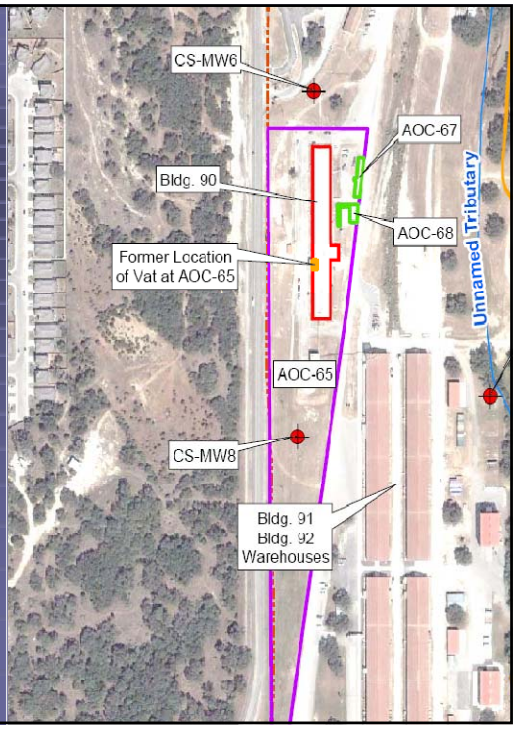
1. **SWMU B-3 Bioreactor Pilot Study:** Enhanced anaerobic bioremediation of chlorinated hydrocarbons in underlying fractured limestone at Plume 1.

2. **AOC-65 Soil Vapor Extraction Pilot Study:** Removal of chlorinated hydrocarbons in underlying fractured limestone at Plume 2.



AOC-65 Background

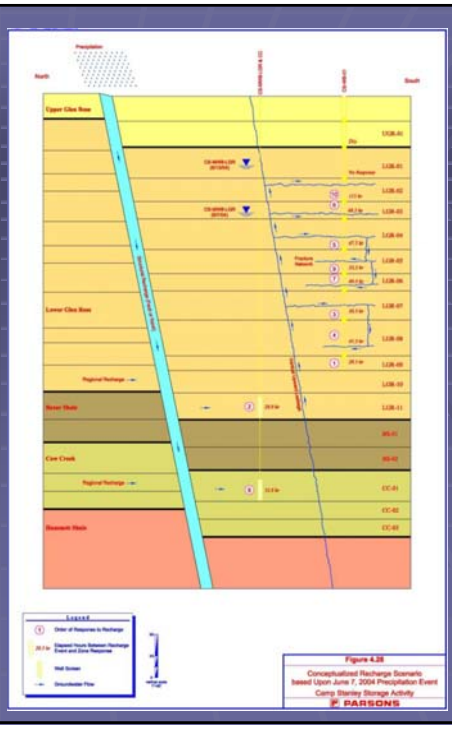
- AOC-65 consists of an area surrounding Building 90.
- Operations included chlorinated solvent degreasing units (vats) which ceased operations and were removed in 1995.
- Initial investigations identified groundwater plume (2) in 1999.
- Interim Removal Actions in 2001 excavated and disposed ~ 1,300 CY of impacted soil media off-post.
- SVE Pilot Study initiated in 2002.



CSSA Conceptual Recharge Scenario

- Long-term monitoring shows that groundwater response to precipitation events can be swift and dramatic. Depending on the severity of a precipitation event, the groundwater response will occur within several days, or even hours.
- The LGR aquifer "bottom fills" from precipitation events.

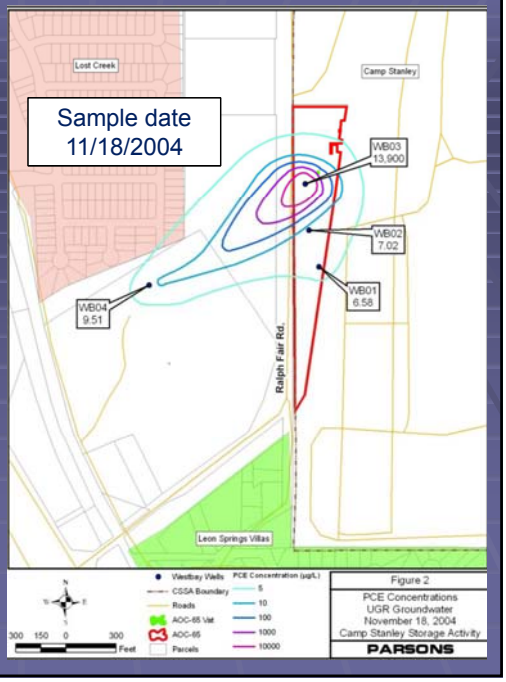
Right: Conceptual Recharge Scenario figure based on June 2004 precipitation event at AOC-65.



AOC-65 Background

- The greatest concentrations of solvents are reported at the near subsurface adjacent to the source area.
  - CS-WB03-UGR has contained PCE concentrations as high as 30 mg/l (3/17/2008) suggesting the presence of DNAPL but never noted on boring logs.
- However, once the main aquifer body is penetrated, the concentrations are diluted to trace levels.
  - CS-MW8-LGR sampled December 8, 2009 contained PCE concentrations of 2.6 µg/l.
- The 11/2004 sampling event is the only event were all four Westbay wells contained water within the UGR.

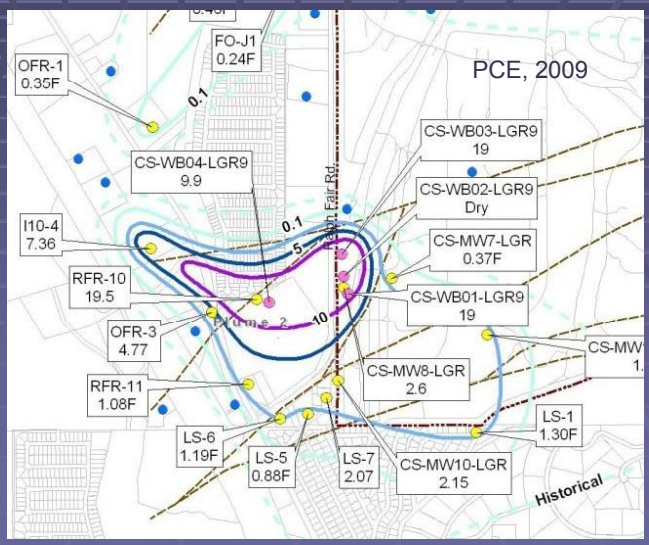
Right: PCE concentrations within UGR groundwater based on November 2004 sampling event.



CSSA PCE Plume 2 Map

- Depth to groundwater ranges from 70 to 300 ft.
- Contaminant concentrations several order of magnitude less than the source area.
- Contaminants appear to migrate slowly and vertically from UGR zone to the LGR through surface precipitation.

Right: PCE concentrations from LGR groundwater for December 2009 sampling event.

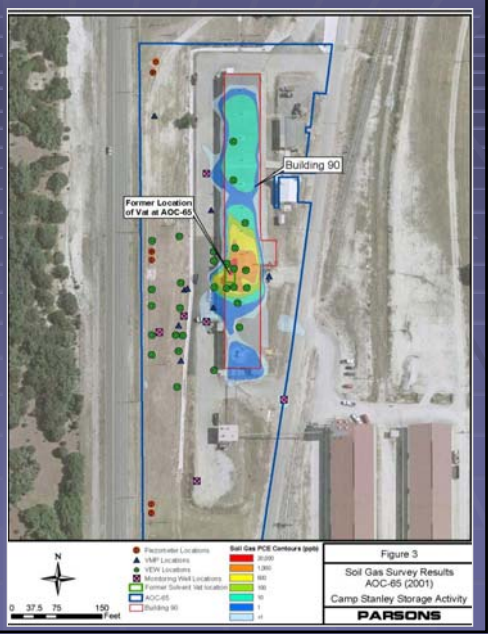


AOC-65 Vapor Intrusion Study

Previous Soil Vapor Monitoring Results

- 2001: PCE/TCE in soil gas is primarily under Building 90.
- 2002: Indoor air studies (Personal air monitors) showed that VOCs in Building 90 breathing zone air did not exceed the OSHA PELs/NIOSH RELs. However, the detection limits were higher than USEPA's residential indoor air risk screening levels.
- Previous data collected in 2001/2002 were inconclusive for identifying a completed vapor intrusion pathway for PCE above residential indoor air risk screening levels.

Right: Aerial photograph showing the location of VEWs, VMPs, piezometers and monitoring wells, and soil gas vapor concentrations from 2001.

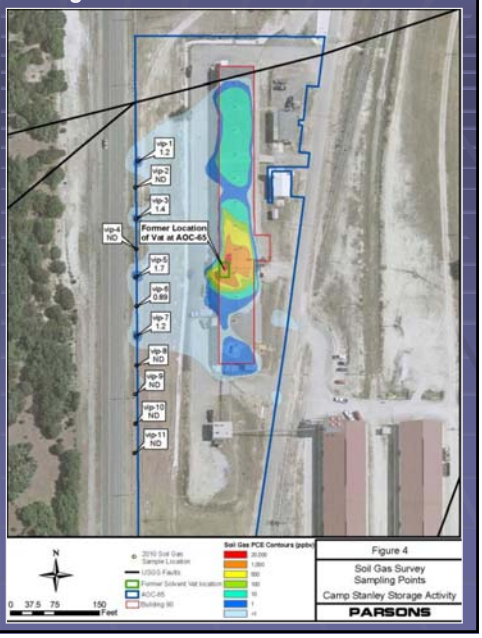


AOC-65 Vapor Intrusion Study

2010 Soil Vapor Monitoring Results

- 2010 results suggest the extent of PCE/TCE in soil gas has migrated to the west. However, data collected in 2010 used better collection methods and provided lower detection limits than 2001 data.
- The area has approximately 3.5 – 5 foot soil cover with soil vapor samples collected at the UGR/Soil interface.
  - Intent to provide result on potential soil vapor intrusion from source area soil gas.
- Data may be used to estimate vapor intrusion potential for residential areas using the Johnson and Ettinger Model (J&E) to estimate surface ground level concentrations.
  - The J&E model is appropriate for relatively homogeneous soil matrix and not fractured bedrock systems.

Right: Aerial photograph with draft soil gas vapor concentrations from 2010.



AOC-65 Vapor Intrusion Study
2010 Indoor Air Vapor Monitoring

- Collected 24 hour indoor air samples from Building 90 with the SVE system off and again with the SVE system operating for PCE analysis using USEPA TO-15 Selective Ion Method (SIM).
  - Intent is to provide result on potential soil vapor intrusion within building from source area.
  - Analysis method provides lowest detection limit currently available.
- Data results and subsequent interpretations may be limited due to:
  - Potential PCE off gassing from equipment/materials within building (e.g., old wooden benches/tables still in use, concrete areas, etc.).
  - Construction of building may be dissimilar to residential construction.
- Data included collection of background samples collected from the dock located outdoors at the south end of Building 90.

AOC-65 Vapor Intrusion Study
2010 Indoor Vapor Monitoring Results

- 2010 USEPA Risk Screening Level (RSL) for PCE within residential indoor air is 0.07 parts per billion volume (ppbv) or 0.41 micrograms per cubic meter (µg/m^3).
- RSL for residential indoor air calculated using TCEQ toxicity data for PCE is 1.6 ppbv or 6.1 µg/m^3.
- Currently, indoor air from within Building 90 indicate PCE concentrations of approximately 0.24 ppbv or 1.6 µg/m^3 which is below TCEQ RSL criteria but above the USEPA RSL for PCE.

Sample ID	PCE Results (µg/m^3)	PCE Results (ppbv)
Bldg 90 Air 01 w/ SVE off	1.6	0.24
Background 01	ND	ND
Bldg 90 Air 02 w/ SVE on	1.5	0.22
Background 02	0.65	0.072

Vapor Intrusion Investigation
Next Steps

1. Collect additional Indoor Air Quality samples from Building 90 (source area).
   - Currently anticipate repeating data collection efforts for sampling and analyzing indoor air within building 90 by TO-15 SIM for PCE.
2. Collect additional soil gas samples from other areas within or near AOC-65.
   - Anticipate collection of additional soil gas data from AOC-65 area outside the source area for data regarding potential impact from LGR groundwater.
3. Collect physical soil property data to refine J&E Model for estimating site specific attenuation factors used to assess risk to indoor air quality, as necessary.
   - Soil physical property data may be collected to refine the J&E Model for predicting soil gas vapor intrusion.

Current AOC-65 SVE Pilot Study Observations

- SVE appears to be removing some amounts of organics from the underlying limestone. Estimated removal rate of PCE (based on analytical data from average of sampling events) for SVE system is:
  - 2008/2009 rate ~ 132 lb/yr.
  - 2009/2010 rate ~ 13 lb/yr[1].
- Emissions continue to be within permit by rule (PBR) limits:
  - AOC-65 SVE permitted PCE emission allowance = 0.268 lb/hr
  - Actual AOC-65 SVE PCE emission rate = 0.021 lb/hr[1]

Note 1 – Reduced removal rate due to blower maintenance and an increase in groundwater levels over VEW screened areas .

AOC-65 Treatability Study Enhancement
Next Steps

- Determine effectiveness of thermally-enhanced SVE (using steam).
- Perform a Technology Assessment to identify other potential remedial options.

AOC-65 Treatability Study Enhancement
Objectives of Thermal-Enhanced SVE Pilot Study

- Apply steam heat to Bldg. 90 subslab system as thermal source to determine if adsorbed CVOCs in underlying limestone volatilize.
- Determine if thermally enhanced SVE is an effective approach for additional removal of CVOC from the underlying limestone formation.
- In progress: Preparing work plans to perform limited study using existing SVE system and CSSA Bldg 89 boiler.

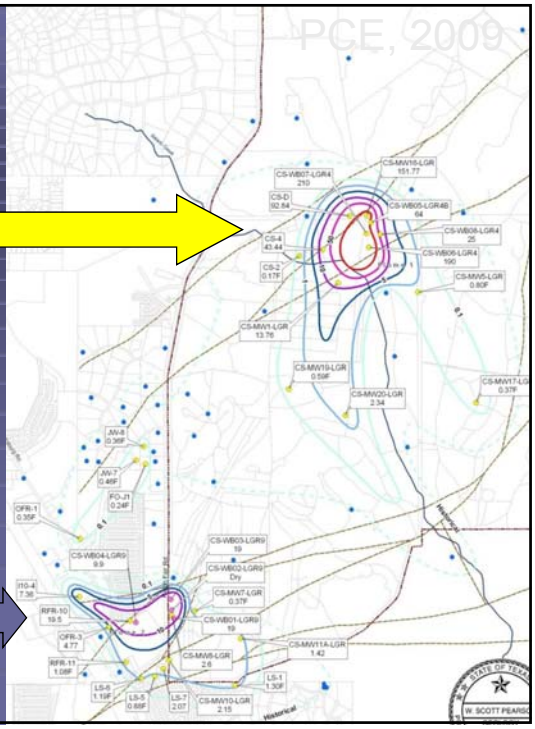
AOC-65 Treatability Study Enhancement
Technology Assessment Objectives

- Describe currently identified remedial options (e.g., thermally-enhanced SVE).
- Identify and describe other possible technologies to evaluate.
- Provide preliminary evaluation of pros and cons of each technology.
- Address possible increased contaminant migration caused by remediation process.
- Identify path forward for additional pilot studies and remediation.
- Draft Technology Assessment to be completed in 2010.

CSSA Pilot Studies
Description

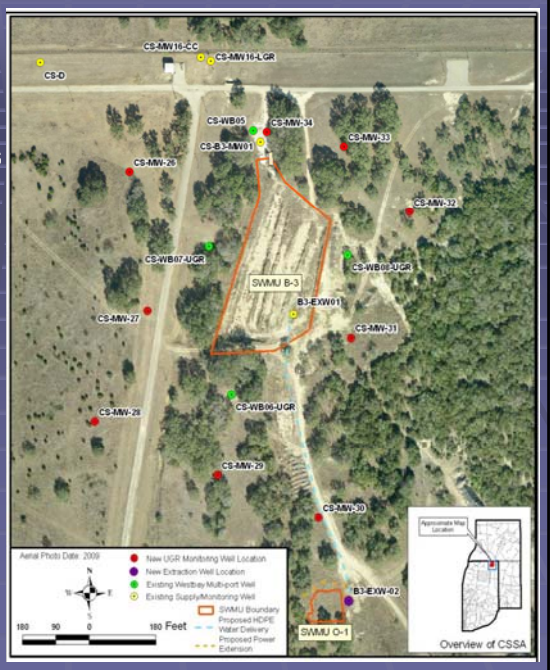
1. **SWMU B-3 Bioreactor Pilot Study:** Enhanced anaerobic bioremediation of chlorinated hydrocarbons in underlying fractured limestone at Plume 1.

2. **AOC-65 Soil Vapor Extraction Pilot Study:** Removal of chlorinated hydrocarbons in underlying fractured limestone at Plume 2.



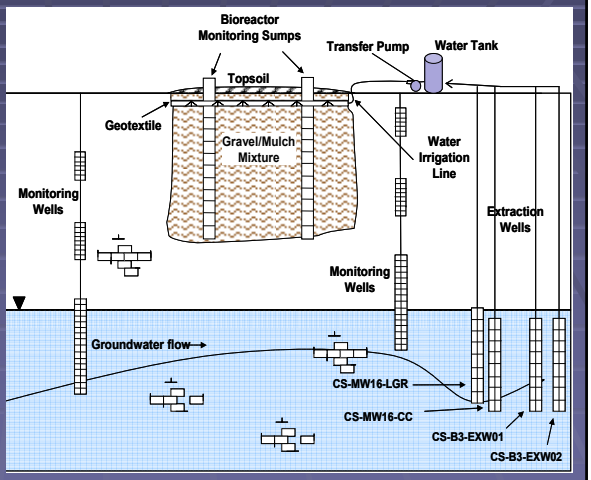
SWMU B-3
Background

- SWMU B-3 consists of 6 trenches operating from 1970's thru1980's.
- Identified in 1995 as potential source of groundwater contamination at nearby supply well (well 16).
- ~15,200 CY waste excavated from SWMU B-3 and disposed off-post in 2006.
- Bioreactor initiated operations in 2007 under TCEQ UIC Authorization No. 5X26004321.



B-3 Bioreactor Pilot Study
General Observations

- Bioreactor is effectively treating injected contaminated groundwater.
- Biotic and abiotic degradation is occurring.
- Significant contamination likely remains in the fractured bedrock formation. Underlying CVOCs are being flushed.

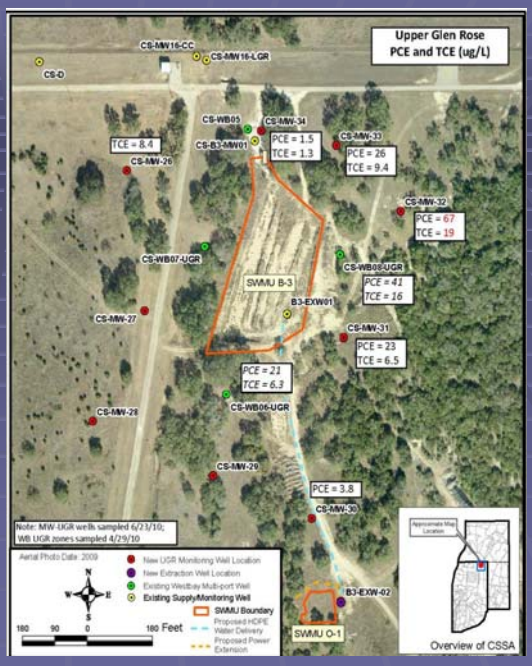


B-3 Bioreactor Pilot Study Objectives
Review and Summary

- Determine if the bioreactor is an effective approach for treatment of groundwater at SWMU B-3 (Plume 1).
  - Biodegradation occurring, but need to capture additional water.
    - **Installed second extraction well at O-1 (April-June 2010).**
- Evaluate the extent of bioreactor influence on the effectiveness of treatment in the surrounding fractured media.
  - Local extent of bioreactor currently being investigated
    - **Installed 9 shallow monitoring wells (April-June 2010). Wells were sampled in June 2010 and will continue to be sampled quarterly.**
- Evaluate the migration of contaminants through the underlying formations and into the underlying aquifer.
  - Local migration pathway(s) investigation continues
    - **Continued monitoring at least through October 2010**
    - **Tracer study using CS-12 groundwater identified connections from T-6 to other trenches, and unsaturated and saturated zones in nearby Westbay wells.**

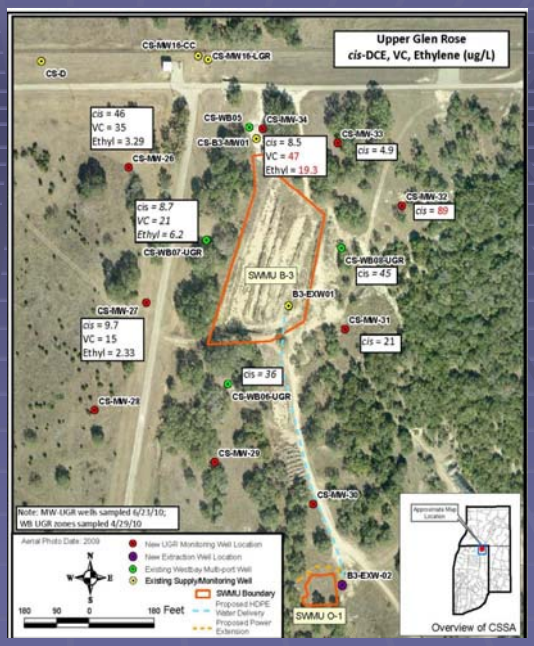
B-3 Bioreactor Pilot Study
New Shallow Well Observations

- An additional 9 shallow monitoring wells constructed within the UGR sampled in June 2010 for Performance Analysis.
- Shallow wells east of the bioreactor contain elevated concentrations of PCE and TCE.
- Shallow wells to the west of the bioreactor contain minor concentrations of PCE or TCE.



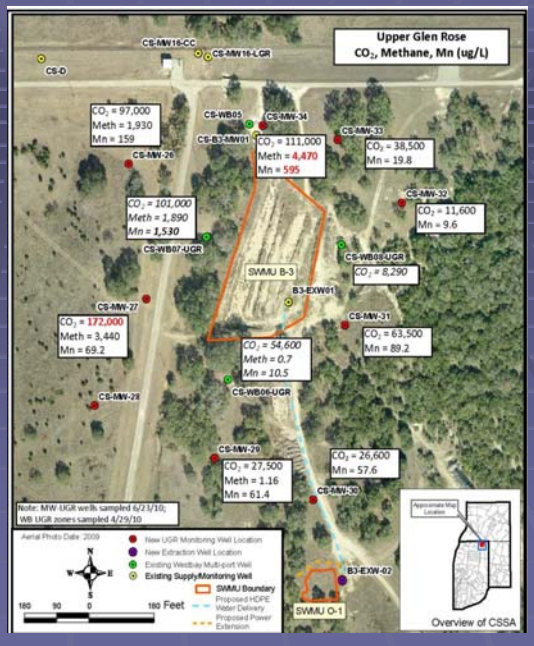
B-3 Bioreactor Pilot Study
New Shallow Well Observations

- Shallow wells north and west of the bioreactor contain elevated concentrations of microbial degradation products vinyl chloride (VC) and ethylene (Ethyl).
- Shallow wells to the east of the bioreactor contain degradation compound concentrations of *cis*-DCE.



B-3 Bioreactor Pilot Study
New Shallow Well Observations

- Shallow wells surrounding the bioreactor contain elevated concentrations of other biotic/abiotic degradation products Carbon Dioxide (CO_2), Methane (Meth) and Manganese (Mn).
- CS-MW-28 was dry during the June 2010 sampling event.



SWMU B-3 Bioreactor Treatability Study
Next Steps

- Continue monitoring bioreactor for UIC Permit and Performance parameters.
- Continue Investigation of degradation pathways through microbial and isotope analysis .
- Investigate other potential extraction well installation area(s).

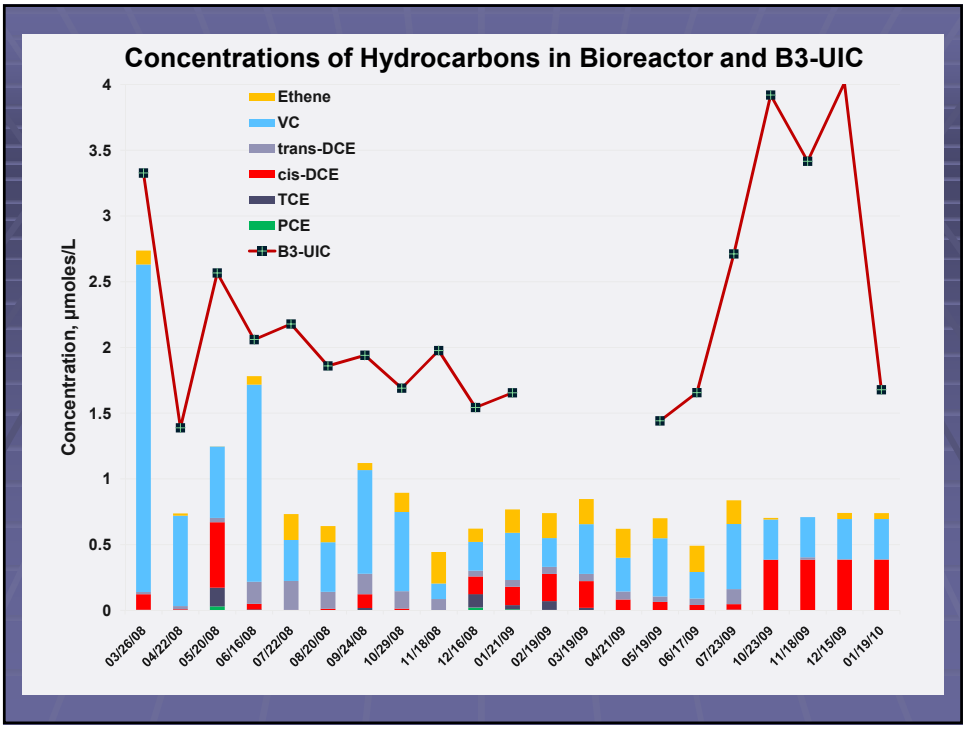
NOBLIS TREATABILITY STUDIES STATUS UPDATE

Specialized Studies

- Investigating opportunities for optimizing/enhancing degradation of contaminants at SWMU B-3
- Conducted specialized tests to investigate biogeochemical pathways of degradation in both aquifer and bioreactor
  - Compound-specific stable isotope analysis
  - Stable isotope probes
  - AMIBA
  - Bacterial gene expression

Improves Knowledge of Bioreactor Performance

- Improved model of degradation pathways in bioreactor
  - Approximately ½ of contaminant mass degraded to CO_2 by bacteria using manganese pathway
  - Dechlorination by *Dehalococcoides* less important than we initially thought
  - Dechlorination by reduced iron distinct possibility
  - Dechlorination by sulfate reducing bacteria also very likely
- BOTTOM LINE-
  - Degradation in bioreactor is complex process
  - Several opportunities exist for enhancing process
  - Inherent degradation potential in sub-surface



Stable Isotope Probes

- On average ~ 50% of contaminant mass added to bioreactor cannot be accounted for
- Substantial amount of soluble Mn[II] produced in bioreactor
- Stable isotope probes used to provide evidence for oxidation pathway leading to CO_2 and Mn[II]
- Probes contain PCE enriched in 13C
- Expect to find 13C in CO2 end product of oxidation

$CH_2CHCl + Mn[IV] + 4H_2O \rightarrow 2CO_2 + Mn[II] + Cl^- + 11H^+$ *equation 1*

$CHClCHCl + 2Mn[IV] + 4H_2O \rightarrow 2CO_2 + 2Mn[II] + 10H^+$ *equation 2*

$H_2S + MnO_2 \quad S^0 + Mn[II] + 2\ OH^-$ *equation 3*

Results for Stable Isotope Probes Containing ^{13}C-PCE Deployed in Bioreactor

	Sample T1-1	Sample T1-2	Sample T1-3
% ^{13}C-Contaminant Loss	40	22	0
PLFA δ^{13}C (‰)	42	25	19
DIC δ^{13}C (‰)	30	44	25
Anaerobic Metal Reducers (% total PLFA)	3.5	0.7	0.4

- Isotopic fractionation of ^{13}C in DIC
  - Consistent with oxidation of DCE/VC to CO_2
- Isotopic fractionation of ^{13}C in PLFA
  - Incorporation of ^{13}C by an assimilatory pathway
- PLFA indicates presence of metal-reducing bacteria

- Results for probes supports anaerobic oxidation pathway for DCE/VC

Sulfate May Contribute to Dechlorination Via Reduced Iron

Results for SO_4^{-2} are consistent with the hypothesis that Fe[II] is formed after dissimilatory SO_4^{-2} reduction, and subsequently oxidized to Fe[III] during dechlorination, forming thiosulfate which disproportionates to bisulfide and sulfate (see equation 4 for stoichiometry)

$$2SO_4^{-2} + 16e^- \rightarrow 2H_2S \rightarrow 2FeS \rightarrow 2Fe^{+3} + S_2O_3^{-2} \rightarrow HS^{-1} + SO_4^{-1} \quad (equation\ 4)$$

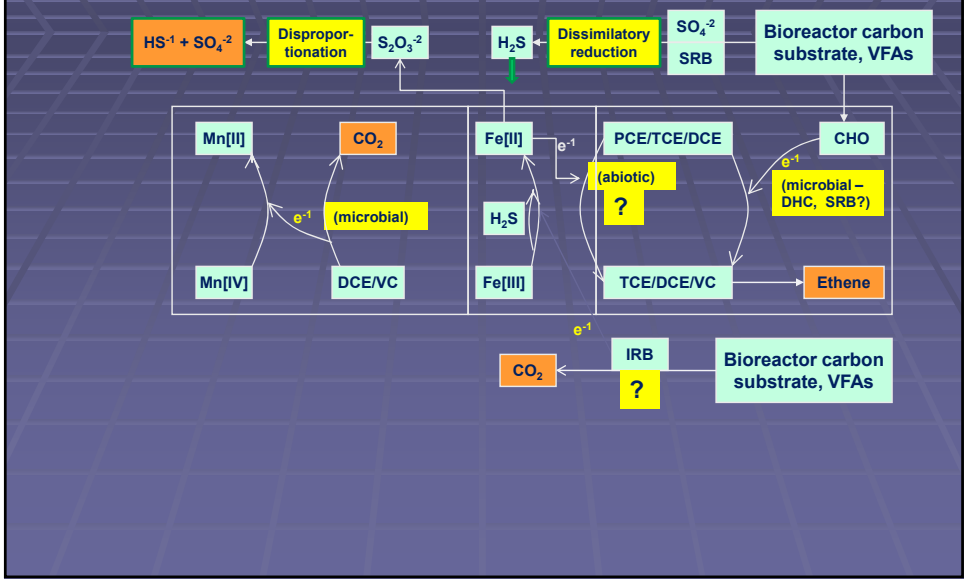
Fe[III]oxide C_2Cl_4 C_2Cl_3

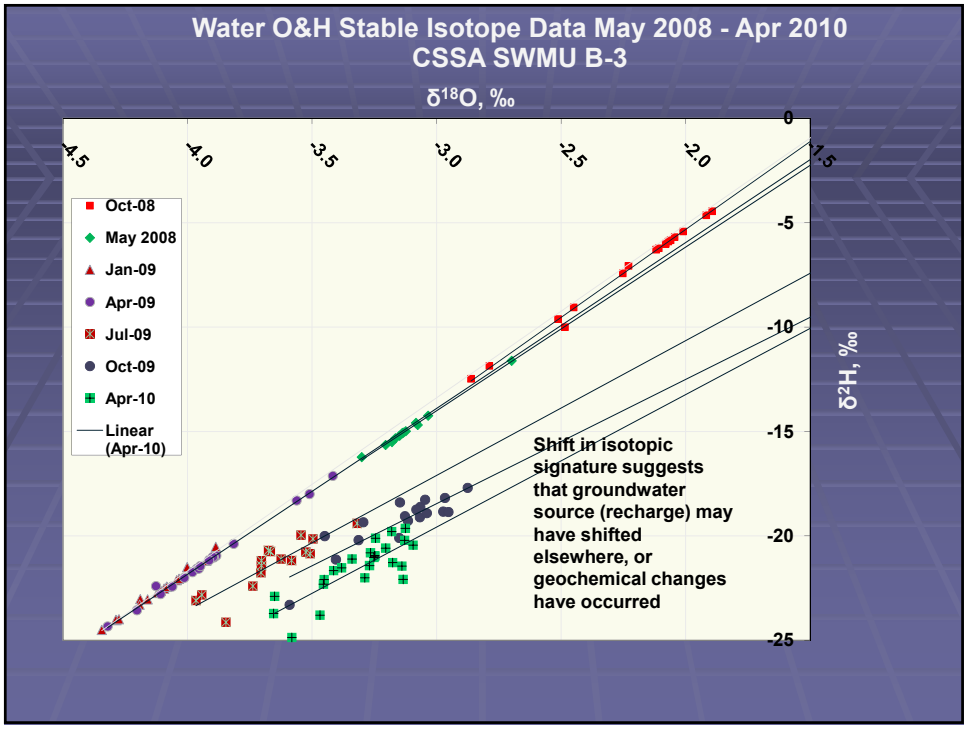
Bioreactor Microbial Assays – June 2010

Group	Target	T1-1	T1-2	T1-3
Sulfate Reducing bacteria	APS gene	1.76E+04	6.56E+04	1.17E+05
Iron and Sulfate Reducing Bacteria	16S rRNA gene (phylogenetic)	2.80E+05	1.12E+05	7.56E+05
Sulfate Reducing Bacteria	APS mRNA	2.15E+05	2.57E+05	<5E-04
Iron and Sulfate Reducing Bacteria	mRNA ????	1.83E+07	1.20E+06	1.07E+06

- Sulfate-reducing bacteria (SRB) are actively reducing sulfate to H_2S
- SRB can also dechlorinate CAH to cis-DCE
- H_2S produced may reduce iron in minerals

Proposed Bioreactor Model





Soil Data collected June 2010

Specie	Description	Units	B3-Background	T1-2	T1-3
Sulfide	AVS	mg/kg/dry	<1000	**1800**	1600
	Cr-extractable Sulfide	mg/kg/dry	<1000	**2300**	<1300
Mn	Bio-A Mn(IV)	mg/kg/dry	**13.8**	<7.2	<6.4
	Strong Acid Divalent Mn	mg/kg/dry	**755**	<29	**80.3**
	Weak Acid Soluble Divalent Mn	mg/kg/dry	<10.100	<14.500	<12.800
Fe3+	Bio-A Fe(III)	mg/kg/dry	**30.7**	**152**	**145**
	Oxidized Iron	mg/kg/dry	<5	<7.2	**14.1**
	Strong Acid Ferric Iron	mg/kg/dry	**77.5**	<29	**776**
	Weak Acid Ferric Iron	mg/kg/dry	<10.1	<14.5	<12.8
Fe2+	Strong Acid Soluble Ferrous Iron	mg/kg/dry	**890**	<29	**258**
	Weak Acid Soluble Ferrous Iron	mg/kg/dry	<10.100	<14.500	<12.8000

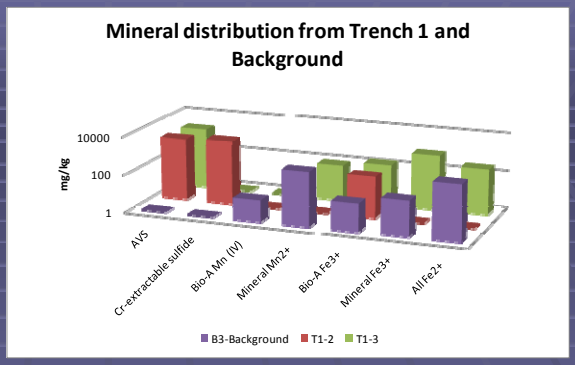
- Background- Evidence of previous iron reduction
- T1-2- Indicates manganese reduction
- T1-3- Indicates previous manganese and iron reduction but present oxidation of iron minerals.

Interpretation of soil analysis-Mn

Soil data indicate that in Trench 1 there is a mechanism that depleted manganese minerals, possibly manganese reducers.

In T1-3 some of the Mn^{2+} produced has mineralized

Soluble Mn^{2+} from water samples has decreased in 2010 compared with 2007



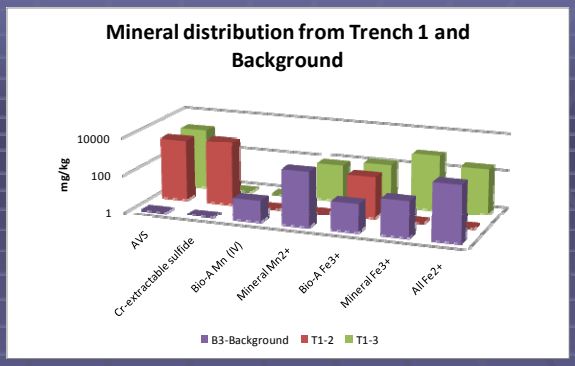
Interpretation of soil analysis-sulfide

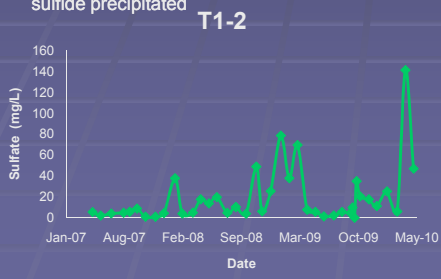
Sulfate reduction occurred in the trench as indicated by sulfide precipitation from soil mineral data

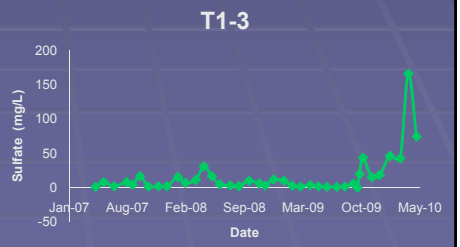
High Cr-extractable sulfide in T1-2 indicates older sulfide minerals.

Sulfate in solution has been variable and recently increased

Iron sulfides do not account for all sulfide precipitated





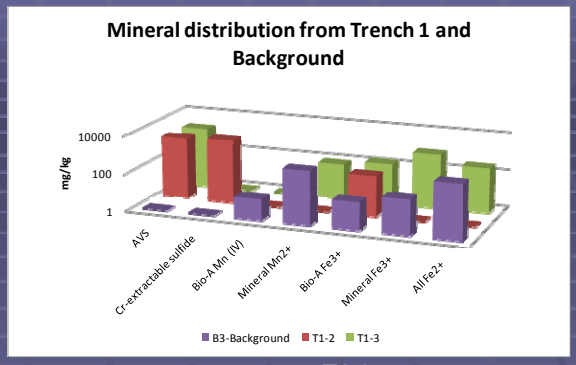


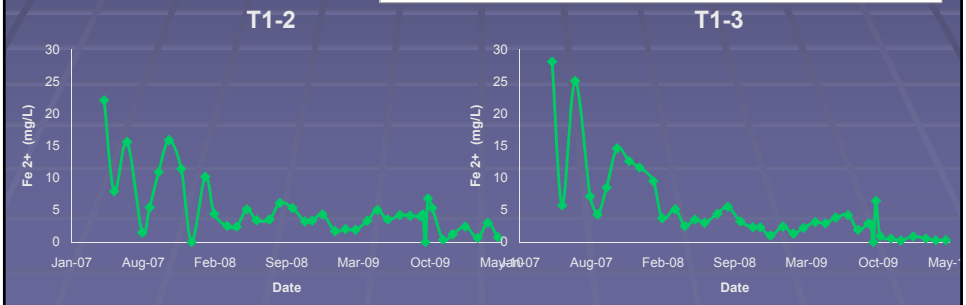
Interpretation of soil analysis-Fe

Oxidized bio-available iron is present and high in the trenches

Dissolved Fe^{2+} has decreased with time, indicates oxidation of soluble iron and mineralization in T1-3.

In T1-2, sulfide minerals are older, therefore Fe^{2+} is not precipitating but rather oxidized.



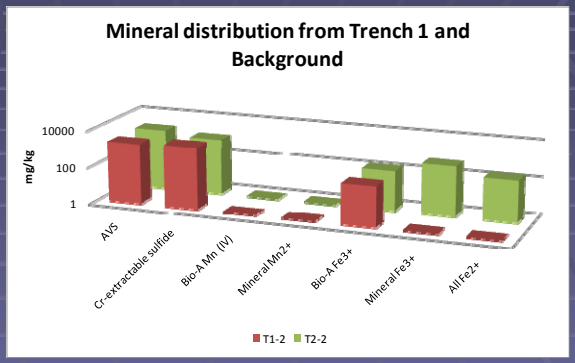


Spatial Heterogeneity

T2-2 and T1-2 are located within 3 ft distance.

The soil Fe distribution is different with only bio-available iron present in T1-2.

More crystalline forms of Fe present in T2-2.



Geochemical Analysis Summary

All sumps in Trench 1 exhibit depletion of bio-available manganese and increased oxygenating conditions that may be limiting degradation of PCE and TCE.

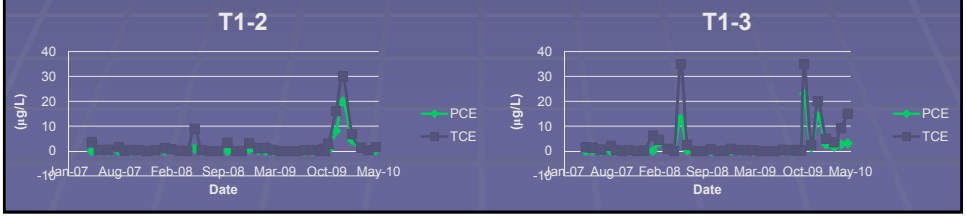
Increased sulfate, and increased bio-available Fe^{3+} suggest oxygenating conditions.

Recent trend of decreasing Mn(II) in water samples indicate a slow down of manganese reduction.

2007 exhibited more reducing conditions, and exhibited degradation of PCE and TCE.

In 2010 there is increased PCE and TCE associated with oxidizing conditions, specially in T1-3. In T1-2 there is a decrease in PCE, TCE that may be associated with manganese reduction.

To enhance degradation of PCE and TCE, bio-available manganese may be added in conjunction with electron donors such as lactate and acetate to stimulate the reducing conditions observed in 2007.



GROUNDWATER MONITORING UPDATE

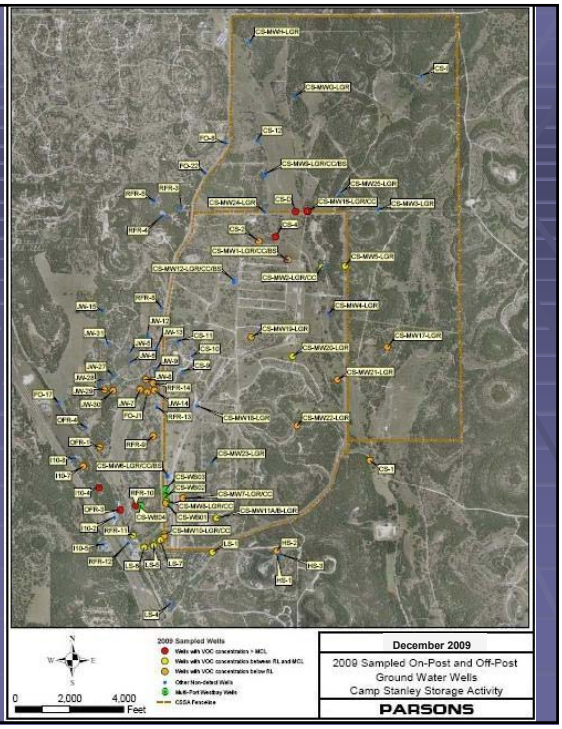
Groundwater Monitoring Program
Overview

- Quarterly Monitoring Program:
  - On-post since December 1999: 44 events
  - Off-post since September 2001: 37 events
- Wells included:
  - 44 On-post monitoring wells
  - 2 On-post drinking water supply wells
  - 2 On-post former drinking water wells
  - 1 Future drinking water well
  - 4 Westbay®-equipped wells
  - 51 Off-post private and public supply wells
- 5 off-post wells have GAC units due to past exceedances

Groundwater Monitoring Program

Sampling Locations

- 9 yrs of quarterly off-post monitoring.
- ~11 yrs of quarterly on-post monitoring.
- Sampling locations vary Quarterly per DQOs and LTMO.

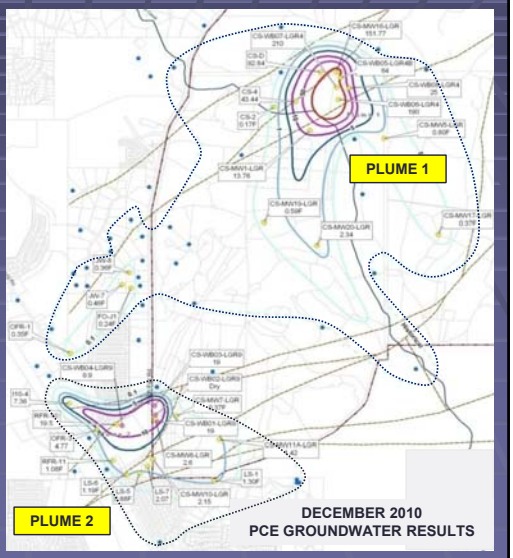


Groundwater Monitoring Program
Recent Changes

- Prolonged drought (October 2007 – August 2009) has seemingly ended. Nearly 22 inches of rainfall between September-December 2009. Another 18"+ has fallen through June 2010. Aquifer levels have rebounded 100 to 150 feet between September 2009 and June 2010.
- JW-31 (Jackson Woods) was added to the monitoring program after the November 2009 Public Meetings. No VOCs have been reported in that well.
- Future supply well, CS-12, has been added to the groundwater monitoring schedule. No VOCs have been reported. An instance of Lead above the AL was reported in March 2010 (0.025 mg/L). Below the AL in June 2010 (0.0039 mg/L).

Groundwater Monitoring Program
2009 Results Overview

- December 2009 was the last "snapshot" sampling event (e.g., all wells sampled).
- 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.
- Both plumes have migrated off-post to the west.
- Dashed line represents historical extent of VOC detections above MDL.
- Concern about increasing trend at I10-4 west of CSSA (Plume 2).



Groundwater Monitoring Program
March 2010 Results Overview

- Two quarterly groundwater events (March and June 2010) have occurred since last regulatory meeting in February 2010. Through the LTMO process, significantly less wells were sampled than the December 2009 snapshot event (every 9 months).

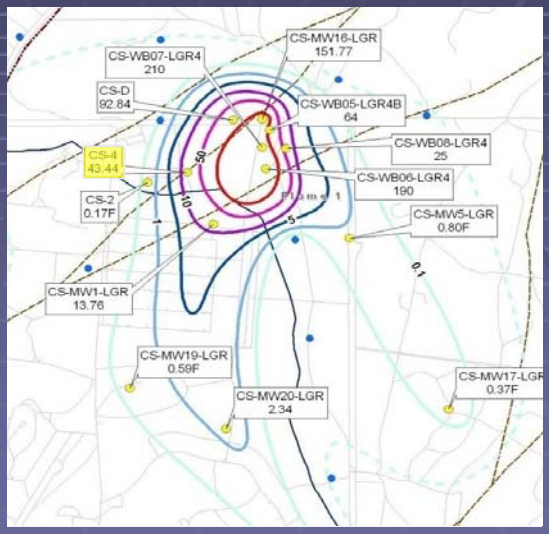
- In March 2010, 11 On-Post and 33 Off-Post wells were sampled.
  - Trace hit (0.24F µg/L) of TCE at CS-10 (1st occurrence ever)
  - Slightly reduced levels of PCE at MW11B-LGR (0.94F µg/L) and MW20-LGR (1.8 µg/L)
  - Lead above AL at CS-9 and CS-12. No more lead in new wells MW20 - MW25.
  - Off-Post, RFR-10 is the only well to exceed the MCLs. In general, most wells slightly decreased in concentration from December 2009.
  - The largest change observed was at I10-4, in which PCE concentrations decreased 7.36 µg/L (December 2009) to 0.69F µg/L (March 2010).

Groundwater Monitoring Program
June 2010 Results Overview

- In June 2010, 26 On-Post and 29 Off-Post wells were sampled.
  - Five Plume 1 wells exceeded MCLs (MW1-LGR, MW16-LGR, MW16-CC, CS-D, and CS-4). Most concentrations are consistent with previous events.
  - CS-4 decreased dramatically from December 2009 back to MCL levels. Lead in CS-12 decreased below AL to 0.0039F µg/L.
  - Off-Post, only RFR-10 exceeded MCLs. In general, VOC concentrations decreased slightly from March 2010.
  - No VOC detections in I10-4, which was above the MCL in December 2009 and at trace levels in March 2010.

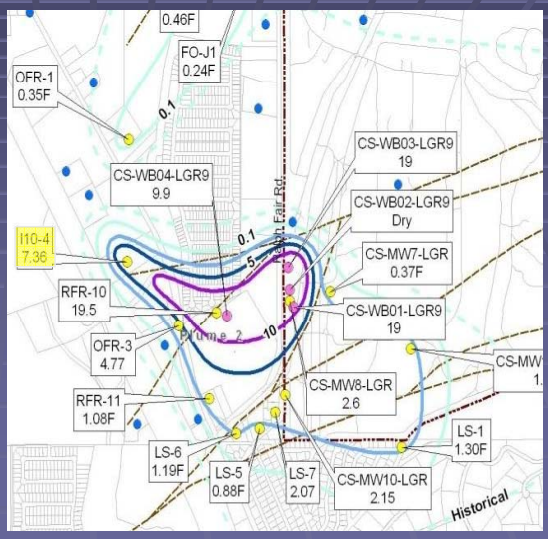
Groundwater Monitoring Program
Well CS-4 (Plume 1)

- Between 1991 and September 2008, CS-4 (west of Plume 1) has historically been below MCLs for PCE, TCE, and DCE.
- In December 2009 after a 15 month sampling hiatus (drought), the well spiked in concentration.
- PCE = 43.44 µg/L
  TCE = 86.89 µg/L
  cis-1,2-DCE = 65.09 µg/L
- Concentrations returned to MCL levels in February & June 2010.
- Spike coincided with Bioreactor Flood Test?



Groundwater Monitoring Program
Well I10-4 (Plume 2)

- Since 2001, I10-4 (west of Plume 2) has historically been below MCLs for PCE, TCE, and DCE until December 2007.
- The well exceed MCLs for PCE and TCE between December 2007 and December 2009.
- PCE = 7.36 µg/L
  TCE = 2.72 µg/L
  cis-1,2-DCE = ND
- Concentrations returned below MCLs in March 2010.
- Concentrations were all ND in June 2010.
- Have concentrations migrated or diluted? Surrounding wells show no change.

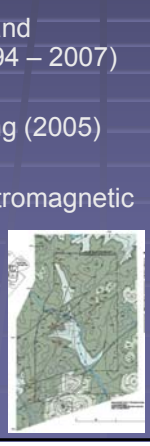


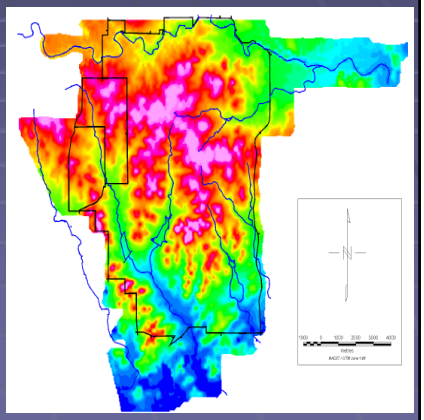
Groundwater Monitoring Program
Upcoming Work

- LTMO Update will be submitted to regulators (August 2010)
- Continued quarterly monitoring and GAC maintenance
- Off-Post Well Survey Update to capture any new wells near CSSA and extend the ¼ mile survey radius to ½ mile

Geologic Modeling by USGS

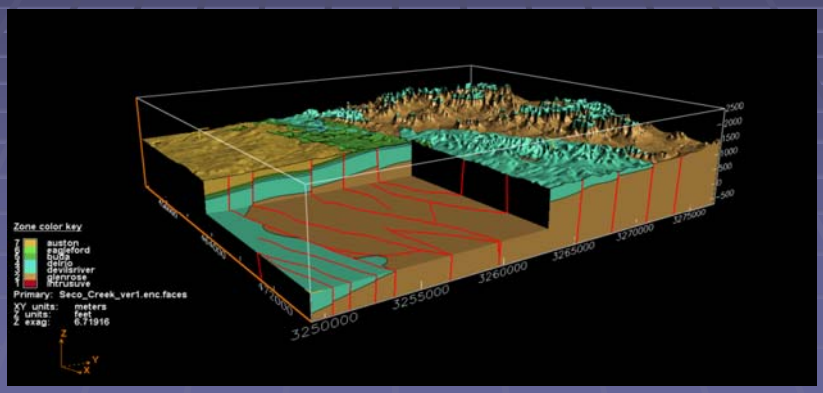
- The United States Geologic Survey (USGS) is currently performing a project to map and model the geology/hydrogeology at CSSA.
- Data will incorporate results of all previous geologic investigations conducted to date.
  - Borehole Information and Geophysical Logs (1994 – 2007)
  - USGS Surface Mapping (2005)
  - USGS Helicopter Electromagnetic (HEM) Survey (2005)





USGS EarthVision Model

- Accurately visualizes geologic subsurface and structure (e.g. faults)
- In the future, the geologic numerical model becomes basis for predictive groundwater modeling and contaminant migration using MODFLOW.



USGS EarthVision model of Seco Creek – Medina County, TX

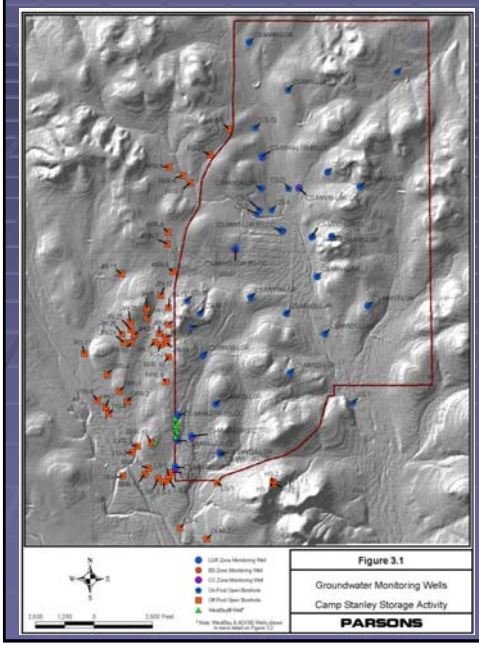
Groundwater Monitoring Program
Long-Term Monitoring Optimization (LTMO) Update

- A **3-Tiered LTMO Evaluation** was applied to the CSSA monitoring program to evaluate the distribution and frequency of groundwater sampling in 2005.
- The LTMO evaluation improved efficiency of monitoring, continue to protect human health, and provide cost savings.
- LTMO Update will be submitted to regulators (August 2010) which includes 4 years of additional monitoring results (2004 – 2009).

LTMO Process Background

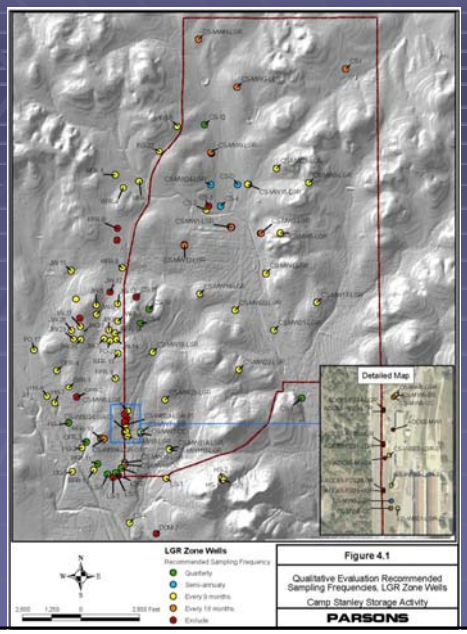
- A summary of the LTMO process was presented to EPA and TCEQ during a meeting January 20, 2005.
- The 3-Tiered LTMO Approach includes:
  - Qualitative Evaluation, Temporal Evaluation, Spatial Evaluation and combining all three.
- References were provided to EPA & TCEQ including guidance on RPO/LTMO processes.
- The CSSA LTMO study was presented as a case study for training conducted March 2005 by US EPA in Sacramento, CA .

CSSA Groundwater Monitoring Program



- 111 Sampling Locations Evaluated.
- 56 On-Post Wells.
- 51 Off-Post Wells.
- 4 Westbay® Wells Evaluated in “Vertical” Analysis.
- 14 New Locations since 2004.
- 8 Off-Post wells dropped out.

Qualitative Evaluation Summary



- Frequency Reductions Recommended
- On Post
  - All LGR Wells on 9-month schedule.
  - Key wells also include Semi-annual round.
  - All BS/CC Wells on 18-month schedule.
  - Supply wells are quarterly.
- Off Post
  - All Wells on same 9-month schedule.
  - Off-Post DQOs pre-empt 9-month schedule.
  - Quarterly → Wells with GAC or important Sentry Wells

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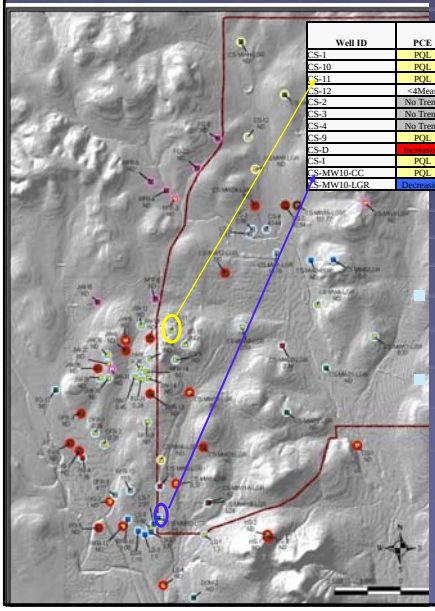
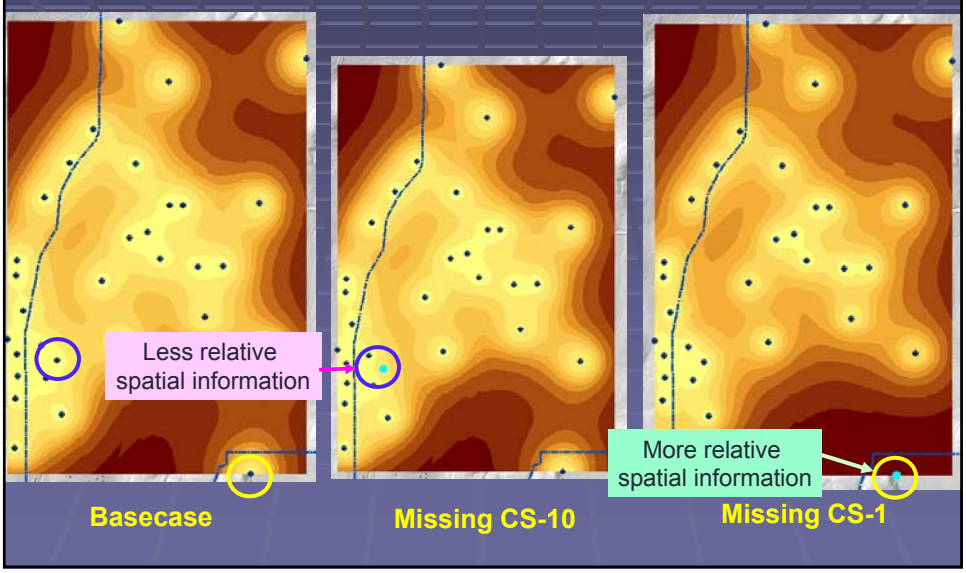
Temporal Evaluation Summary



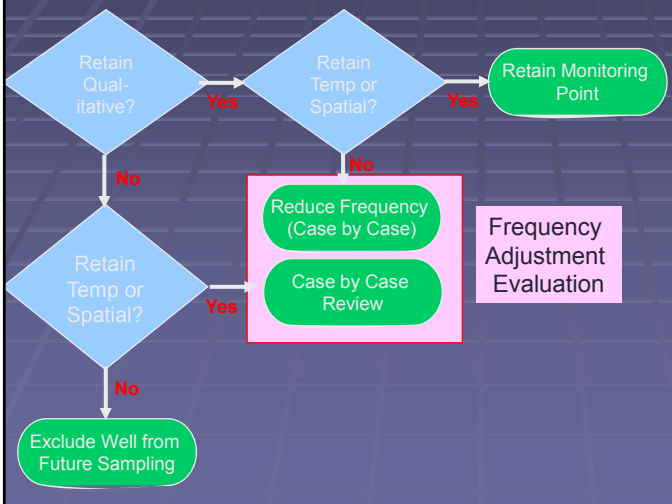
Well ID	PCE	TCE	cis-1,2-DCE	Lead	Bromo-form	Bromodi-chloromethane	Vinyl Chloride	Toluene	Exclude/ Reduce	Retain
CS-1	PQL	No Trend	ND	Decreasing	No Trend	Decreasing	ND	No Trend		✓
CS-10	PQL	ND	ND	No Trend	PQL	Increasing	ND	No Trend	✓	
CS-11	PQL	PQL	PQL	Increasing	ND	Decreasing	ND	No Trend		✓
CS-12	<4Meas	<4Meas	<4Meas	<4Meas	<4Meas	<4Meas	<4Meas	<4Meas		✓
CS-2	No Trend	PQL	ND	No Trend	ND	ND	ND	No Trend	✓	
CS-3	No Trend	ND	ND	No Trend	<4Meas	ND	ND	<4Meas	✓	
CS-4	No Trend	Increasing	Increasing	PQL	ND	ND	ND	PQL		✓
CS-9	PQL	ND	ND	Increasing	ND	ND	ND	Increasing	✓	
CS-D	Increasing	Increasing	No Trend	No Trend	ND	ND	PQL	No Trend		✓
CS-I	PQL	PQL	ND	No Trend	ND	Decreasing	ND	No Trend		✓
CS-MW10-CC	PQL	PQL	ND	PQL	ND	ND	ND	No Trend	✓	
CS-MW10-LGR	Decreasing	PQL	ND	PQL	ND	ND	ND	No Trend		✓

- CS-11
  - ↑ Lead Downgradient = Retain
- CS-MW10-CC
  - Stable PCE Trend downgradient
  - Others ND/PQL = Exclude/Remove

Spatial Statistics Evaluation Summary



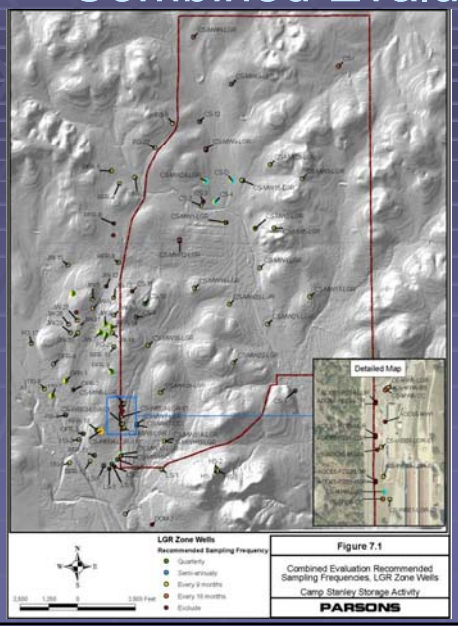
Combined Evaluation



Combine 3 Analyses to Determine Final Distribution and Frequency Recommendation

Qualitative Verified & Refined by Quantitative

Combined Evaluation Summary



- 89 On & Off-Post Wells
  - 14 (18-months)
  - 49 (9-months)
  - 8 (Semi-Annual + 9-month Snapshot)
  - 10 (Quarterly)
  - 8 (Quarterly due to Off-Post DQOs)
- 4 Westbay Wells
  - 37 LGR Zones (9-months)
  - 9 BS/CC Zones (18-months)
- AOC65
  - Exclude PZs and MWs

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LTMO Recommendations

	18-month	9-month	Semi-Annual + 9-month	Quarterly	DQO Quarterly	Westbay 18-month Schedule[1]	Westbay 9-month Schedule[1]	Totals
On-Post	14	20	8	4	-	-	-	46
Off-Post	-	29	-	6	8	-	-	43
Westbay		8*	-	0	-	9	37	46
	14	49	8	10	8	9	37	135

Notes:[1] The Westbay schedule will follow 1 quarter behind the On-Off-Post Schedule

** 8 LGR Westbay Zones will also be sampled on the On/Off-Post Schedule for Mapping Purposes*

- On & Off-Post Wells
  - Reduce from 209 to 152 (27%) sampling events per year
    - On-Post: 100 to 76 events (24% reduction)
    - Off-Post: 109 to 76 events (30% reduction)
- Westbay® Wells
  - Reduce from 85 to 69 sampling events per year (19% reduction)

LTMO Recommendations

Schedule Type	Well Count	YEAR 1				YEAR 2				YEAR 3				YEAR 4				YEAR 5			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
9-Month (On/Off Post)	49	9			9			9			9			9			9			9	
18-Month (On-Post Only)	14	18						18						18						18	
Quarterly (On/Off-Post)	10	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Semi + 9-Month Snapshot (On-Post Only)	8	SA		SA	9	SA		SA		SA	9	SA		SA		SA	9	SA		SA	
DQO Quarterly/9-Month (Off-Post Only)	8	Q	Q	Q	Q	Q	Q	9			9			9			9			9	
Westbay (LGR Zones)	29		9			9			9				9		9				9		9
Westbay (LGR Zones)	8	9	9		9	9		9	9		9		9	9	9		9	9	9		9
Westbay (BS/CC Zones)	9		18						18						18						18

- Proposed LTMO Sampling Schedule
  - Base Sampling Schedule is 9 months
    - Overall Sample Reduction which still produces an area-wide "Snapshot" event.
    - Westbay sampling is staggered by 1 quarter for scheduling/manpower effectiveness.

SUMMARY

- The Final LTMO Recommendations for on- and off-post were submitted to EPA and TCEQ August 2010.
- CSSA would like to implement LTMO recommendations on-post only in the December 2010 sampling event.

Document Submittal

Document Submittal

- Current Procedure for CSSA Documents
  - Draft documents are put into PDF format including an executive summary and all tables, figures, and appendices.
  - The PDF and associated Word text file are uploaded to the CSSA FTP site.
  - The Environmental Program Manager is notified by email that a document is ready for review.
  - Once review comments are received and incorporated, final documents are uploaded to the FTP site using the same process.
  - If applicable/requested, hard copies are made and sent to CSSA, regulators, the public, etc.
  - Finalized documents are uploaded to the Environmental Encyclopedia quarterly so there is often some lag time.

Document Submittal

- Typical CSSA Documents
  - Semi-Annual Progress Report to EPA
  - Annual Groundwater Monitoring Report
  - Quarterly Groundwater Monitoring Report
  - Annual Groundwater Contamination Fact Sheet (other Fact Sheets as needed)
  - Annual Bioreactor O&M Update
  - Annual SVE System Update
  - SWMU/AOC work plans and reports (RIRs, APARs)
  - Correspondence with contractors, regulators, the public

Questions?

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