PARSONS
8000 Centre Park Drive, Suite 200 • Austin, Texas • 78754 • (512) 719-6000 • Fax: (512) 719-6099 • www.parsons.com

February 17, 2006

Via e-mail
Mr. Jesse Perez
HQ/AFCEE
3300 Sidney Brooks
Brooks City Base, TX 78235-5112

Subject: Task Order (TO) 0006 (TO0006) TIM #2 Meeting Minutes,
Construction of Outfall Reuse, Aboveground Storage Tank Relocation, & Interim Remedial Actions at SWMU B-3 and AOC-65, Camp Stanley Storage Activity (CSSA), Boerne, Texas
Texas Contract FA8903-04-D-8675, TO 0006
Parsons Job Number 744223.01000

Dear Mr. Perez:

Attached please find minutes for the TO0006 TIM #2 meeting held on Thursday, February 9, 2006 at CSSA. The topics discussed included the current status of bioreactor technology and the current status of all tasks to be completed under TO0006. A copy of the presentations used for the meeting and the meeting agenda are attached to the meeting notes.

Please let me know if you have any questions or comments.

Sincerely,

Brian Vanderglas
Project Manager

Attachments

xc: Glare Sanchez, CSSA
Jeff Aston, CSSA
James Cannizzo, Fort Sam Houston
Chris Beal, Portage
Brian Vanderglas, Parsons
Eric North, Parsons
Julie Burdey, Parsons
744223 Project File

TECHNICAL INTERCHANGE MEETING NO. 2
MEETING MINUTES
CONSTRUCT OF OUTFALL REUSE SYSTEM,
ABOVEGROUND STORAGE TANK (AST) RELOCATION,
AND INTERIM REMEDIAL ACTIONS AT AOC-65 AND SWMU B-3
CAMP STANLEY STORAGE ACTIVITY, BOERNE, TEXAS
FA8903-04-D-8675/DELIVERY ORDER 0006
PARSONS 744223.01000

Date: Thursday, 9 February 2006

Time: 8:30 A.M. - 12:30 P.M.

Place: Camp Stanley Storage Activity (CSSA)

Subject: SWMU B-3 Bioreactor Work, TO0006 Status

Attendees:

Attendee	Organization	Phone
Glare Sanchez	CSSA ENV	(210) 698-5208
Jeff Aston	CSSA ENV	(210) 336-1270
James Cannizzo	Fort Sam Houston	(210) 295-9830
Chris Beal	Portage	(210) 295-7417
BrianVanderglas	Parsons	(512) 719-6059
Julie Burdey	Parsons	(512) 719-6062
Gary Cobb	Parsons	(512) 719-6011
Kyle Caskey	Parsons	(210) 204-8529
Samantha Elliott	Parsons	(210) 347-6012
Eric Tennyson	Parsons	(210) 722-4364
Eric North	Parsons	(512) 719-6054
Doug Downey	Parsons	(303) 764-1915

*Minutes prepared by Eric North and Brian Vanderglas, Parsons.

INTRODUCTIONS AND TO 0006 REQUIREMENTS

The meeting was directed and led by Doug Downey (Bioreactor discussion) and Brian Vanderglas (TO0006 status). The purpose of the meeting was to discuss the latest understanding of the science behind the bioreactor approach for remediating sites similar to SWMU B-3, and to discuss the status of each of the work breakdown structure (WBS) tasks under TO0006. Brian Vanderglas introduced and led the meeting. The meeting

discussions were conducted per the meeting agenda attached to these minutes. All attendees were present for all portions of the meeting. Meeting notes are as follows:.

TIM #2 **MEETING NOTES**

(Thursday, February 9, 2006)

1. SWMU B-3 BIOREACTOR DISCUSSIONS

This portion of the meeting was conducted by Doug Downey. The main points that were covered during this discussion included:

- Methodology of installing and implementing the bioreactor.
- Discussions on other Parsons bioreactor projects and the accompanying results.

Mr Downey explained the bioreactor approach and his thoughts on construction details that had been debated, including the mixture of the sand and organic materials. Doug maintains that we need to bring the organic carbon to about ten times its natural background at CSSA to kick the reductive dechlorination process into full speed.

Mr. Downey presented results from a bioreactor that Parsons installed at an Altus Air Force Base (AFB) landfill in Oklahoma. This site had a TCE plume with concentrations up to 400 parts per million (ppm). The bioreactor material was installed in a long trench that was excavated directly above the highest concentrations of TCE in the landfill plume. Within eight months, the bioreactor had reduced the concentrations two orders of magnitude at the location of the bioreactor trench and had strongly influenced concentrations in surrounding wells, both upgradient and downgradient.

Doug explained the main details that will facilitate a successful bioreactor is the quality of the organic materials and the homogeneous mixing of the sand and organic materials. The organic materials need to be fresh. If tree chippings are used, the chips should be less that 2" in length and should be freshly chipped. Doug explained that they have used a variety of materials for the organic materials, such as cotton hulls. The main point is that the organic material must have an organic carbon reserve that is fresh to provide greater persistence and strength of reaction, and that can be easily solubilized into the bioreactor liquids and surrounding matrix (or fractured bedrock in the case of SWMU B-3). The mixing of the sand and organic material should be very thorough to ensure it is homogeneous and that water can percolate through it easily while contacting the most surface area of the organic material.

Mr. Downey indicated that the bioreactor at CSSA's SWMU B-3 will be the largest bioreactor constructed to date in the US, once it is built. Doug also explained the differences between the Altus landfill bioreactor and the B-3 bioreactor. Specifically, CSSA has lower contaminant concentrations, greater volume requiring treatment, more varying water levels including a significant interval of underlying bedrock that remains unsaturated for substantial periods of time, and greater depths to contaminated aquifer at SWMU B-3..

2. TO0006 STATUS DISCUSSIONS

Brian Vanderglas led the TO0006 WBS status discussions. The main discussion points are broken down below.

Schedule Discussions

The first slide presented anticipated schedule details for the various tasks under TO0006. Some key decisions were made during the discussion of this slide.

- Brian Vanderglas indicated that the Underground Injection Control (UIC) Application approval letter from TCEQ had not yet been received, so the tracer study and subsequent substrate injection (treatability study) have been delayed. Gary Cobb also indicated that the low water conditions in the Middle Trinity Aquifer may also require a slight deviation in how we perform the work. Glare Sanchez stated that she did not care if schedules for B-3 tracer test and substrate injection tasks slipped a little for anticipated rain events, if the possibility was there that delaying could produce better results or easier working conditions. Parsons agreed to continue tracking the status of the UIC application approval, and evaluating possible impacts or solutions to the treatability study activities planned.
- Gary Cobb discussed a slight modification to the injection permit, so that we have greater flexibility with regard to which well is used to supply groundwater for reinjection. Currently, the UIC application does not specifically include CS-MW-16CC, so Gary Cobb will contact Bryan Smith at TCEQ to see if it is necessary to update wells which may be pumped to provide water for the substrate injection.
- The AST has power issues to decide on. Tom Tijerina (CSSA) has an afternoon meeting scheduled with Harry Topping (AusTex) and Henry Dress (Parsons) to discuss power supply and other critical issues with regard to moving the ASTs from their existing concrete pad to a new location on the other side of the motor pool.
- The tablet system customization for CSSA's outfall treatment system will be discussed during a scheduled afternoon presentation and inspection of facilities by PPG. PPG will be at CSSA today to discuss customization of their skid units with Parsons and CSSA and to hopefully decide upon a final customizable unit for each location..
- Based on discussions with Doug Downey and Kyle Caskey held on Wednesday, February 8, 2006, Ken Rice (Parsons) reported that the bid packages for the bioreactor construction vendors will need to be updated to include enhancements and clarifications provided by Doug. Specifically, Mr. Downey wanted to get specific requirements for the mulch into the bid package addenda..
- Glare Sanchez indicated that she would like Parsons to provide an additional engineer or remediation construction manager with experience constructing bioreactors and biowalls to be present along with Kyle Caskey during critical periods of the installation of the bioreactor, such as when the initial mixing of the mulch backfill commences Doug Downey will provide a quality control (QC)

plan that has been used on Altus AFB bioreactor and several biowall construction projects for inclusion into the construction quality plan already prepared and approved for this task order, which includes the installation of the bioreactor.

- Glare Sanchez asked whether the bioreactor wells and piezometers should be linked in to the SCADA system. Doug Downey recommended running the bioreactor for a year or two before spending the money and effort on that level of automation..
- Glare Sanchez inquired whether the soil vapor extraction (SVE) system drilling could be lumped with drilling on other CSSA projects to reduce costs. Parsons indicated that we would try to accommodate that request, but that the reduction in costs would be fairly negligible as the mobilization charge is only $1,000. On a separate note, Parsons needs to provide responses to comments (RTCs) to CSSA's comments on the SVE workplan.

TO0006 Status Discussions

These slides covered the progress that has been made under each WBS for TO0006. Included on each slide was budget information, such as total budget, budget expended to date, and expected budget to complete task. Ms. Sanchez voiced concern about WBSs that are overbudget, such as WBS 02000 (work plans and DQOs) which is approximately $20,000 over its original budget, and WBS 05000 (AST Upgrade) which is projected to be about $70,000 over its original budget when complete. However, Mr. Vanderglas explained that the underbudget WBSs will more that makeup for those that are overbudget, such as WBS 03000 (outfall 01 Reuse) which is projected to come approximately $120,000 underbudget and WBS 08000 (asphalt removal action) which was completed approximately $47,000 underbudget..

Since the task order is on track to be completed approximately $77,000 less than originally estimated, various scenarios were discussed for getting the most functional use of any funds that my remain after completing this task order. However, Mr.. Vanderglas warned that this speculation was premature since the removal action and bioreactor construction had yet to be priced, and the quantities of excavated volume or backfill construction had yet to be determined, either of which could expend all of the potential surplus funds from the prior completed tasks.

FOLLOW-UP ISSUES AND ACTION ITEMS

- Determine what organic material will be used in the bioreactor and the source of that mulch. Have the winning bidder submit a sample of the mulch mix in a gallon plastic storage bag for inspection.

.

- Gary Cobb to follow up with Bryan Smith of TCEQ to determine whether updates to injection permit (to add additional groundwater source wells) are necessary.

- Ken Rice (Parsons) will update the bid package for the bioreactor construction vendors, and issue an addendum to the statement of work and bid forms for bidder consideration.
- Identify an additional technical resource to provide additional technical support to Kyle Caskey for the startup of the bioreactor construction.
- Incorporate quality control (QC) plan from previously completed bioreactor and biowall projects for the installation of the CSSA bioreactor.
- Parsons will provide responses to comments (RTCs) to CSSA's comments on the SVE workplan.

DEPARTMENT OF THE ARMY
CAMP STANLEY STORAGE ACTIVITY, RRAD
25800 RALPH FAIR ROAD, BOERNE, TX 78015-4800

Agenda for Technical Progress MeetingNumber 01

Construction of Outfall Reuse System, Aboveground Storage Tank Relocation & Interim Remedial Actions at SWMU B-3 & AOC-65

AFCEE WERC, Task Order 06

Time: Thursday, February 9, 2005; 8:30 am to 1:30 pm

Place: Building 98, Camp Stanley Storage Activity

Proposed Order of Discussion

Date & Time	Topic
8:30 am- 9:30 am	Bioreactor Presentation/Latest Developments & Results Impact of Bioreactor "lessons learned" on SWMU B-3 Bioreactor
9:45 am – 10:15 am	Anticipated schedule by WBS tasks and Time-critical tasks/decisions. Tracer Test AST Upgrade Construction Tablet System customization & Procurement/Installation SWMU B-3 Injection & Aquifer Treatability Test SWMU B-3 Excvation & Bioreactcor Construction SVE System Expansion
10:30 am – 11:30 am	Description of Task Order Objectives Meetings (wbs task 02) Remedial Optimization (wbs task 04) AOC-65 & SWMU B-3 SVE Expansion & O&M (wbs task 06) SWMU B-3 Monitoring System Installation (wbs task 07) Off-site asphalt Removal & Disposal (wbs task 08) SWMU B-3 Removal Action (wbs task 09) SWMU B-3 Bioreactor Construction (wbs task 10) Bioreactor O&M (wbs task 11) Well 16 Pumping Tests (wbs 12) Task Order & Program Management (wbs task 90) Outfall Reuse Design & Construction (wbs task 3) Aboveground Storage Tank Upgrade (wbs task 5)
12:30 am – 2:00 pm	Follow-Up Discussion Planning (future activities/requirements) Other

Task Order 0006
TIM #2

February 9, 2006

Camp Stanley Storage Activity

Boerne, TX

Agenda

- **8:30 am- 9:30 am**
  - **Bioreactor Presentation/Latest Developments & Results**
  - **Impact of Bioreactor "Lessons Learned" on SWMU B-3 Bioreactor**
- **9:45 am – 10:15 am**
  - **Anticipated Schedule by WBS Tasks and Time-Critical Tasks/Decisions**
    - **Tracer Test**
    - **AST Upgrade Construction**
    - **Tablet System Customization & Procurement/Installation**
    - **SWMU B-3 Injection & Aquifer Treatability Test**
    - **SWMU B-3 Excavation & Bioreactor Construction**
    - **SVE System Expansion**
- **10:30 am – 11:30 am**
  - **Description of Task Order Objectives**
    - **Task Order & Program Management (WBS 90000)**
    - **Meetings (WBS 01000)**
    - **Workplans and DQOs (WBS 02000)**
    - **Outfall Reuse Design & Construction (WBS 03000)**
    - **Remedial Optimization (WBS 04000)**
    - **Aboveground Storage Tank Upgrade (WBS 05000)**
    - **AOC-65 & SWMU B-3 SVE Expansion & O&M (WBS 06000)**
    - **SWMU B-3 Monitoring System Installation (WBS 07000)**
    - **Off-Site Asphalt Removal & Disposal (WBS 08000)**
    - **SWMU B-3 Removal Action (WBS 09000)**
    - **SWMU B-3 Bioreactor Construction (WBS 10000)**
    - **Bioreactor O&M (WBS 11000)**
    - **Well 16 Pumping Tests (WBS 12000)**
- **12:30 am – 2:00 pm**
  - **Follow-Up Discussion**
    - **Planning (Future Activities/Requirements)**
    - **Other**

Bioreactor:
Latest Developments & Results

Impact of Bioreactor “Lessons Learned” on SWMU B-3 Bioreactor

Anticipated Schedule by WBS Tasks and Time-Critical Tasks/Decisions

- **Tracer Test**
  - **Will be performed approximately 1 week after receipt of TCEQ UIC approval letter (tentatively 2/20/06)**
- **AST Upgrade Construction**
  - **Still awaiting determination of final requirements and redesign; hope to begin construction by mid-March**
- **Tablet System Customization & Procurement/Installation**
  - **Finalization of design & procurement/implementation will be completed after 2/9/06 meeting with vendor**
- **SWMU B-3 Injection & Aquifer Treatability Test**
  - **Awaiting approval of substrate/tracer tech memo & UIC authorization; hope to implement injection by end of March**
- **SWMU B-3 Excavation & Bioreactor Construction**
  - **Prebid meeting held 2/8/06; award by 2/28/06; begin implementation by 3/31/06**
- **SVE System Expansion**
  - **SVE systems are operational; O&M WP approved and final, O&M startup is currently pending pre-startup testing of subslab system. Begin O&M by Februrary 28.**

Description of Task Order Objectives

WBS 90000: Project Management

- Items to be completed include:
  - Procurement of B-3 removal action, Outfall 01, and change order AST
  - General project management items over remaining course of project

63% physically complete

Budget ~$169k, Expended ~$70k

WBS 01000: Meetings

- Completed meetings for project kickoff, 3 DQO meetings, and TIM #1
- Up to 4 more TIM meetings (not including TIM #2) included in scope

43% physically complete.

Budget ~$64k, Expended ~$25k

WBS 02000: Work Plans and DQOs

- Items to be completed under this task include:
  - Finalize SAP and WP addenda for Modification 02
  - Finalize SVE O&M & Expansion Plans
  - Modify bid SOW engineering specifications pending consensus decisions

99.6% physically complete

Budget ~37k, Expended ~$56k

-Technical Memorandums
-Updated Comprehensive Program Safety Plan

WBS 03000: Outfall Reuse Construction

- Items to be completed under this task include:
  - Finalize tablet system design during vendor meeting on 2/9/06
  - Determine customization specifications for Outfall 01 and revise WP accordingly

6% physically complete.

Budget ~197k, Expended $30k

-Anticipate additional $40k required to complete installation.

WBS 04000: Remedial Optimization

- Items to be completed under this task include:
  - Finalize Enhanced Anaerobic Biodegradation WP
  - Confirm receipt and approval of TCEQ injection authorization
  - Receive approval for tracer/substrate technical memorandum
  - Perform tracer test and injection by end of March

28% physically complete

Budget ~$143k, Expended ~$65k

WBS 05000: AST Upgrade

- Items to be completed under this task include:
  - Execute redesign of AST upgrade
  - Execute change order for AST upgrade
  - Implement AST upgrade by end of March

18% physically complete.

Budget ~$118k, Expended ~40k

-Anticipate additional $150k to redesign, complete upgrade at new location

WBS 06000: AOC-65/SWMU B-3 SVE Expansion

- Items to be completed under this task include:
  - Finalize RTCs for SVE Expansion WP
  - Restart blower(s) and begin SVE O&M by end of February

14% physically complete.

Budget ~$261k, Expended ~$40k budget.

-6 months of SVE O&M included in scope
-400 feet of SVE wells at AOC-65 & SWMU B-3

WBS 07000: SWMU B-3 Monitoring System

- Items to be completed under this task include:
  - Completion of well installation reports
  - Additional Westbay sampling

79% physically complete.

Budget ~$381k, Expended ~$342k.

WBS 08000: Asphalt Removal Action

- This task is complete

100% complete.

Budget ~$99k, Expended, ~$52k

WBS 09000: SWMU B-3 Removal Action

- Items to be completed under this task include:
  - Complete procurement for removal action by end of February
  - Implement removal action by early to mid-March

1.5% Complete. Removal action contractor procurement on-going.

Budget ~$677k, Expended ~$39k

WBS 10000: Bioreactor Construction

- Items to be completed under this task include:

  -Construct bioreactor in trenches.

  -Install piezometers & Injection Well

  -Construction Reporting.

12% physically complete (design/plan)

Budget ~$368k, Expended ~$39k

WBS 11000: Bioreactor Testing & O&M

- Items to be completed under this task include:

  -bioreactor O&M plan

  -Conduct bioreactor O&M and sampling (UIC authorization)

  -Additional Westbay monitoring as part of O&M

  -Reporting

  0% Complete- not started

  Budget $67,293

WBS 12000: CS-MW16-CC Pumping Test

- Items to be completed under this task include:
  - Completion of data analysis and report of findings

85% physically complete.

Budget ~$41k, Expended ~$30k

Follow-up Discussion

- Future Plans
- Other Topics

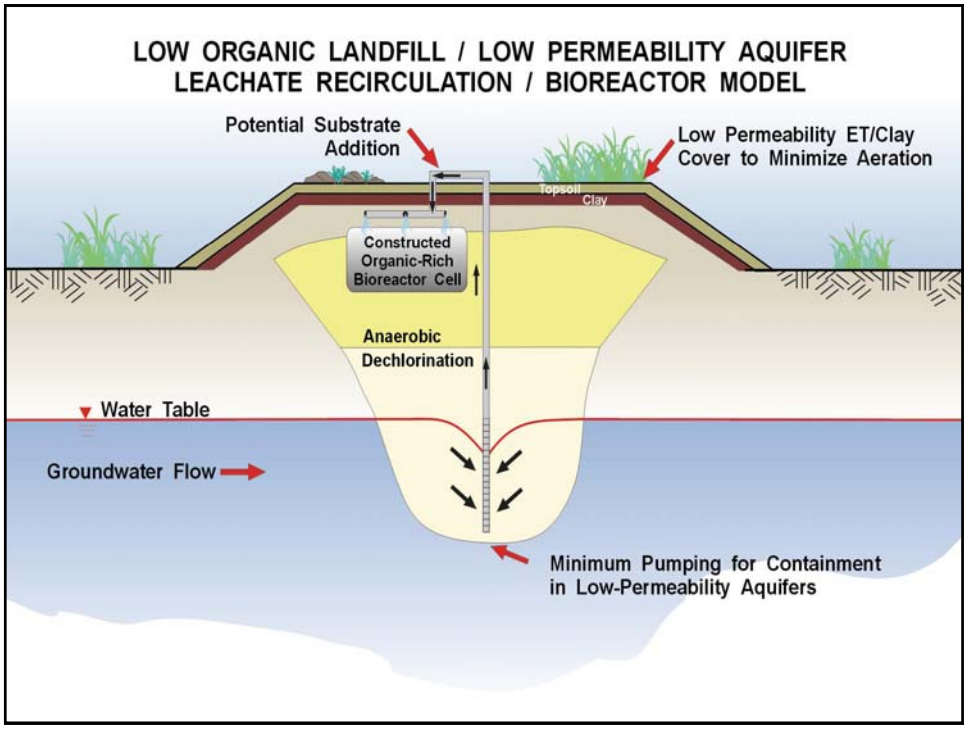
REMOVING CHLORINATED SOURCES IN LANDFILLS USING IN-SITU BIOREACTORS

Doug Downey
PARSONS
Feb 2006

TECHNOLOGY DESCRIPTION

- IN SITU BIOREACTORS PROVIDE A UNIQUE TREATMENT OPTION FOR SOURCE AREAS CONTAINING CHLORINATED SOLVENTS
- CONCENTRATED MASS OF ORGANIC CARBON DRIVES REDUCTIVE DECHLORINATION PROCESSES (ANAEROBIC BIODEGRADATION)
- RECIRCULATION OF CONTAMINATED GROUNDWATER IN BIOCELL REMOVES ADDITIONAL MASS
- THE FOCUS OF THE ALTUS AFB AND CSSA PROJECTS IS REMOVING SOLVENT SOURCE AREAS LOCATED WITHIN OLD LANDFILLS OR WASTE DUMPS

2



ALTUS AFB TEST SITE DESCRIPTION

- Site LF-3 is an old landfill with 4000-ft TCE/DCE plume
- Hot Spot TCE concentrations of 20 mg/L
- Shallow aquifer is in fractured clay and shale
- Monitored Natural Attenuation alone will take 100-200 years to achieve cleanup standards

4

Mulch Placement in Landfill

5

Groundwater Entering Gravel-Filled Collection Trench

6

Solar-Powered Pump and Monitoring Wells Installed

BIOREACTOR OPERATIONS

- Baseline sampling and initiated groundwater recirculation November 2003
- 24 Months of reliable and continuous operation
- Over 700,000 gallons of groundwater captured and recirculated through the bioreactor
- No significant fouling of system

8

RESULTS TO DATE

- Dissolved Organic Carbon
- Geochemical Changes
- Chlorinated Solvent Reductions
- Application to CSSA

9

Dissolved Organic Carbon

- Initial Background – 5 mg/L
- Initial Inside Bioreactor – 12,500 mg/L
- Two Year Results
  - Inside Bioreactor - 32 mg/L
  - Beneath Bioreactor – 14 mg/L
  - Downgradient Shallow – 21mg/L
  - Downgradient 17-22 ft bgs – 7.5 mg/L
  - Downgradient 25-35 ft bgs – 4 mg/L
  - Upgradient 15-30 ft bgs – 14 mg/L
- Volumetric distribution of DOC is >10X bioreactor volume

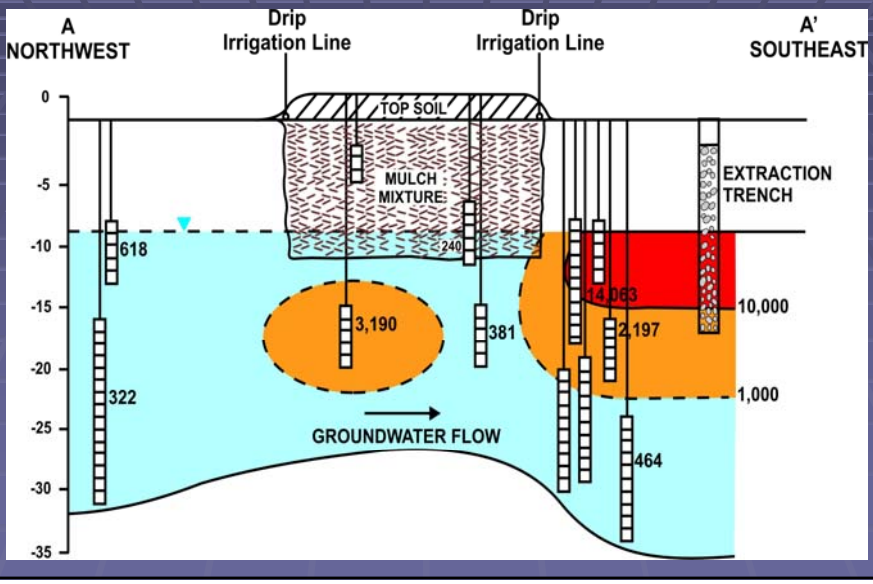
10

ORP Changes

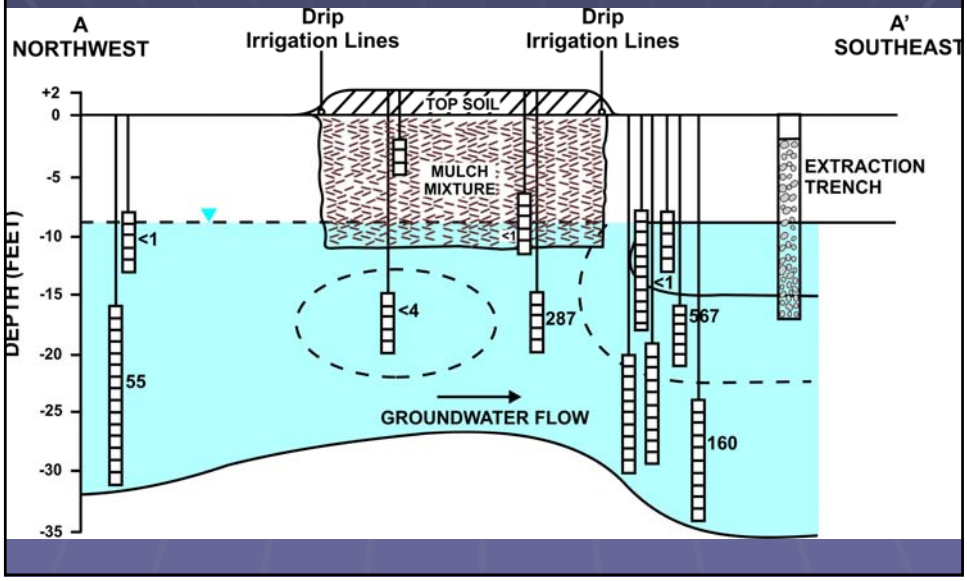
- Initial Background – +90mV
- Two Year Results
  - Inside Bioreactor - -365mV
  - Beneath Bioreactor – -164mV
  - Downgradient Shallow – -193mV
  - Downgradient 17-22 ft bgs – -110mV
  - Downgradient 25-35 ft bgs – -50mV
  - Upgradient 15-30 ft bgs – -118mV
- Anaerobic conditions have been created in an aquifer volume that is >10X bioreactor volume

11

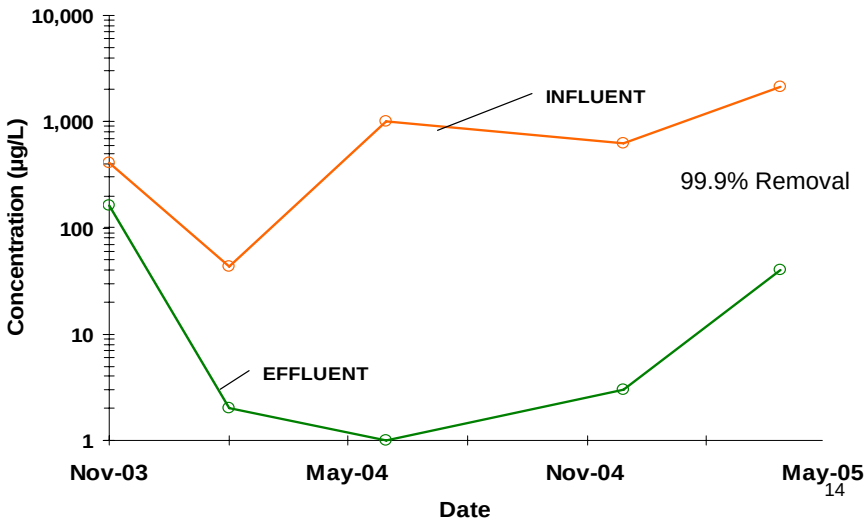
Initial TCE Levels in Bioreactor Cross-Section



TCE Levels in Bioreactor Cross-Section (After 8 Months)

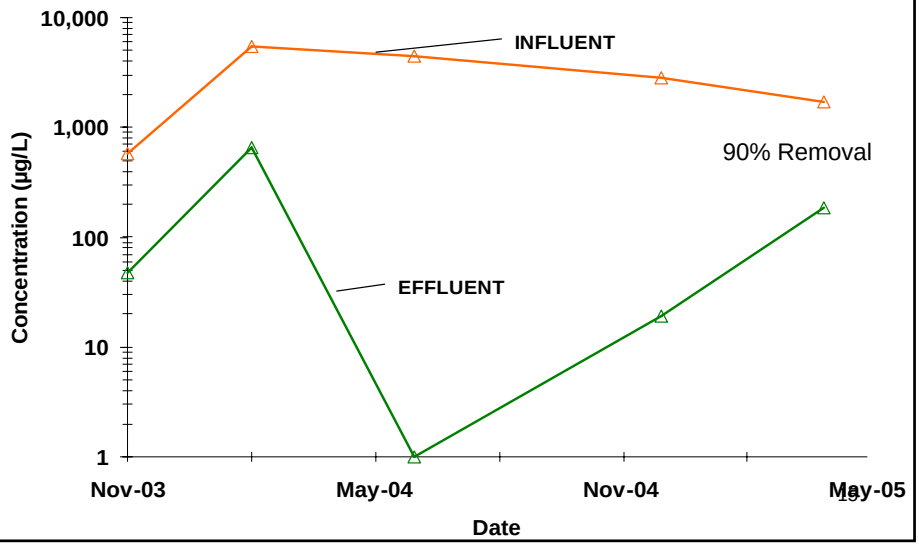


TCE vs. Time

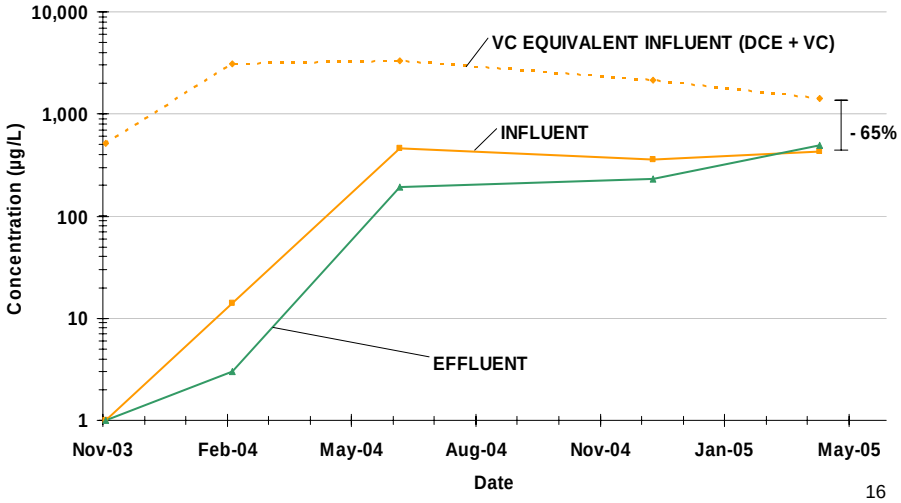


14

cis-1,2-DCE vs. Time

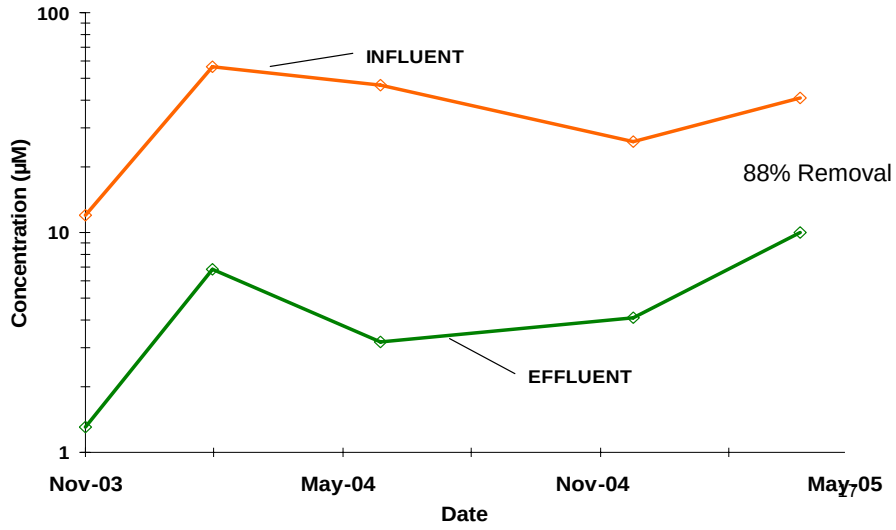


Vinyl Chloride vs. Time



16

Total Molar Concentration vs. Time



SUMMARY

- Average DOC in formation wells has increased from 5 mg/L to 12 mg/L at two years. Average ORP values in and around biowall are now less than -120mV and adequate for reductive dechlorination
- Bioreactor influence is >10X the bioreactor volume including groundwater 10-15 feet beneath the bioreactor and collection trench
- Average total molar CAH reduction inside bioreactor over 24 months is 88 percent.
- DCE and VC are degrading in the presence of sulfate

18

Toxicity Reduction

- One of the primary goals of remediation is toxicity reduction. Based on changes in TCE, DCE, and VC in historical source well WL-250, located downgradient of bioreactor, significant toxicity reduction is occurring.
- Maximum pre-bioreactor concentrations in WL-250
  - TCE – 27,000 ug/L
  - DCE – 2,200 ug/L
  - VC - <400 ug/L
- April 2005 concentrations in WL-250
  - TCE- 15 ug/L
  - DCE – 332 ug/L
  - VC – 466 ug/L
- "Toxicity equivalents" (Concentration/MCL)
  - Max pre-bioreactor – 5431 tox equivalents
  - May 2005 values - 241 tox equivalents
  - **95% reduction in toxicity released from source area**

19

Application at CSSA

- **SWMU B-3 Bioreactor will determine how this technology performs in deep fractured bedrock (potential for AOC-65)**
- **Concept is to apply treatment at the same rock interface where solvents were spilled so organic carbon will follow the same fracture system as contaminants**
- **SWMU B-3 initial concentrations of chlorinated parent compounds PCE/TCE are two orders of magnitude lower than Altus landfill**
- **CSSA groundwater has much lower sulfate which means less interference with TCE/PCE degradation.**
- **Even a 95% reduction in PCE/TCE will achieve MCLs**

20

This will be the largest bioreactor of its kind in the United States and will provide useful full-scale remediation for Site B-3 and design and performance information for future bioreactors at other DoD and industrial sites.

PARSONS

21