

**Travis Air Force Base
Environmental Restoration Program
Remedial Program Manager's
Meeting Minutes**

20 October 2011, 1300 Hours

Mr. Mark Smith, Travis Air Force Base (AFB), conducted the Remedial Program Manager's (RPM) meeting on 20 October 2011 at 1300 in the Main Conference Room, Building 570, Travis AFB, California. Attendees included:

- Mark Smith Travis AFB
- Glenn Anderson Travis AFB
- Lonnie Duke Travis AFB
- Gregory Parrott Travis AFB
- Dezso Linbrunner USACE-Omaha
- Alan Friedman California Regional Water Quality Control Board (RWQCB)
- Jose Salcedo California Department of Toxic Substances Control (DTSC)
- Nadia Hollan Burke United States Environmental Protection Agency (USEPA)
- Mary Snow Techlaw, Inc
- Rachel Hess ITS
- Mike Wray CH2M HILL
- Loren Krook CH2M HILL
- Tony Chakurian CH2M HILL

Handouts distributed at the meeting and presentations included:

- Attachment 1 Meeting Agenda
- Attachment 2 Master Meeting and Document Schedule
- Attachment 3 SBBGWTP Monthly Data Sheet (September 2011)
- Attachment 4 CGWTP Monthly Data Sheet (September 2011)
- Attachment 5 NGWTP Monthly Data Sheet (September 2011)
- Attachment 6 Site ST018 Monthly Data Sheet (September 2011)
- Attachment 7 Presentation: August/September 2011 Performance Monitoring Results at Travis AFB
- Attachment 8 Presentation: LF007C Investigation Update

- No Attachment Presentation: FT005 Soil Remedial Action Update
- Attachment 9 Presentation: Management Overview Briefing
- Attachment 10 Presentation: 2011 Field Schedule Update

1. **ADMINISTRATIVE**

A. Previous Meeting Minutes

The 21 September 2011 RPM meeting minutes were approved and finalized as written, with the following exceptions. Mr. Salcedo requested a correction be made on page three, paragraph six, second sentence, change “pH” to “PAH”, and on page five, second paragraph, third sentence; change the word “raise” to “increase”. Mr. Anderson suggested a change on page six, under Administration Record, third sentence, replace “weed eating” to “weed mowing” and delete the word “mowing” after SBBGWTP. Mr. Salcedo suggested inserting the word “upcoming” before GSAP, fifth sentence (same section as above). Mr. Salcedo suggested a correction on page seven, first paragraph change “slide shows” to “slide show”. Ms. Hess requested to insert her corrected modification for the fourth paragraph on page eight. Ms. Burke requested that a question she asked on FT005 the soil remediation presentation be included in the minutes. The following insertion was made to FT005 Soil Remedial Action Update: “Ms. Burke had a comment on the comparison of the proposed volume to the actual volume. Ms. Hess stated volumes at this time appear fairly close but we will know more as data results come in.”

B. Action Item Review.

Action items from September were reviewed.

Action item one still open. No change.

Action item two still open. No change.

Action item three still open. No change. A discussion with EPA is needed to substantiate the terminology for site closure completion reports. Need to schedule in an upcoming RPM meeting agenda, and possibly get AFCEE involved.

Action item four still open: No change, ongoing.

Action item five is closed.

Master Meeting and Document Schedule Review (see Attachment 2)

The Travis AFB Master Meeting and Document Schedule (MMDS) was discussed during this meeting (see Attachment 2).

Travis AFB Annual Meeting and Teleconference Schedule

— The next RPM meeting will be held on 30 November 2011. A teleconference is tentatively scheduled for 14 December 2011 at 0930 with Travis AFB, the

Regulatory Agencies, and Mr. Wray and Mr. Krook from CH2MHILL, to discuss the Technical and Economic Feasibility Analysis (TEFA) document.

The 2012 Annual Meeting and Teleconference Schedule were discussed. The meeting date in February (15 February 2012) may need to be revised, depending on an Air Force Training symposium meeting scheduled for that same week. The 21 November 2012 was changed to 14 November 2012 to accommodate the Thanksgiving holiday.

Travis AFB Master Document Schedule

- Focused Feasibility Study (FFS): The Final document will be issued on 28 October 2011. DTSC, RWQCB and EPA to receive one paper copy and one CD copy, Techlaw to receive one CD copy.
- Proposed Plan (PP): No change.
- Groundwater Record of Decision (ROD): No change. A scoping meeting for the ROD will be included in the November RPM meeting or held separately in the afternoon after the RPM meeting. Ms. Burke asked if it would be beneficial to invite EPA Headquarters (EPA HQ) personnel for the scoping meeting, adding if they are not available on 30 November 2011 to perhaps schedule a scoping meeting on a different date to include EPA HQ in the discussion. Mr. Anderson agreed.
- Potrero Hills Annex: (FS, PP, and ROD): No change. The California Regional Water Quality Control Board (RWQCB) has asked the responsible parties to conduct additional groundwater sampling. The responsible parties are preparing a Work Plan (WP). Mr. Anderson said he suggested that the responsible parties look into implementing a remedial action. Mr. Parrott said years ago they looked at installing an above ground bioreactor.
- Site ST027-Area B Human Health Risk Assessment: No change in document schedule. This document was previously categorized as Primary by mistake. So, it was re-categorized to the Secondary Document section of the MMDS. Ms. Burke said EPA can meet the due date.
- Site ST027-Area B Ecological Risk Assessment: No change in document schedule. This document was previously categorized as Primary by mistake. So, it was re-categorized to the Secondary Document section of the MMDS. Ms. Burke said EPA can meet the due date.
- Work plan for Assessment of Aerobic Chlorinated Cometabolism Enzymes at Travis AFB: The Agency Comments Due date was changed to give the Regulatory Agencies more time for their review. The subsequent due dates were changed accordingly. Ms. Burke said she gave the document to Dr. Wilson and that he probably won't get back to her until the end of this month. Mr. Friedman said the new due date worked for him. Mr. Duke said this document is a high priority because we need to get in the field to collect the samples.

- FT005 Remedial Action Completion Report: No change. Dates are all still To Be Determined (TBD) and will remain TBD until the field work has been completed.
- RPO Baseline Implementation Report: The Regulatory Agencies requested one additional week for their review. The Agency Comments Due date will be changed to 31 October 2011. The subsequent due dates will change accordingly.
- Technical and Economic Feasibility Analysis (TEFA): The AF Service Center Comments Due date was changed to 24 October 2011. Travis sent a copy of the document to their Field Support Center in San Antonio and they requested one more week to review. The subsequent dates have not changed, Travis is not sure if this delay will interfere with the subsequent review dates. Mr. Friedman asked about the size of the document. Mr. Anderson said it was 146 pages, includes text and figures.
- Quarterly Newsletter (October 2011): No change. Mr. Anderson recognized and thanked Ms. Burke for her contribution to the October 2011 Quarterly Newsletter. Mr. Anderson said they also have received positive feedback from that article. Mr. Smith added that the Newsletter is submitted electronically to Air Force personnel as well as to the MAJCOM. One of the leadership personnel in the Air Mobility Command said that the Newsletter was a well prepared, professional newsletter and that he was impressed by the collaboration and cooperation Travis has with the Regulatory Agencies and RAB members.
- 2010/2011 GSAP: The Agency review period has been increased from thirty to sixty days to accommodate the heavy document review load at this time. The subsequent due dates for the GSAP Annual Report will be changed accordingly.
- 2010 GWTP RPO Annual Report: Final. Moved to History.
- Old Skeet Range Engineering Evaluation/Cost Analysis: The Draft went out to the agencies for review a week late. The Agency Comment Due date will therefore be extended by one week. The subsequent due dates will change accordingly. Mr. Anderson said this is the lowest priority document on the schedule.

2. CURRENT PROJECTS

Treatment Plant Operation and Maintenance Update

Mr. Duke reported on the treatment plant status.

South Base Boundary Groundwater Treatment Plant (see Attachment 3)

The South Base Boundary Groundwater Treatment Plant (SBBGWTP) performed at 90.6% uptime, and 3.6 million gallons of groundwater were extracted and treated during the month of September 2011. All of the treated water was discharged to Union Creek. The average flow rate for the SBBGWTP was 83.7 gallons per minute (gpm). Electrical power usage was 14,220 kWh and approximately 19,481 pounds of CO₂ were created (based on DOE calculation). Approximately 2.15 pounds of volatile organic compounds (VOCs) were removed in September. The total mass of VOCs removed since startup of the system is 409 pounds.

Optimization Activities: No optimization activities to report for the month of September.

Central Groundwater Treatment Plant (see Attachment 4)

The Central Groundwater Treatment Plant (CGWTP) performed at 90.5% uptime with approximately 1.5 million gallons of groundwater extracted and treated during the month of September 2011. All treated water was diverted to the storm drain. The average flow rate for the CGWTP was 38.1 gpm, and electrical power usage was 2,311 kWh for all equipment connected to the Central plant; approximately 3,166 pounds of CO₂ were created. Approximately 4.61 pounds of VOCs were removed from groundwater in September. The total mass of VOCs removed since the startup of the system is 11,243 pounds.

Optimization Activities for WTTP: The WTTP remains off line since it was shut down in April 2010 for the ongoing rebound study. No additional optimization activities to report for the month of September.

Optimization Activities for CGWTP: No optimization activities to report for the month of September.

North Groundwater Treatment Plant (see Attachment 5)

The North Groundwater Treatment Plant (NGWTP) performed at 100% uptime with approximately 16,620 gallons of groundwater extracted and treated during the month of September 2011. The average flow rate of the NGWTP, while operating, was 0.38 gpm and electrical power use was 553 kWh for all the equipment connected to the North plant; approximately 751 pounds of CO₂ was created. Approximately 0 VOCs were removed from the groundwater in September. The total mass of VOCs removed since the startup of the system is 174.3 pounds.

Optimization Activities: No optimization activities to report for the month of September.

Site ST018 Groundwater (MTBE) Treatment Plant (see attachment 6)

The Site ST018 (MTBE) Treatment Plant (S18GWTP) performed at 100% uptime with approximately 188,000 gallons of groundwater extracted and treated during the month of September 2011. All treated water was diverted to the storm drain. The average flow rate for the S18GWTP was 3.63 gpm. Electrical power usage for the month was 128 kWh for all equipment connected to the S18GWTP plant, which equates to the creation of approximately 128 pounds of CO₂. Approximately 1.49 pounds of BTEX, MTBE and TPH were removed from groundwater in September. The total BTEX, MTBE and TPH mass removed since the startup of the system is 6.6 pounds.

Note: electrical power use is for the alarm system and a pump that pushes water through the GAC. The other pumps in the system are all solar powered. Ms. Burke asked if Travis has calculated what the off the grid electrical use savings is by using solar power. Mr. Duke said no.

Optimization Activities: No optimization activities to report for the month of September.

3. Presentations

August/September 2011 Performance Monitoring Results at Travis AFB (see attachment 7)

Mr. Wray gave a brief introduction on the performance monitoring data for the sites that have had significant optimization upgrades to the interim remedies. During the presentation, each site had three slides: 1) a summary of key points, 2) a map of the TCE plume, and 3) a cross section. These figures included the historical TCE concentration progression from the baseline measurements through the current performance monitoring data. The sample collection program for these sites started with a baseline (i.e., pre injection of EVO), followed by four quarterly sampling events. Following that initial year of quarterly monitoring, the site was then placed into an annual sampling schedule. The quarterly sample collection is conducted at the same time for all optimized sites, although the sites are not all at the same point in their sampling schedule. For this presentation, only the TCE data was shown on the cross sections. The other detected VOCs were not shown, because TCE is typically so much more abundant than the other VOCs. The CD that was handed out during the meeting had the other Chemicals of Concern (COC) included in the cross sections. Mr. Duke said this data will also be included in the future Annual RPO Reports.

Following the introduction by Mr. Wray, Mr. Chakurian reported on the Performance Monitoring Analytical Results. See Attachment 7 for details.

Site SS015 EVO Injection - (second quarterly performance monitoring):

- There have been significant reductions in the hot spot area as seen in analytical results from wells IW2128x15 and MW216x15. Since the EVO injection was conducted, there have been significant reductions in DCE, and vinyl chloride in the source area. Cis-1,2-DCE decreased from 8,800 µg/L to 535 µg/L, and vinyl chloride decreased from 5,140 µg/L to 80.7 µg/L.

- The detections of ethane and ethene in MW216x15 confirm the complete destruction of vinyl chloride is occurring.
- Dissolved Total Organic Carbon (TOC) in the hot spot injection area remains high and is sustaining a rapid rate of Enhanced Reductive Dechlorination (ERD). TOC concentration in MW216x15 increased from a baseline concentration of 13.8 mg/L to a high of 1,310 mg/L. Currently the TOC is at 645 mg/L. Four wells in the hot spot area still contain >50 mg/L TOC. The EPA recommendation is 20 mg/L to sustain ERD, and the site appears to be well above that level. Concentrations of TOC below 20 mg/L could trigger the need for more EVO injection.
- Several wells will be dropped from the performance monitoring, because no impact from the EVO injection is anticipated to be seen at these wells for a long time due to their distance from the injection wells: MW624x15, MW2119x15, and MW2125x15. These wells will continue to be monitored in the GSAP program, so if impacts from the EVO injection occur, it will be detected. Mr. Wray said the reasoning for dropping these wells is because some of the wells in the performance monitoring network are up to 100 to 150 feet away from the treatment zone, and based on the data collected to date, they will not experience impacts from the EVO injection any time soon. The analytical data does not show changes yet in wells that are much closer to the treatment zone, and so it is not necessary to collect samples from wells way outside of the treatment zone until we start seeing an impact in the wells that are at a lesser distance. These wells can be added back in to the performance monitoring once we see the treatment zone start to expand. Mr. Chakurian added that these wells have been non-detect for VOCs the last couple of sampling rounds. In other wells, we are seeing TCE reductions which provide the rationale to add them to the performance monitoring network. So we want to start sampling those wells for TOC analysis to see if the TCE reduction is due to the EVO injection. TOC analysis will be added to wells MW2124x15 and MW2103x15. TOC, dissolved iron, and manganese analyses will be added to MW2104x15.

Ms. Burke asked if the reason these wells were initially included in the performance monitoring is because it wasn't known how fast the EVO would spread. Mr. Wray said yes, correct. Ms. Burke asked if removing these wells from the performance monitoring is in a report, or how is this being communicated? Mr. Duke said it is being communicated in this RPM meeting. Mr. Wray said we would like to make these changes in the November 2011 quarterly performance sampling. Mr. Salcedo asked if future injections were needed and has there been thought to inject EVO in MW2124x15. Mr. Chakurian said it is a four inch well and it is certainly a possibility. Ms. Burke said if you plan on taking these wells off of the quarterly performance monitoring would you add them to the annual GSAP. Mr. Wray said it would be decided based on the decision tree. Mr. Salcedo said he had no problem with those wells being removed. Mr. Smith said that that if Ms. Burke and Mr. Friedman are not comfortable with removing these wells from performance monitoring, he could leave them in, however, these wells are not providing any useful performance data. The recommendation is based on the analytical data and as it stands now it would not be cost effective to keep sampling these wells until we start to see changes in the wells that are closer to the treatment zone. Mr. Friedman said that made sense and he was okay with the recommendation. Ms. Burke said that she would

like a week to look at the data, that the rationale seems very logical, and that if she does not get back to Travis by 1 November 2011 to go ahead and make the proposed changes.

- The geochemical data collected from the hot spot area supports ERD. We are seeing high methane levels, high dissolved iron and manganese, and significantly depleted sulfate, which are all positive geochemical signatures for anaerobic conditions favoring ERD.

Mr. Chakurian referred to a map of the TCE plume and a cross section with the baseline and subsequent quarterly TCE concentrations posted. See attachment 7 for details.

Site SS016 Bioreactor - (third quarterly performance monitoring):

- In November 2010, the in situ bioreactor began operation in the Site SS016 OSA source area.
- Based on the first three quarters of performance data, the bioreactor is providing high rates of TCE, DCE, and vinyl chloride removal.
- Based on the August/September 2011 analytical data the bioreactor is removing over 99% of the TCE and nearly 92% of the total molar chlorinated VOCs entering the bioreactor.
- One difficulty with this site is that the bedrock is shallow and the saturated interval surrounding the bioreactor is in bedrock. So the downgradient distribution of TOC is slow, and ERD is slow to develop in the downgradient direction. Monitoring well MW2112Ax16 which is located approximately 10 feet downgradient of the bioreactor is just beginning to show evidence of ERD. DCE and vinyl chloride concentrations are beginning to rise in that well, and TOC has increased from a baseline of 4.2 mg/L to 17.1 mg/L.
- The dissolved TOC supply inside the bioreactor has ranged from 866 to 210 mg/L over the first nine months and is sustaining a rapid rate of ERD inside the bioreactor.
- Geochemical data collected from the bioreactor supports ERD. High methane, high dissolved iron and manganese, and totally depleted sulfate are all positive geochemical signatures of anaerobic conditions favoring ERD.

Mr. Chakurian pointed out that at one Site SS016 well, MW2022x16, the TCE concentration increased from the baseline result of 591 µg/L to 5,610 µg/L over the reporting period. We think this is due to mounding of the injected groundwater. This well is located directly upgradient of the source area bioreactor. Mr. Salcedo asked if there was another well further upgradient of MW2022x16. Mr. Chakurian said no. Mr. Wray pointed out that there is an existing horizontal well EW03x16 which is tied into the bioreactor for recirculation of untreated groundwater. Mr. Chakurian said that in well TPE-Wx16 the TCE concentration for the baseline was 82,500 µg/L,

and dropped in the first quarter to 28,000 µg/L. The second quarter result for TCE was 80,700 µg/L, and the third quarter result 40,100 µg/L. This indicates that the contaminated groundwater is getting recirculated.

Monitoring well PZAx16 will be dropped from the performance monitoring since it is too far crossgradient from the plume to provide useful information at this time.

Mr. Chakurian referred to a map of the TCE plume and a cross section with the baseline and subsequent quarterly TCE concentrations posted. See attachment 7 for details.

Site SD036 EVO Injection - (third quarterly performance monitoring):

- The TCE hot spot area targeted for the EVO injection at Site SD036 focused on the area surrounding three wells; MW2031Bx36, MW2061Bx36, and PZ550Cx36. This area is showing significant reductions in TCE and increases in DCE when compared to the baseline concentrations. Very little vinyl chloride is being generated.
- In well MW2061Bx36, which was not one of our injection wells, we are seeing a significant decrease in TCE concentrations. The TCE concentrations went from 18,500 to 5,570 mg/L since the baseline sampling was conducted.
- Ethane and Ethene are being detected at the site, indicating that complete dechlorination of the DCE and vinyl chloride seems to be in progress.
- There is a general increase in DCE in the monitoring wells in the treatment area.
- Well MW2033Ax36 showed an increase in TCE when compared to the baseline results. This may have been caused by mounding of the injected oil.
- TOC in the hot spot area remains high and is sustaining ERD. TOC in MW2031Bx36 increased from <1 mg/L to 2,410 mg/L in May, and then decreased to 1,040 mg/L in August. TOC is being used up as degradation progresses.
- Geochemical data collected for the hot spot area supports ERD. High methane, high dissolved iron and manganese, and significantly lower sulfate levels are all positive geochemical signatures favoring ERD.
- Sulfate reduction is competing with TCE reduction. A continuing influx of sulfate will deplete the TOC supply and slow TCE and DCE removal.

Monitoring well MW2033Bx36 will be dropped from our performance monitoring, because the TCE concentrations have not gone above 5 mg/L. Mr. Wray pointed out MW2033Ax36, the shallower well of the pair, has much higher TCE concentrations and will continue to be sampled in the performance monitoring program. Well MW2033Bx36 is screened below the TCE contamination. Ms. Burke asked if it wouldn't be prudent to keep this well in the program to bound the deeper portion of the plume. Mr. Chakurian said that there is vertical control with the

deep clay layer acting as a barrier. Mr. Chakurian said this well will become part of the GSAP annual program. Mr. Salcedo said that he agrees with the rationale in dropping this well from the performance sampling.

Mr. Chakurian referred to a map of the TCE plume and a cross section with the baseline and subsequent quarterly TCE concentrations posted. See attachment 7 for details.

Site SD037 EVO Injection - (fourth quarter performance monitoring):

- The TCE hot spot area targeted for the EVO injection includes the area of monitoring wells MW524x37 and MW2039Ax37. These wells showing significant reductions in TCE. Increases in DCE are significant in MW2039Ax37, and there also is an apparent increase in MW524x37. The very high TOC concentrations in MW524x37 are likely creating conditions for total destruction of TCE, DCE and vinyl chloride. Trace levels of vinyl chloride are being observed.
- The ethane and ethene detected indicates that complete dechlorination of the DCE and vinyl chloride appears to be in progress.
- At well MW524x37 a total molar reduction of 94% for VOCs has occurred in the first nine months of ERD treatment. The other monitoring wells that are being monitored at this site are over 50 feet from the injections wells and are not showing evidence of ERD yet.
- The dissolved TOC supply in the hot spot injection area remains high and is sustaining a rapid rate of ERD. The TOC concentration in the target well MW524x37 has increased from a baseline concentration of 1.16 mg/L to 2,155 mg/L in one month since the EVO injections, and is down to 306 mg/L nine months after the injection. Well MW2039Ax37 has not experienced an increase in the TOC levels, but TCE levels have decreased and DCE levels have increased. Well MW2039Ax37 may be located at the edge of the TOC influence, and we are not seeing much TOC impact yet.
- The geochemical data collected from the hot spot area supports ERD. The high methane, high dissolved iron and manganese, and significantly lower sulfate levels, are all positive geochemical signatures for anaerobic conditions favoring ERD. Sulfate levels are in excess of 200 mg/L at this site, so it is likely that sulfate reduction is competing with TCE reduction. The influx of sulfate will continue to decrease the TOC supply and eventually slow TCE and DCE removal.

Mr. Wray said the initial plan was to sample four quarters at each enhanced attenuation site and then transition to annual sampling. However it was decided to collect one more quarter of data at Site SD037 and at the Site DP039 Permeable Reactive Barrier (Biobarrier), to support the ROD. Ms. Burke said that, aside from supporting the ROD, we need to consider what sort of frequency of data you need to develop an operation and maintenance design. Mr. Wray said we are thinking of that as well, and that we are in tune with the O&M requirements of these sites. That is why four inch injection wells were installed in the event the data shows that more EVO injections are needed.

Mr. Chakurian referred to a map of the TCE plume and a cross section with the baseline and subsequent quarterly TCE concentrations posted. See attachment 7 for details.

Site DP039 Permeable Reactive Barrier (Bio-barrier) EVO Injection - (fourth quarter performance monitoring):

- There have been significant TCE reductions, minor DCE accumulation, and no vinyl chloride accumulation along the line of the DP039 biobarrier injection wells.
- In the injection wells there are high levels of TOC that have degraded most of the TCE, DCE, and vinyl chloride.
- The TOC supply along the line of injections wells is still adequate for ERD; the average TOC concentration is 426 mg/L which is well above the EPA recommended level for ERD of 20 mg/L.
- The TOC is dropping in two of the three injection wells that were sampled. These wells will be monitored for TOC depletion to better estimate the recharge frequency for this site.
- The downgradient wells are 80 to 150 feet from the line of injections, and there is minimal impact observed so far based on the data. There is some signs of TOC impact at MW2093x39, and MW2092Ax39 has elevated methane and may be seeing the leading edge of the treatment zone that originates from the PRB. This is a good sign.
- The geochemical data collected from the line of injection wells supports ERD. The high methane, high dissolved iron and manganese, and depressed sulfate are all positive geochemical signs for anaerobic conditions favoring ERD.

Mr. Salcedo asked if the downward trend in TOC is critical. Mr. Wray said they are on a downward trend, however still above EPA recommendation for ERD levels. However, EVO reinjection may be needed within two years or so.

Mr. Krook reminded the group that the treatment zones are designed to remove hotspots, and that the distal portions of the plume will be remediated under the process of natural attenuation.

Ms. Burke asked if there is rationale, such as a decision tree, as to what wells will be sampled, is this indicated in a document somewhere? Mr. Wray said that the supporting sampling data is in the CD that was handed out during this meeting.

Mr. Chakurian referred to a map of the TCE plume and a cross section with the baseline and subsequent quarterly TCE concentrations posted. See attachment 7 for details.

Site DP039 Bioreactor, Operating for Thirty Months, Performance Sampling Results:

Note: The site DP039 Bioreactor is already on the annual sampling schedule and was not sampled during this event. The information below is the same data presented at the May 2011 RPM meeting.

- During the past 30 months of operation, a reduction of 99% of TCE and 95% of total molar VOCs have occurred in the aquifer up to 30 feet away of the bioreactor.
- The most contaminated well in the source area is monitoring well MW793x39 which had a baseline TCE concentration of 8,000 µg/L. TCE concentrations in this well have been reduced to 5.3 µg/L as indicated in the May 2011 sampling data.
- The bioreactor could now continue to operate with very limited monitoring on an annual basis.
- Bioreactors are most efficient with treatment of higher TCE levels in the recirculated water. With the significantly reduced contaminants in the DP039 bioreactor, an intermittent or pulsed operation such as one week on and four weeks off may be more effective to conserve the small quantities of TOC being generated in the bioreactor.
- Previous attempts to increase the TOC being generated from the bioreactor into the surrounding aquifer have not been very successful.
- It appears that the daily recirculation of sulfate-rich groundwater through the bioreactor is rapidly decreasing the TOC that was added to the bioreactor as vegetable oil in October 2010.

Mr. Chakurian said that the TCE plume first is treated through the bioreactor. The plume then passes through the phytostabilization area, followed by the biobarrier. Mr. Anderson said that this site has a very effective design. He also indicated that where the biobarrier and bioreactor are located, you can't plant trees because of the asphalt and concrete pavement. When you look at this site, the design was tailored to its condition.

Ms. Burke said she appreciated the presentation and that the results are very promising, and looks forward to seeing more data.

Mr. Chakurian referred to a map of the TCE plume and a cross section with the baseline and subsequent quarterly TCE concentrations posted. See attachment 7 for details.

LF007 Investigation Update (see Attachment 8)

Mr. Wray gave the presentation on the LF007C Investigation. See attachment 8 for details.

- First step was to perform the data gaps investigation, and site characterization.
- Then Groundwater Modeling would be conducted to evaluate contaminant distribution and capture zone analysis.

- The goal of this task is to optimize the Interim Remedial Action (IRA) at Site LF007C. The plan is to install new monitoring wells and possibly new extraction wells if needed based on the evaluation. Currently there are two solar powered extraction wells that pump the groundwater at a very low rate to the North Plant. There is no power supply available at this site.
- Site LF007C is one of three off-base plumes. This off-base portion of this site is privately owned pasture land. The site is basically flat with an expansive shallow depression where the vernal pools develop. The Air Force has an easement agreement to allow for the remediation work. (A map is included in the attachment to show the location of Site LF007C).

Ms. Burke asked if there is local pumping by the property owner. Mr. Wray said no and that was indicated in the March 2009 Work Plan.

- Hydrogeology: Thirty to forty feet of fine grained alluvium overlies the Nortonville Shale bedrock. The alluvium is very fine grained, with few sand lenses. The regional groundwater flow is to the south and southeast. A bedrock high located to the southeast influences groundwater flow locally to north-northwest. Depth to water, as observed in the recent borings, is thirteen to sixteen feet bgs.
- TCE is the only Chemical of Concern (COC) and the only chemical detected above the Interim Remediation Goals (IRGs). The TCE plume is migrating to the northwest, and the extent of the plume has not been defined off base. The GSAP reports shows statistically decreasing trends in the TCE concentration in two plume wells (MW617x07 and EW614x07).
- Data Gaps Investigation: The objective was to define the off base portion of the TCE plume by conducting in situ sampling (hydropunch), followed by installation of monitoring wells and extraction wells if needed. The plan was to delineate the plume in phases by hydropunch sampling first until defined. Samples collected were to be analyzed for VOCs on a 24 hour turnaround time (TAT). Travis consulted with United States Fish and Wildlife Service (USFWS) for a Biological Opinion (BO). The BO was received on 11 August 2011. USFWS required a full time biologist to monitor the field work, and was very specific about conducting the field work during the dry season only. The first phase of drilling was conducted between 03 October and 14 October 2011. Planking was placed to all drill sites to protect the vernal pools from the equipment. Nine soil borings were drilled, and sixteen hydropunch samples were collected.
- Results of the Investigation: Four soil borings were drilled and logged. Collected two hydropunch samples from each boring (one shallow, one deep), which were sent to the laboratory on 24-hour TAT. Received the sample results, and based on the analytical data we will drill stepout borings and collect two hydropunch samples from the stepouts until defined. Bedrock was observed to be approximately 29 to 42 feet bgs. Shallow groundwater samples collected ranged from 11 to 22 ft. Deep groundwater samples collected ranged from 25 to 42 feet. The plume was defined to non-detect on all sides except the northern end. Photos of the drilling activities are included in the attachment.

- The next phase will be conducted 24 October 2011 to 27 October 2011. Two stepout borings will be drilled and sampled. When all of the monitoring wells are installed, they will be developed and sampled. Although there is no rain predicted in the immediate forecast, the rainy season is expected to start soon, and ponded water in the vernal pools will halt any further field work at this site.
- Future Tasks: Groundwater modeling to evaluate capture zone. Evaluate placement of monitoring wells, and extraction wells (if needed). Installation of pumps and conveyance. Connect to and possibly upgrade the treatment system. Conduct performance monitoring.

Ms. Burke said she did not understand why Travis had to stop pumping during the wet season, stating the groundwater shouldn't have anything to do with the vernal pool. Mr. Parrot said that this pool may be hydraulically connected to the groundwater. Ms. Burke understood saying that they could not be hundred percent sure and have to err on the safe side. Mr. Anderson said that is correct.

FT005 Soil Remedial Action Update (No attachment)

Ms. Hess gave a brief update on the FT005 Soil Remedial Action Update.

Ms. Hess said the excavation work is still being conducted. A total of 9,300 cubic yards of soil has been removed and taken to the Potrero Hills Landfill for disposal, which is about 665 loads. We received 6,000 cubic yards of clean dirt to use as backfill. As the cleanup levels are attained, the excavation voids are backfilled, but only after we surveyed the locations. Work has been completed on the additional step downs in Area A this week. We will start on the five TPH locations that have been identified to meet unrestricted use, which represents about 1,500 cubic yards. For the industrial soil removal it is very close to our estimated volumes. The actual excavation volume is still not clear for the industrial or residential levels. We will know the final excavation volume when the project has been completed.

Program Update: Management Overview Briefing (see Attachment 9)

Mr. Wray reported on the status of field work and documents which are completed, in progress, and upcoming. See Attachment 9 for details.

Highlights included:

Completed Documents: 2010 Annual Groundwater RPO Report.

New Documents added: Work Plan for Assessment of Aerobic Chlorinated Cometabolism Enzymes. Old Skeet Range Engineering Evaluation/Cost Analysis (EECA).

Field Work In Progress: FT005 Soil Remedial Action, LF007C Site Characterization (Wetlands)

Upcoming Documents: New Document added, FT005 Remedial Action Completion Report.

Field Schedule (see Attachment 10)

Mr. Wray reported on the 2011 field schedule. See Attachment 10 for details.

Highlights included: LF005 Soil Remedial Action. LF007C Remedy Optimization Investigation (2nd Phase hydropunch and wells), Quarterly RPO Performance Monitoring, 2011 Semiannual GSAP Sampling, Sampling for Assessment of Aerobic Chlorinated Cometabolism Enzymes, and Site SS029 System Optimization Analysis Investigation.

4. New Action Item Review

None.

5. PROGRAM/ISSUES/UPDATE

Ms. Burke requested Ms. Snow to be added to the distribution list when documents are submitted for review.

Mr. Smith announced the Legislative Super Committee has communicated cutbacks to save money. The good news is there are no layoff talks. But there are restrictions on travel and spending. Any decrease in Supply funds could impact production of The Guardian. Mr. Smith said he would do what he could to keep production of The Guardian going as well as some travel. Mr. Smith asked the Regulators if they received communication on new budget cuts. Ms. Burke said EPA has made cutbacks for travel. There is no budget for travel to the non-superfund sites. For the superfund sites there is some money for travel, but the approval process has been elevated. She said this does not affect Travis AFB RPM or RAB meetings because it is so close to EPA Region 9 Headquarters. Mr. Friedman said they have been restricted to mission critical sites.

Mr. Salcedo said his office is undergoing renovation, and from 22 November 2011 through 9 December 2011 he will not have a business phone. If you need to get a hold of Mr. Salcedo, communicate through email.

General Discussion

None.

7. Action Items

Item #	Responsible	Action Item Description	Due Date	Status
1.	Travis AFB	Petition to have the Lysimeter removed.	TBD	Open
2.	Travis AFB	Research beneficial reuse of treated water and give update.	TBD	Open
3.	Travis AFB and EPA	Review past site closure completion reports to determine if future site closure reports are necessary.	TBD	Open
4.	Travis AFB	Travis AFB is to advise Regulatory Agencies when remedial actions/fieldwork are scheduled at Travis AFB so a site visit can be planned.	TBD	Open
5.	Travis AFB	Mr. Smith is to schedule the RPM and RAB meetings for calendar year 2012	N/A	Closed.

TRAVIS AIR FORCE BASE
ENVIRONMENTAL RESTORATION PROGRAM
REMEDIAL PROGRAM MANAGER'S MEETING
BLDG 570, Main Conference Room
20 October 2011, 01:00 P.M.
AGENDA

1. ADMINISTRATIVE

- A. PREVIOUS MEETING MINUTES
- B. ACTION ITEM REVIEW
- C. MASTER MEETING AND DOCUMENT SCHEDULE REVIEW

2. CURRENT PROJECTS

- A. TREATMENT PLANT OPERATION AND MAINTENANCE UPDATE (LONNIE)

3. PRESENTATIONS

- A. PROGRAM UPDATE: ACTIVITIES COMPLETED, IN PROGRESS AND UPCOMING
- B. 2011 FIELD SCHEDULE
- C. FT005 SOIL REMEDIAL ACTION UPDATE
- D. LF007 INVESTIGATION UPDATE

4. NEW ACTION ITEM REVIEW

5. PROGRAM/ISSUES/UPDATE

NOTE:

Travis AFB Master Meeting and Document Schedule

(2011)

Annual Meeting and Teleconference Schedule

Monthly RPM Meeting (Begins at 9:30 a.m.)	RPM Teleconference (Begins at 9:30 a.m.)	Restoration Advisory Board Meeting (Begins at 7:00 p.m.) (Poster Session at 6:30 p.m.)
01-26-11	—	—
02-16-11	—	—
03-16-11	—	—
04-21-11 (1:00 PM)	—	04-21-11
05-26-11	—	—
06-15-11	—	—
07-20-11	—	—
08-17-11	—	—
09-21-11	—	—
10-20-11 (1:00 PM)	—	10-20-11
11-30-11	—	—
—	—	—

South Base Boundary Groundwater Treatment Plant

Monthly Data Sheet

Report Number: 133 Reporting Period: 31 Aug – 30 Sept 2011 Date Submitted: 14 October 2011

This monthly data sheet presents information regarding the South Base Boundary Groundwater Treatment Plant (SBBGWTP) and associated remedial process optimization (RPO) activities.

System Metrics

Table 1 presents operation data from the September 2011 reporting period.

Table 1 – Operations Summary – September 2011		
Operating Time:	Percent Uptime:	Electrical Power Usage:
SBBGWTP: 720 hours	SBBGWTP: 90.6%	SBBGWTP: 14,220 kWh (19,481 lbs CO ₂ generated ^a)
Gallons Treated: 3.6 million gallons	Gallons Treated Since July 1998: 751 million gallons	
Volume Discharged to Union Creek: 3.6 million gallons		
VOC Mass Removed: 2.15 lbs^b	VOC Mass Removed Since July 1998: 409 lbs	
Rolling 12-Month Cost per Pound of Mass Removed ^c \$5,039 ^c		
Monthly Cost per Pound of Mass Removed: \$10,971		
lbs = pounds		
^a Based on Department of Energy estimate that 1 kilowatt hour generated produces 1.37 pounds of GHG.		
^b Calculated using September 2011 EPA Method SW8260B analytical results.		
^c Costs include operations and maintenance, reporting, analytical laboratory, project management, and utility costs related to operation of the system.		

Table 2 presents individual extraction well flow rates along with the average system flow during the monthly reporting period.

Table 2 – SBBGWTP Average Flow Rate (gpm) ^a							
FT005 ^b				SS029		SS030	
EW01x05	Offline	EW736x05	Offline	EW01x29	0.1	EW01x30	7.9
EW02x05	2.1	EW737x05	Offline	EW02x29	6.1	EW02x30	2.6
EW03x05	Offline	EW742x05	Offline	EW03x29	Offline ^d	EW03x30	3.5
EW731x05	Offline	EW743x05	Offline	EW04x29	5.9	EW04x30	24.7
EW732x05	Offline	EW744x05	Offline	EW05x29	10.1	EW05x30	7.7
EW733x05	Offline	EW745x05	Offline	EW06x29	10.7	EW06x30	Dry
EW734x05	Offline ^c	EW746x05	Offline	EW07x29	7.5	EW711x30	16.6
EW735x05	7.1						
FT005 Total:		9.1		SS029 Total:		40.4	
				SS030 Total:		63.0	
SBBGWTP Average Monthly Flow ^e : 83.7 gpm							

^a Extraction well flow rates are based on the monthly readings.

^b Most extraction wells at FT005 were taken offline in accordance with the 2008 Annual Remedial Process Optimization Report for the Central Groundwater Treatment Plant, North Groundwater Treatment Plant, and South Base Boundary Groundwater Treatment Plant.

^c Pump offline during July through September 2011 due to inoperable pump.

^d EW03x29 is expected to be brought back online in October 2011.

^e The average groundwater flow rate was calculated using the Union Creek Discharge Totalizer and dividing it by the operating time of the plant

gpm – gallons per minute

Recharge –not pumping while the well recharges.

SBBGWTP – South Base Boundary Groundwater Treatment Plant

Table 3 presents a summary of system shutdowns during the monthly reporting period.

Table 3 – Summary of System Shutdowns					
Location	Shutdown		Restart		Cause
	Date	Time	Date	Time	
SBBGWTP	16 September 2011	1730	19 September 2011	1330	PLC fault cause system shutdown. PLC power was cycled and system restarted.
SBBGWTP = South Base Boundary Groundwater Treatment Plant					

Summary of O&M Activities

Monthly groundwater samples at the SBBGWTP were collected on 8 September 2011. Sample results are presented in Table 4. The total VOC concentration (71.2 µg/L) in the influent sample has increased slightly since the August 2011 sample (51.1 µg /L) was collected. No contaminants were detected in the effluent process stream. Figure 1 presents a plot of influent concentrations at the SBBGWTP over the past year. The previous year of influent data indicates increased influent concentrations from approximately December 2010 through September 2011. This slight increase in influent concentration is likely due to increased pumping efforts at Site SS030, and increased operation of Site FT005 wells EW02x05, EW734x05, and EW735x05.

The SBBGWTP was shut down for approximately 68 hours in September 2011 due to a PLC fault. Upon discovery of the fault, power to the PLC was immediately cycled, and system resumed operation.

On 14 September 2011 it was discovered that two stages of the EW07x29 pump head were sheared in pieces and the main shaft of the pump was bent. The damaged parts were replaced with a suitable spare pump head. EW07x29 was brought back online on 14 September 2011, and is pumping at the expected flow rate of about 7.5 gpm.

On 19 September 2011 the variable frequency drive (VFD) at well EW01x29 was not responding to any start/run commands. At that time, it was also discovered the SCADA was incorrectly indicating the water level in the well at 0 ft bgs. The VFD was replaced, and the well was brought back online on 19 September 2011. Troubleshooting will continue in October 2011 to determine the cause of the faulty water level reading at the SCADA.

The parts required to bring EW03x29 back online were received in August 2011. On 27 September 2011 the discharge piping and plug to power source were installed along with the VFD. All electrical and communication connections continue to be completed and integrated into the Site SS029 SCADA. EW03x29 is expected to be brought back online in October 2011.

The cost per pound of contamination removed during the September 2011 monitoring period was due to increased efforts (equipment purchases and labor hours) to bring extraction well EW03x29 back online after having been offline since 2004. Many of the parts required for operation of the pump within the wells were obsolete and required replacement. A new pump, along with new above-ground piping and internal communication devices were successfully installed in September 2011, but communication programming is still required to make EW03x29 operational.

Optimization Activities

No optimization activities occurred at the SBBGWTP in September 2011.

Sustainability

Travis AFB is committed to decreasing the amount of GHG produced directly (waste streams discharging GHG) or indirectly (GHG produced as related to electrical energy consumption) from all systems across Travis AFB. Travis AFB continues to optimize each treatment plant to reduce the amount of electrical energy consumed, and to implement sustainable treatment plant optimization programs, such as bioreactors and EVO injection well networks.

Figure 2 presents the historical GHG production from the SBBGWTP. The SBBGWTP produced approximately 19,481 pounds of GHG during September 2011. This is an increase from August 2011 (10,439 pounds) which can be attributed to an increase in gallons treated. The overall energy consumption levels remain consistent with the general decrease in energy demand since the air stripper was bypassed, and the granular activated carbon (GAC) system was brought online.

TABLE 4

Summary of Groundwater Analytical Data for September 2011 – South Base Boundary Groundwater Treatment Plant

Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	8 September 2011 (µg/L)		
				Influent	Midpoint	Effluent
Halogenated Volatile Organics						
Bromodichloromethane	5.0	0.15	0	ND	ND	ND
Carbon Tetrachloride	0.5	0.14	0	ND	ND	ND
Chloroform	5.0	0.16	0	ND	0.20 J	ND
Dibromochloromethane	5.0	0.13	0	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND
1,2-Dichloroethane	0.5	0.15	0	0.17 J	ND	ND
1,1-Dichloroethene	5.0	0.19	0	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.19	0	4.7	3.1	ND
trans-1,2-Dichloroethene	5.0	0.33	0	ND	ND	ND
Methylene Chloride	5.0	0.66	0	ND	ND	ND
Tetrachloroethene	5.0	0.21	0	ND	ND	ND
1,1,1-Trichloroethane	5.0	0.14	0	ND	ND	ND
1,1,2-Trichloroethane	5.0	0.20	0	ND	ND	ND
Trichloroethene	5.0	0.19	0	66.3	0.5	ND
Vinyl Chloride	0.5	0.18	0	ND	ND	ND
Non-Halogenated Volatile Organics						
Benzene	1.0	0.17	0	ND	ND	ND
Ethylbenzene	5.0	0.22	0	ND	ND	ND
Toluene	5.0	0.14	0	ND	ND	ND
Xylenes	5.0	0.23 – 0.5	0	ND	ND	ND
Other						
Total Petroleum Hydrocarbons – Gasoline	50	8.5	0	NM	NM	ND
Total Petroleum Hydrocarbons – Diesel	50	50	0	NM	NM	ND
Total Suspended Solids (mg/L)	NE	1.0	0	7 J	NM	NM

* In accordance with Appendix B of the Travis AFB South Base Boundary Groundwater Treatment Plant Operations and Maintenance Manual (CH2M HILL, 2004).

Notes:

J = analyte concentration is considered an estimated value

mg/L = milligrams per liter

N/C = number of samples out of compliance with discharge limits

ND = not detected

NE = not established

NM = not measured

µg/L = micrograms per liter

Figure 1
SBBGWTP Total VOC Influent Concentrations
Travis Air Force Base, California

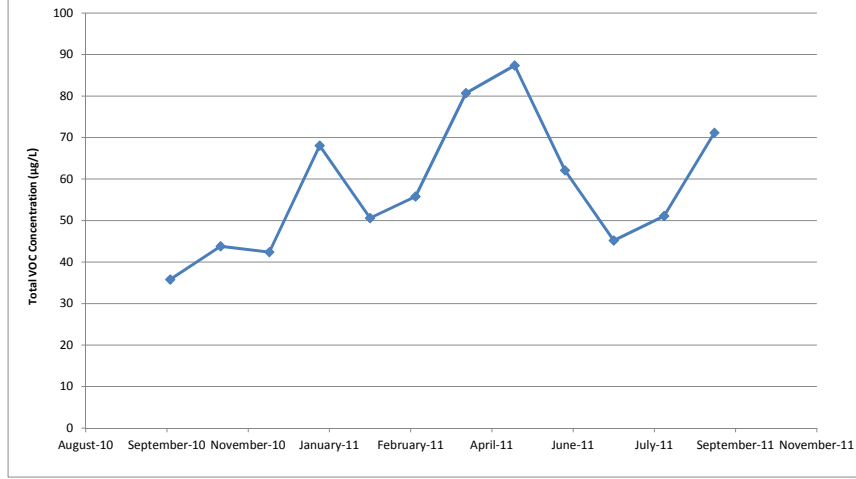
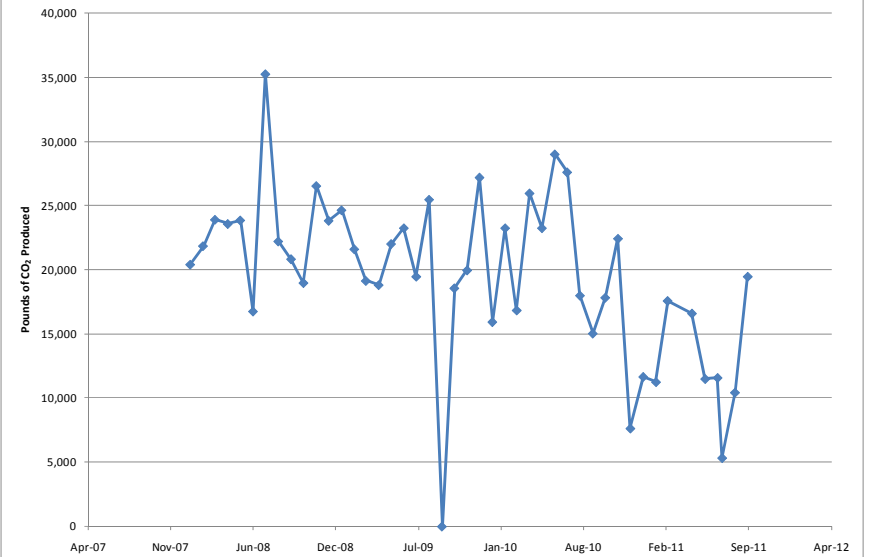


Figure 2
Equivalent Pounds of CO₂ Produced by the South Base Boundary Groundwater Treatment Plant



Central Groundwater Treatment Plant Monthly Data Sheet

Report Number: 146 Reporting Period: 31 Aug – 30 Sept 2011 Date Submitted: 14 October 2011

This monthly data sheet presents information regarding all systems and associated remedial process optimization (RPO) activities to the Central Groundwater Treatment Plant (CGWTP). The systems associated with the CGWTP include the CGWTP and the West Treatment and Transfer Plant (WTTTP), which operated briefly in August 2011 for rebound vapor sample collection. The RPOs related to the CGWTP network of treatment systems include various emulsified vegetable oil (EVO) injection sites, two (2) bioreactors, and various rebound studies.

System Metrics

Table 1 presents operational data from the September 2011 reporting period.

Table 1 – Operations Summary – September 2011					
Operating Time:		Percent Uptime:		Electrical Power Usage:	
CGWTP:	671 hours	CGWTP:	90.5%	CGWTP:	2,311 kWh (3,166 lbs CO ₂ generated ^a)
WTTTP:	Water: 0 hours Vapor: 0 hours	WTTTP:	Water: 0% Vapor: 0%	WTTTP:	0 kWh
Gallons Treated: 1.5 million gallons		Gallons Treated Since January 1996: 449 million gallons			
VOC Mass Removed:		VOC Mass Removed Since January 1996:			
4.61 lbs ^b (groundwater only)		2,557 lbs from groundwater			
0 lbs (vapor only)		8,686 lbs from vapor			
Rolling 12-Month Cost per Pound of Mass Removed ^c \$1,943 ^c					
Monthly Cost per Pound of Mass Removed: \$2,966					
^a Based on Department of Energy estimate that 1 kilowatt hour generated produces 1.37 pounds of GHG.					
^b Calculated using September 2011 EPA Method SW8260B analytical results.					
^c Costs include operations and maintenance, reporting, analytical laboratory, project management, and utility costs related to operation of the CGWTP.					
NA – not available / not recorded					

Table 2 presents individual extraction well flow rates during the monthly reporting period.

Table 2 – CGWTP Average Flow Rates ^a		
Location	Average Flow Rate	
	Groundwater (gpm)	Soil Vapor (scfm) ^b
EW01x16	20.0	Offline
EW02x16	7.4	Offline
EW03x16	3.5 ^c	Offline
EW605x16	6.5	Offline
EW610x16	5.9	Offline
CGWTP	38.1	--
WTTTP	Offline ^b	Offline
^a Measured by the effluent discharge to the storm drain divided by the operating time during the month		
^b No vapor or groundwater was treated in September 2011.		
^c Water discharged to Site SS016 bioreactor – flow rate taken from wellhead Flow Totalizer divided by operating time during the month.		
gpm = gallons per minute		
-- = not applicable/not available		
scfm = standard cubic feet per minute		

Table 3 presents average flow rate values from the West Industrial Operable Unit (WIOU) extraction wells.

Table 3 – Average Flow Rate from the WIOU Extraction Wells ^a (gpm)							
SD037/ SD043				SD033/SD034		SD036	
EW599x37	Offline	EW705x37	Offline	EW501x33	Offline	EW593x36	Offline
EW700x37 ^b	Offline	EW706x37	Offline	EW503x33	Offline	EW594x36	Offline
EW701x37	Offline	EW707x37	Offline	EW01x34	Offline	EW595x36	Offline
EW702x37	Offline	EW510x37	Offline	EW03x34	Offline		
EW703x37	Offline	EW511x37	Offline				
EW704x37 ^b	Offline	EW555x43	Offline				
^a Extraction wells are offline due to the ongoing rebound study in the WIOU.							
gpm—gallons per minute							

Table 4 presents average a summary of shutdowns during the monthly reporting period.

Table 4 – Summary of System Shutdowns					
Location	Shutdown		Restart		Cause
	Date	Time	Date	Time	
CGWTP (Groundwater)					
CGWTP	6 September 2011	0030	6 September 2011	1000	Blown fuse on FU-1 in MCC
CGWTP	13 September 2011	1915	16 September 2011	1000	Blown fuse on FU-5 in MCC
WTTP					
WTTP (Vapor)	9 August 2011				System resumed rebound study shutdown after samples were collected for annual rebound study report.
WTTP (Water)	9 August 2011				System resumed rebound study shutdown after samples were collected for annual rebound study report.
CGWTP = Central Groundwater Treatment Plant WTTP = West Transfer Treatment Plant					

Summary of O&M Activities

Monthly groundwater samples at the CGWTP were collected on 8 September 2011. Sample results are presented in Table 5. The total VOC concentration (360 µg/L) in the influent sample has decreased slightly since the August 2011 sample (404 µg/L) was collected. No contaminants were detected in the effluent process stream. Figure 1 presents a plot of influent concentrations at the CGWTP versus time for the past year.

The CGWTP experienced approximately 73 hours of down time during September 2011. About 63 hours of the down time was due to blown fuses (FU-1 and FU-5) in the CGWTP main control panel. Each fuse was replaced and the system was brought back online.

Optimization Activities

The WTTP remained offline since being shut down in April 2010 for the ongoing vapor rebound study. The WTTP was brought back online briefly on 9 August 2011 for the soil vapor sample collection event. Travis AFB will continue to monitor four (4) dual phase extraction (DPE) wells (EW510x37, EW700x37, EW702x37, and EW707x37) on an annual basis, and the WTTP SVE system will remain offline for the continuing rebound study for at least another year.

No additional optimization activities occurred at the CGWTP in September 2011.

Sustainability

Travis AFB is committed to decreasing the amount of GHG produced directly (waste streams discharging GHG) or indirectly (GHG produced as related to electrical energy consumption) from all systems across Travis AFB. Travis AFB continues to optimize each treatment plant to reduce the amount of electrical energy consumed, and to implement sustainable treatment plant optimization programs, such as bioreactors and EVO injection well networks.

Figure 2 presents the historical GHG production from the systems associated with the CGWTP. The CGWTP produced approximately 3,166 pounds of GHG during September 2011. This is a slight decrease from the amount produced in August 2011 (approximately 3,515 pounds). The decrease in GHG is likely attributed to the decrease in CGWTP monthly operating time.

TABLE 5
Summary of Groundwater Analytical Data for September 2011 – Central Groundwater Treatment Plant

Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	8 September 2011 (µg/L)			
				Influent	After Carbon 1 Effluent	After Carbon 2 Effluent	System Effluent
Halogenated Volatile Organics							
Bromodichloromethane	5.0	0.15	0	ND	ND	ND	ND
Carbon Disulfide	1.0	0.19	0	0.2 J	ND	ND	ND
Carbon Tetrachloride	0.5	0.14	0	ND	ND	ND	ND
Chloroform	5.0	0.16	0	ND	ND	ND	ND
MTBE	1.0	0.5	0	0.56 J	ND	ND	ND
1,2-Dichlorobenzene	5.0	0.25	0	0.47 J	ND	ND	ND
1,3-Dichlorobenzene	5.0	0.15	0	0.44 J	ND	ND	ND
1,4-Dichlorobenzene	5.0	0.15	0	0.30 J	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND	ND
1,2-Dichloroethane	0.5	0.15	0	ND	ND	ND	ND
1,1-Dichloroethene	5.0	0.19	0	0.61	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.19	0	79.5	0.69 J	ND	ND
trans-1,2-Dichloroethene	5.0	0.33	0	3.4	ND	ND	ND
Methylene Chloride	5.0	0.66	0	ND	ND	ND	ND
Tetrachloroethene	5.0	0.21	0	0.63	ND	ND	ND
1,1,1-Trichloroethane	5.0	0.14	0	ND	ND	ND	ND
1,1,2-Trichloroethane	5.0	0.2	0	ND	ND	ND	ND
Trichloroethene	5.0	0.19	0	274	0.21 J	ND	ND
Vinyl Chloride	0.5	0.18	0	0.47 J	0.48 J	ND	ND
Non-Halogenated Volatile Organics							
Benzene	1.0	0.17	0	ND	ND	ND	ND
Ethylbenzene	5.0	0.22	0	ND	ND	ND	ND
Toluene	5.0	0.14	0	ND	ND	ND	ND
Total Xylenes	5.0	0.5 – 0.23	0	ND	ND	ND	ND

* In accordance with Appendix G of the *Travis AFB Central Groundwater Treatment Plant Operations and Maintenance Manual* (URS Group, Inc., 2002).

Notes:
J = analyte concentration is considered an estimated value
N/C = number of samples out of compliance with discharge limits
ND = not detected
µg/L = micrograms per liter

Figure 1
CGWTP Total VOC Influent Concentrations
Travis Air Force Base, California

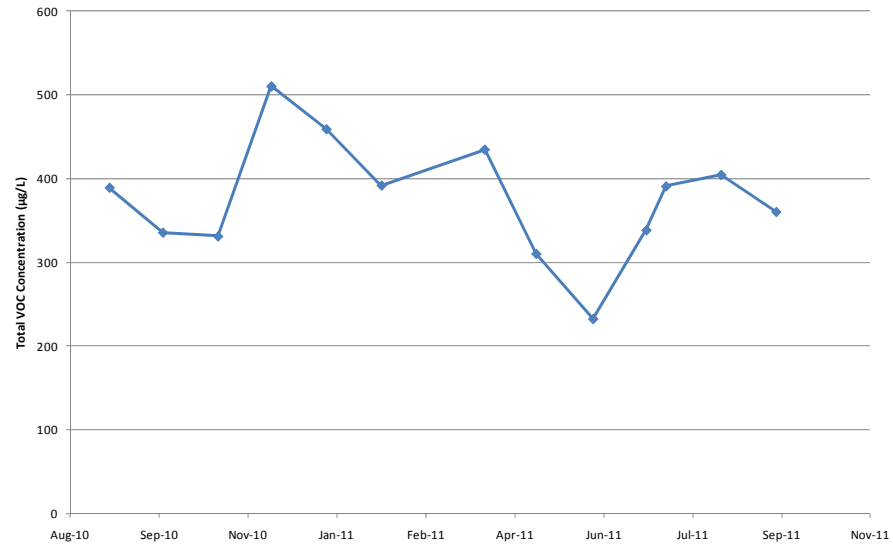
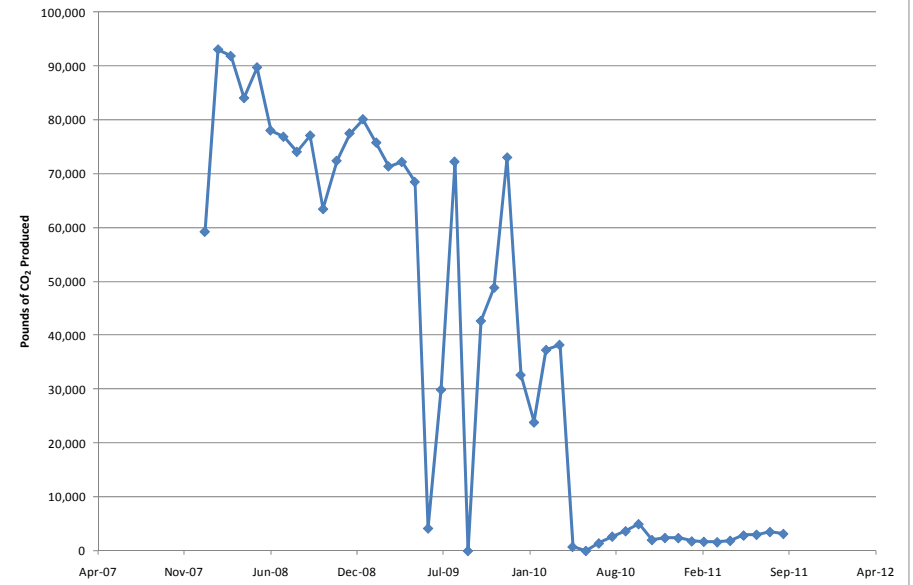


Figure 2
Equivalent Pounds of CO₂ Produced by the Central Groundwater Treatment Plant



Performance Monitoring Results

Performance monitoring sampling results are presented in these monthly data sheets as data are collected throughout the year. Performance monitoring is conducted quarterly for the first year of operation of a new process, followed by semiannual or annual sampling thereafter. Currently, performance monitoring is taking place at Sites within Travis AFB that have undergone remedial process optimization activities in the form of in situ bioreactors or EVO injections:

- Site SS015 EVO injection – area treatment approach
- Site SS016 in situ bioreactor
- Site SD036 EVO injection – area treatment approach
- Site SD037 EVO injection – area treatment approach
- Site DP039 EVO injection – permeable reactive biobarrier
- Site DP039 in situ bioreactor

Performance monitoring at each Site serves to track the progress and effectiveness of each optimization effort, and data are typically collected on a quarterly basis for the first year of operation, and annually thereafter. The Site DP039 bioreactor was not monitored during the August 2011 event, but monitoring will resume at the Site in November 2011.

The performance data are presented in the form of graphical attachments (cross sections, attached to this data sheet) and a technical analysis of the results. A summary of the performance monitoring data for the year will also be presented in the annual Remedial Process Optimization Report. Performance data cross sections and maps are presented as an attachment to this monthly data sheet and are presented as follows:

- Site SS015 – Figures 1A-D, 2A-D
- Site SS016 – Figures 3A-D, 4A-D
- Site SD036 – Figures 5A-D, 6A-D, 7A-D
- Site SD037 – Figures 8A-D, 9A-D
- Site DP039 permeable reactive biobarrier – Figures 10A-D, 11A-D, 12A-D, 13A-D

Bioreactors

Travis AFB has two bioreactors installed on base: one (1) at Site DP039, and the other at Site SS016. The following sections present analytical data obtained during the latest performance monitoring event in August 2011. Only the Site SS016 bioreactor was scheduled for performance monitoring in August 2011. The next performance monitoring sampling event is scheduled for November 2011 and will include sample collection from both bioreactors (Sites SS016 and DP039).

Site SS016 Bioreactor

The Site SS016 bioreactor is located directly south of Building 18 in the OSA, and was installed in September 2010. The bioreactor is approximately 25 feet square and approximately 25 feet deep.

Performance data were collected in August 2011 in accordance with the Site SS016 bioreactor performance monitoring schedule. These data represent the third performance monitoring sampling event following the baseline event in October 2010. The next scheduled performance monitoring sampling event for the Site SS016 bioreactor is in November 2011.

Based on the first three quarters of performance data, the bioreactor is providing high rates of TCE, DCE and vinyl chloride removal. Nearly 400,000 gallons of groundwater has been pumped from horizontal well EW003X16 into the top of the bioreactor and allowed to filter down through the mulch/gravel media. Well

MW2020AX16 is screened in the bottom of the bioreactor to measure the success of CVOC treatment within the bioreactor. Based on the latest August 2011 data, the bioreactor is removing over 99% of the TCE and nearly 92% of the total molar CVOCs entering the bioreactor. Sustained high levels of ethene in MW2020AX16 also confirm that destruction of vinyl chloride is underway within the bioreactor. Because the saturated interval surrounding the bioreactor is in bedrock, the distribution of TOC and occurrence of enhanced reductive dechlorination (ERD) downgradient of the bioreactor has been slow to develop.

Well MW2112AX16 is located approximately 10 feet downgradient of the bioreactor and continues to show evidence of ERD. Vinyl chloride, ethene, and methane are increasing at this well and TOC has increased from a baseline of 4.2 mg/L to 17.1 mg/L. A similar pattern of vinyl chloride, ethene, and methane increase is beginning to occur at well TPE-Wx16 which is located 20 feet downgradient of the bioreactor. Well MW2022x16 is located approximately 15 feet upgradient of the bioreactor and has experienced increasing TCE concentrations which are likely the result of groundwater mounding around the bioreactor. This groundwater is still within the capture zone of the EW003x16 extraction well and localized mounding does not represent a migration threat.

The dissolved TOC supply inside the bioreactor has decreased from 866 mg/L to 210 mg/L over the first nine months of its operation. Based on CVOC reductions, the current level of TOC is still sustaining a rapid rate of ERD inside the bioreactor. No organic recharge of the bioreactor is needed for the next three months of operation. The downgradient distribution of TOC is slow due to the bedrock aquifer conditions, however, TOC has recently increased from 8.8 to 16 mg/L in well TPE-Wx16 located 20 feet downgradient of the bioreactor.

Geochemical data collected from the bioreactor supports ERD. High methane, high dissolved iron and manganese, and totally depleted sulfate are all positive geochemical signatures for anaerobic conditions favoring ERD. However, relatively high sulfate (560 mg/L) in the EW003x16 extraction well is increasing the demand for TOC and could eventually reduce the bioreactor's effectiveness. Conversely, the potential formation of iron sulfide particles in the bioreactor could be providing an increase in abiotic reduction of the CVOCs. An analysis of sediment from the bottom of well MW2020Ax16 for iron sulfide content could provide additional evidence to evaluate abiotic reduction mechanisms.

Most wells in the performance monitoring network are providing useful information for evaluating the progress of the ERD remedy, however, well PZAx16 is not needed for quarterly sampling. Samples collected from the Site SS016 bioreactor during future performance monitoring events will not include samples from well PZAx16.

Emulsified Vegetable Oil Injections

Four Sites at Travis AFB (Sites SS015, SD036, SD037, and DP039) underwent EVO injection during 2010. The following sections provide performance monitoring data obtained during August and September 2011.

Site SS015

The EVO injection program at Site SS015 consists of three (3) injection and three (3) monitoring wells arranged throughout the Site SS015 source area. This configuration is known as an area approach, since the EVO is injected over a broad area instead of in a wall-like barrier as was done at Site DP039.

Data were collected as part of performance monitoring activities during September 2011, which represents the second quarter of performance monitoring data at this Site. The next performance sampling event is scheduled for November 2011.

The area targeted for the EVO injection (target wells IW2128x15 and MW216x15) are showing significant reductions in TCE, DCE and vinyl chloride when compared to baseline concentrations. Remaining cis-1,2 DCE

continues to degrade at both of these wells without significant vinyl chloride accumulation. Detections of ethane and ethene in these wells also confirm complete destruction of vinyl chloride. There were also significant CVOC reductions in wells surrounding the original TCE hot spot (IW2126x15, IW2127x15, IW2128x15, MW2129x15, and MW2132x15). The only well containing over 100 µg/L of TCE that has not been impacted by the injection is MW2124x15, which is located approximately 100 feet downgradient of the EVO injection area. Well MW2103x15 is located approximately 75 feet downgradient of the EVO injection area and this well has seen TCE decrease from 31.7 to 6.2 ug/L over the past eight months.

The dissolved TOC supply in the hot spot injection area remains high and is sustaining ERD. Concentrations of TOC in the target well MW216x15 have decreased by approximately 50% over the past four months, but still remains at 645 mg/L. Four wells in the original CVOC hot spot area still contain TOC in excess of 50 mg/L approximately seven months after EVO injection. Additional TOC samples will be collected at wells MW2124x15 and MW2103x15 during the November 2011 sampling event to determine the downgradient influence of the EVO injection.

Geochemical data collected from the hot spot area supports ERD. High methane, high dissolved iron and manganese, and significantly depleted sulfate are all positive geochemical signatures for anaerobic conditions favoring ERD. Groundwater samples collected from MW2104x15 in November 2011 will be analyzed for TOC, sulfate, dissolved iron, and dissolved manganese to assist in comparing the geochemistry of the injection area to an upgradient area.

There are many wells at this site that are not providing useful information for evaluating the progress of the ERD remedy. These wells have several monitoring events with non-detects for CVOCs and are not needed to define the plume boundary. Wells, MW624x15, MW2119x15, MW2125x15 will not be included in the November 2011 performance sampling event.

Site SD036

The EVO injection program at Site SD036 consists of eight (8) injection wells arranged throughout the site “hot spot.” This configuration is known as an area approach, since the EVO is injected over a broad area instead of in a wall-like barrier, as was done at Site DP039.

Performance monitoring data were collected in August 2011 as part of a sampling event that represents the third performance sampling event for this Site. The next performance monitoring event for this site is scheduled for November 2011.

The TCE hot spot area targeted for the EVO injection (target wells include MW2031Bx36, MW2061Bx36, and PZ550Cx36) are showing significant reductions in TCE and increases in DCE when compared to baseline concentrations. Small amounts of vinyl chloride are being formed, and ethane and ethane are being detected, all of which indicates that complete dechlorination of the DCE and vinyl chloride appears to be in progress. The overall rate of dechlorination does seem to be slowing in the target wells. For example, at MW2031Bx36, a total molar reduction of 88% changed little between May and August of 2011. Target well MW2033Ax36 showed an increase in TCE when compared to baseline, which may be due to lateral displacement of TCE during injection activities. There is a general increase in DCE concentrations in monitoring wells in and around the hot spot treatment area.

The dissolved TOC supply in the hot spot injection area remains high and is sustaining ERD. Concentrations of TOC in target well MW2031BX36 increased from a baseline concentration of < 1 mg/L to 2,410 mg/L six months after EVO injection but have decreased to 1,040 mg/L three months later. This pattern of decreasing TOC levels is expected as groundwater moves through the injection area and TOC is consumed in biological reactions. There is a good correlation between decreasing TCE concentrations and wells with higher TOC concentrations. Conversely, wells with less than 10 mg/L TOC seem to show little evidence of TCE removal. There is not much evidence for TOC migration outside of the injection area.

Geochemical data collected from the hot spot area supports ERD. High methane, high dissolved iron and manganese, and significantly lower sulfate levels are all positive geochemical signatures for anaerobic conditions favoring ERD. However, it is also apparent that sulfate reduction is competing with TCE reduction and that a continuing influx of sulfate will deplete the TOC supply and slow TCE and DCE removal.

Most quarterly sampling wells included in the performance monitoring network are providing useful information for evaluating the progress of the ERD remedy; however, well MW2033Bx36 is not needed for quarterly sampling. Samples collected from Site SD036 during future performance monitoring events will not include samples from well MW2033Bx36.

Site SD037

The EVO injection program at Site SD037 consists of seven (7) injection wells arranged throughout the site “hot spot.” This configuration is known as an area approach, since the EVO is injected over a broad area instead of in a wall-like barrier as was done at Site DP039.

Performance monitoring data were collected in August 2011 as part of a sampling event that represents the fourth quarter of monitoring data for this Site. Although the original plan was for this site to convert to annual performance monitoring following one year of quarterly sampling, it was determined that one additional quarter of sampling would be beneficial in the evaluation of this remedy optimization. Therefore, the next performance monitoring event for this site is scheduled for November 2011.

The TCE hot spot area targeted for the EVO injection (target wells MW524x37 and MW2039Ax37) are showing significant reductions in TCE. Increases in DCE are significant in MW2039x37 and are also apparent in MW524x37. High TOC levels (306 mg/L in August 2011) in MW524x37 are creating conditions for total destruction of TCE and DCE. Trace levels of vinyl chloride are being formed, and ethane and ethane are being detected in MW2039x37 indicating complete dechlorination of DCE and vinyl chloride is in progress. At MW524x37, a total molar reduction of 94% has occurred in the first nine months of ERD treatment. Other wells being monitored at this site are all over 50 feet from EVO injection wells and are not yet showing evidence of ERD.

The dissolved TOC supply in the hot spot injection area remains high and is sustaining a rapid rate of ERD. TOC concentrations in the target well MW524x37 increased from a baseline concentration of 1.16 mg/L to 2,155 mg/L one month after EVO injection and are down to 306 mg/L nine months after injection. Hot spot well MW2039Ax37 has not experienced a rise in TOC levels, yet TCE levels are down and DCE levels are up. This well may be located at the edge of the TOC influence and is receiving water that has passed through aquifer containing higher concentrations of TOC. There is no evidence of TOC influence beyond 10 feet of injection wells, but a lack of wells in the 20 to 50 feet radius of any injection well has made it difficult to estimate TOC influence at this site.

Geochemical data collected from the hot spot area supports ERD. High methane, high dissolved iron and manganese, and significantly lower sulfate levels are all positive geochemical signatures for anaerobic conditions favoring ERD. However, it is also apparent that sulfate levels in excess of 200 mg/L are present at the site and sulfate reduction is competing with TCE reduction. A continuing influx of sulfate is depleting the TOC supply and will eventually slow TCE and DCE removal.

There are many wells in the quarterly monitoring program that are not providing useful information for evaluating the progress of the ERD remedy. Wells MW532x37, MW2101Ax37, MW2101Cx37, MW2102Ax37, and MW2102Cx37 are not needed for quarterly monitoring of the progress of ERD. Samples collected from Site SD037 during future performance monitoring events will not include samples from those wells.

Site DP039

The EVO injection program at Site DP039 consists of thirteen (13) injection wells arranged in a linear or wall-like fashion perpendicular to the groundwater gradient. The purpose of this arrangement is to form a permeable reactive biobarrier (PRB) that treats contaminated groundwater as it flows downgradient through the injection well network.

Performance monitoring data were collected in August 2011 as part of the performance monitoring sampling program. Data collected in August 2011 represent the fourth quarterly performance monitoring event for this Site. Although the original plan was for this site to convert to annual performance monitoring following one year of quarterly sampling, it was determined that one additional quarter of sampling would be beneficial in the evaluation of this remedy optimization. Therefore, the next performance monitoring event is scheduled for November 2011.

Groundwater samples collected from the line of PRB injection wells have shown significant TCE reductions, minor DCE accumulation, and no vinyl chloride accumulation. The TOC remaining around the injection wells is supporting ERD of the TCE, DCE, and vinyl chloride concentrations passing near the PRB wells.

The supply of TOC along the line of injection wells is still adequate for ERD (average of 426 mg/L in August 2011) and is well above the EPA recommended 20 mg/L. The concentration of TOC is dropping in all three injection wells that were sampled. The rate of TOC depletion varies significantly between wells. For example, IW2081x39 has had a 62 percent TOC reduction over 9 months while IW2085x39 has had a 97 percent TOC reduction in nine months. Some injection wells may require reinjection in less than 2 years, while others may have adequate TOC remaining for longer than 2 years.

Downgradient impact of injection is minimal based on sample results from wells that are 80 to 150 feet downgradient of the PRB injection wells. However, well MW2093x39 may be seeing some TOC impact. MW2092Ax39 has elevated methane and may be seeing the leading edge of the groundwater that has passed through the PRB. Methane transports faster through the aquifer than CVOCs. Because the average groundwater velocity through the biobarrier has been estimated at 35 feet per year, it is not surprising that the impacts of the biobarrier have not been observed by wells that are 80 to 150 feet downgradient.

Geochemical data collected from the line of injection wells supports ERD. High methane, high dissolved iron and manganese, and depressed sulfate are all positive geochemical signatures for anaerobic conditions which favor ERD.

Future optimizations of the Site DP039 PRB might include installation of a monitoring well between two injection wells so as to provide a better idea of total PRB effectiveness.

North Groundwater Treatment Plant Monthly Data Sheet

Report Number: 118 Reporting Period: 31 Aug – 30 Sept 2011 Date Submitted: 14 October 2011

This monthly data sheet presents information regarding the North Groundwater Treatment Plant (NGWTP) and associated remedial process optimization (RPO) activities.

System Metrics

Table 1 presents operational data from the September 2011 reporting period:

Table 1 – Operations Summary – September 2011			
Operating Time:		Percent Uptime:	
NGWTP:	725 hours	NGWTP:	100%
		NGWTP:	553 kWh (751 lbs CO ₂ generated ^a)
Gallons Treated: 16,620 gallons		Gallons Treated Since March 2000: 82.6 million gallons	
Volume Discharged to Duck Pond: 16,620 gallons		Volume Discharge to Storm Drain: 0 gallons	
VOC Mass Removed: 6.9 x 10⁻⁴ pounds^b		VOC Mass Removed Since March 2000: 174.3 pounds (Groundwater)	
Rolling 12-Month Cost per Pound of Mass Removed ^c Not Measured^d			
Monthly Cost per Pound of Mass Removed: Not Measured^d			
^a Based on Department of Energy estimate that 1 kilowatt hour generated produces 1.37 pounds of GHG.			
^b VOCs from September 2011 influent sample detected by EPA Method SW8260B.			
^c Value not calculated since measurement does not accurately represent the cost effectiveness of the system. The system was not removing mass from December 2010 to May 2011, but operating costs were incurred.			
^d Value not calculated since measurement does not accurately represent the potential effectiveness of the system. O&M costs are low, but very little contaminant mass is being treated.			

Table 2 presents individual extraction well flow rates during the monthly reporting period.

Table 2 – NGWTP Average Flow Rates	
Location	Average Flow Rate (gpm)
EW614x07	0.19 ^a
EW615x07	0.19 ^a
NGWTP	0.38 ^b
^a Estimated to be 50 percent of total NGWTP flow rate.	
^b Average flow rate calculated by dividing the system discharge volume into the duck pond by the operating time.	
gpm = gallons per minute	

Table 3 presents average a summary of shutdowns during the monthly reporting period.

Table 3 – Summary of System Shutdowns				
Location	Shutdown		Restart	
	Date	Time	Date	Time
Cause				
NGWTP = North Groundwater Treatment Plant				

Summary of O&M Activities

Analytical data from the 8 September 2011 sampling event are presented in Table 4. Concentrations of TCE (4.4 µg/L) and cis-1,2 DCE (0.58 µg/L) were detected in the influent sample. Note that these influent detections, in both cases, are less than the effluent limits (5.0 µg/L for each of these contaminants). Contaminant concentrations were not detected in the effluent process stream. Figure 1 presents a plot of influent concentrations at the NGWTP versus time for the past year. The NGWTP is off line when vernal pools are present at Site LF007C.

Optimization Activities

No optimization activities were conducted at the NGWTP in September 2011.

Sustainability

Travis AFB is committed to decreasing the amount of GHG produced directly (waste streams discharging GHG) or indirectly (GHG produced as related to electrical energy consumption) from all systems across Travis AFB. Travis AFB continues to optimize each treatment plant to reduce the amount of electrical energy consumed, and to implement sustainable treatment plant optimization programs, such as the solar arrays employed to power the system.

Figure 2 presents the historical GHG production from the systems associated with the NGWTP. The NGWTP used 553 kWh which calculates to approximately 758 pounds of GHG generation during September 2011. The overall GHG generation remains considerably lower than traditional GWTPs since the system is predominantly powered by solar arrays.

TABLE 4
Summary of Groundwater Analytical Data for September 2011 – North Groundwater Treatment Plant

Constituent		Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	8 September 2011 (µg/L)		
					Influent	After Carbon 1	Effluent
Halogenated Volatile Organics							
Bromodichloromethane		5.0	0.15	0	ND	ND	ND
Bromoform		5.0	0.19	0	ND	ND	ND
Carbon Tetrachloride		0.5	0.14	0	ND	ND	ND
Chloroform		5.0	0.16	0	ND	ND	ND
Dibromochloromethane		5.0	0.13	0	ND	ND	ND
1,3-Dichlorobenzene		5.0	0.15	0	ND	ND	ND
1,4-Dichlorobenzene		5.0	0.15	0	ND	ND	ND
1,1-Dichloroethane		5.0	0.15	0	ND	ND	ND
1,2-Dichloroethane		0.5	0.15	0	ND	ND	ND
1,1-Dichloroethene		5.0	0.19	0	ND	ND	ND
cis-1,2-Dichloroethene		5.0	0.19	0	0.58 J	ND	ND
trans-1,2-Dichloroethene		5.0	0.33	0	ND	ND	ND
Methylene Chloride		5.0	0.66	0	ND	ND	ND
Tetrachloroethene		5.0	0.21	0	ND	ND	ND
1,1,1-Trichloroethane		5.0	0.14	0	ND	ND	ND
1,1,2-Trichloroethane		5.0	0.2	0	ND	ND	ND
Trichloroethene		5.0	0.19	0	4.4	ND	ND
Vinyl Chloride		0.5	0.18	0	ND	ND	ND
Non-Halogenated Volatile Organics							
Benzene		1.0	0.17	0	ND	ND	ND
Ethylbenzene		5.0	0.22	0	ND	ND	ND
Toluene		5.0	0.14	0	ND	ND	ND
Xylenes		5.0	0.23 – 0.5	0	ND	ND	ND
Other							
Total Petroleum Hydrocarbons – Gasoline		50	8.5	0	NM	NM	ND
Total Petroleum Hydrocarbons – Diesel		50	50	0	NM	NM	ND

* In accordance with Appendix G of the *Travis AFB North Groundwater Treatment Plant Operations and Maintenance Manual*, Sites FT004, SD031, and LF007 Area C (URS Group, Inc., 2005).

Notes:

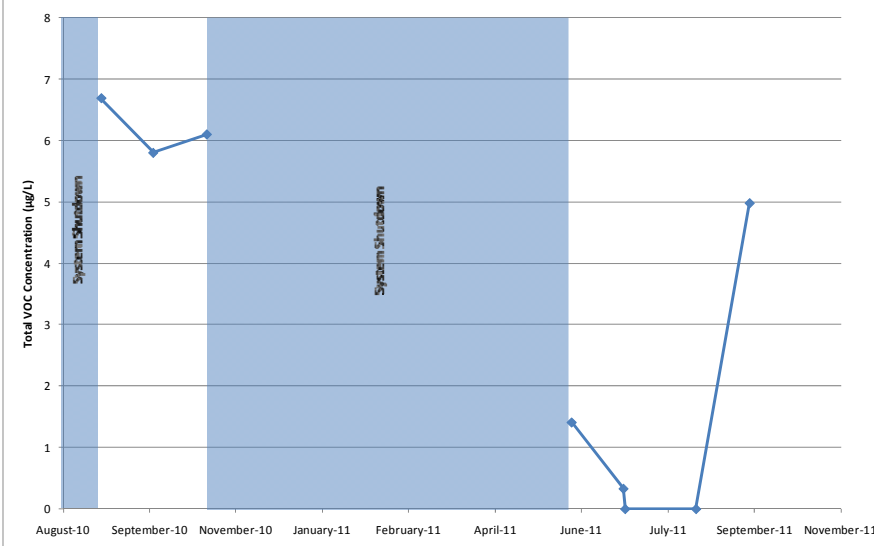
N/C = number of samples out of compliance with discharge limits

ND = not detected

NM = not measured

µg/L = micrograms per liter

Figure 1
NGWTP Total VOC Influent Concentrations
Travis Air Force Base, California

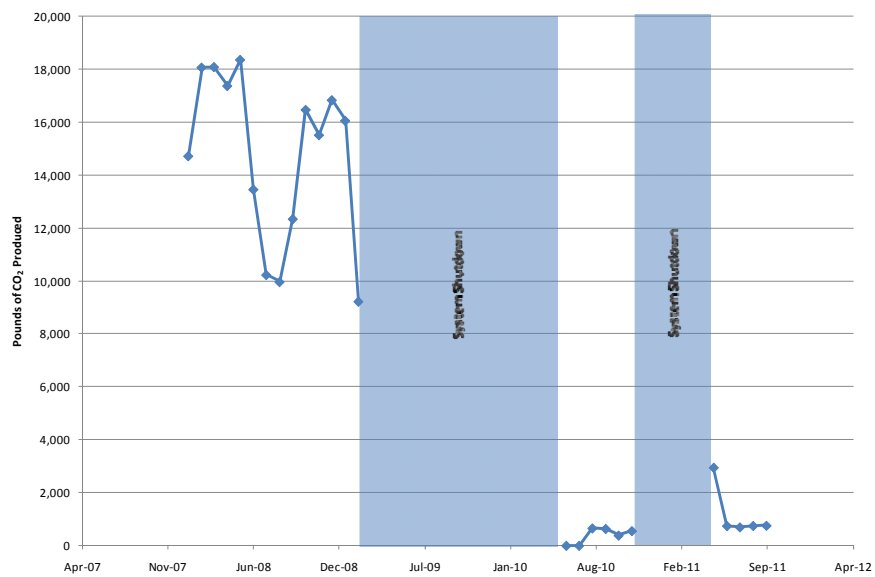


North Groundwater Treatment Plant
Monthly Data Sheet
NGWTP_September11

4 of 5

September 2011

Figure 2
Equivalent Pounds of CO₂ Produced by the North Groundwater Treatment Plant



Site ST018 Groundwater Treatment Plant Monthly Data Sheet

Report Number: 007 Reporting Period: 31 Aug – 30 Sept 2011 Date Submitted: 14 October 2011

This monthly data sheet presents information regarding the Site ST018 Groundwater Treatment Plant (S18GWTP).

System Metrics

Table 1 presents operation data from the September 2011 reporting period.

Table 1 – Operations Summary – September 2011		
Operating Time:	Percent Uptime:	Electrical Power Usage:
S18GWTP: 860 hours	S18GWTP: 100%	S18GWTP: 128 kWh (175 lbs CO ₂ generated ^a)
Gallons Treated: 188 thousand gallons	Gallons Treated Since March 2011: 905 thousand gallons	
Volume Discharged to Union Creek: 188 thousand gallons		
BTEX, MTBE, TPH Mass Removed: 1.49 lbs^b		BTEX, MTBE, TPH Mass Removed Since March 2011: 6.6 lbs
Rolling 12-Month Cost per Total Pounds of Mass Removed: \$4,711		
Monthly Cost per Pound of Mass Removed: \$3,031		
Lbs = pounds		
^a Based on Department of Energy estimate that 1 kilowatt hour generated produces 1.37 pounds of GHG.		
^b Calculated using July and September 2011 EPA Method SW8260B analytical results. Influent samples are collected on a quarterly basis.		
^c Costs include operations and maintenance, reporting, analytical laboratory, project management, and utility costs related to operation of the system; however the system is only in its sixth month of operation.		

Table 2 presents individual extraction well flow rates along with the average system flow during the monthly reporting period.

Table 2 – S18GWTP Average Flow Rates ^a	
Location	Average Flow Rate Groundwater (gpm)
EW2014x18	1.05
EW2016x18	1.32
EW2019x18	1.42
Site ST018 GWTP	3.63
^a All flow rates calculated by dividing total gallons processed by system operating time for the month.	
gpm = gallons per minute	
S18GWTP = Site ST018 Groundwater Treatment Plant	

Table 3 presents a summary of system shutdowns during the monthly reporting period.

Table 3 – Summary of System Shutdowns					
Location	Shutdown		Restart		Cause
	Date	Time	Date	Time	
S18GWTP					
S18GWTP = Site ST018 Groundwater Treatment Plant					

Summary of O&M Activities

Monthly groundwater samples (ST018GWTPWBC2 and ST018GWTPWEFF) at the S18GWTP were collected on 9 September 2011. Sample results are presented in Table 4. No contaminant concentrations from the effluent or carbon filter samples were detected during laboratory analysis. The total inlet concentration (benzene, toluene, ethylbenzene, total xylenes, MTBE, TPH-gas, TPH-diesel, and TPH-motor oil) reported in the quarterly (3Q11) influent sample is 951 µg/L, and was collected in July 2011. This is an increase in VOC concentration from the 2Q11 (April 2011) [332 µg/L] influent sample. Figure 1 presents a plot of influent quarterly concentrations at the S18GWTP versus time.

Optimization Activities

No optimization activities occurred at the S18GWTP in September 2011.

Sustainability

Travis AFB is committed to decreasing the amount of GHG produced directly (waste streams discharging GHG) or indirectly (GHG produced as related to electrical energy consumption) from all systems across Travis AFB. Travis AFB continues to optimize each treatment plant to reduce the amount of electrical energy consumed, and to implement sustainable treatment plant optimization programs, such as the solar arrays employed to power the system.

As a result of the solar arrays at S18GWTP, the system produced approximately 175 pounds of GHG during September 2011. This is a slight increase (110 pounds) from August 2011 which is likely due to the increase in operation hours and gallons treated. However, the overall GHG generation remains considerably lower than traditional GWTPs since the system is predominantly powered by solar arrays.

TABLE 4
Summary of Groundwater Analytical Data for September 2011 – Site ST018 Groundwater Treatment Plant

Constituent	Instantaneous Maximum ^a (µg/L)	Detection Limit (µg/L)	N/C	9 September 2011 (µg/L)		
				Influent ^b	After Carbon 2	System Effluent
Fuel Related Constituents						
MTBE	5	0.1 ^c	0	270	ND	ND
Benzene	5	0.1	0	16	ND	ND
Ethylbenzene	5	0.1	0	24	ND	ND
Toluene	5	0.1	0	2.3	ND	ND
Total Xylenes	5	0.1	0	38.7	ND	ND
Total Petroleum Hydrocarbons – Gasoline	50	5.5	0	430	ND	ND
Total Petroleum Hydrocarbons – Diesel	50	50	0	170	ND	ND
Total Petroleum Hydrocarbons – Motor Oil	--	300	0	ND	ND	ND

^a In accordance with the National Pollutant Discharge Elimination System (NPDES) Effluent Limitations

^b Values taken from July 2011 sample data. Influent sampling is conducted on a quarterly basis.

Notes:

µg/L = micrograms per liter

ND = not detected above method detection limit

NM = not measured this month

Figure 1
S18GWTP Total VOC Influent Concentrations
Travis Air Force Base, California

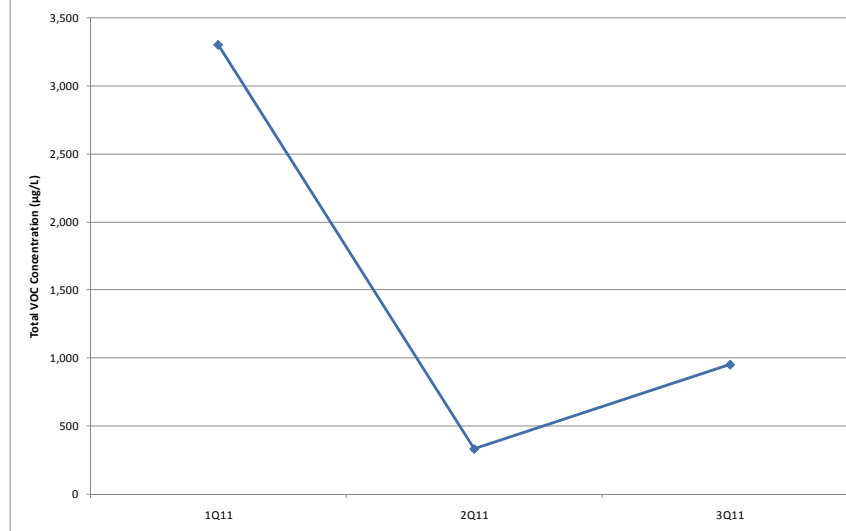
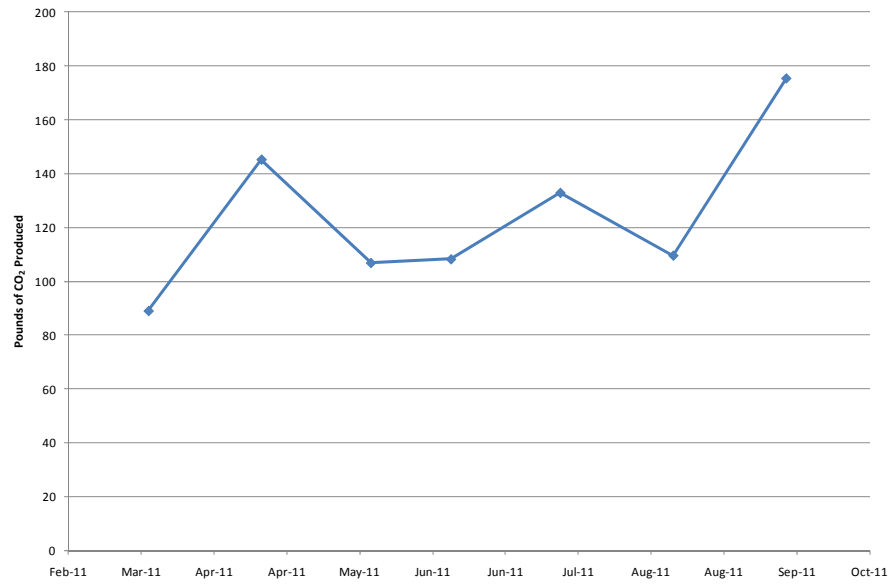


Figure 2

Equivalent Pounds of CO₂ Produced by the Site ST018 Groundwater Treatment Plant

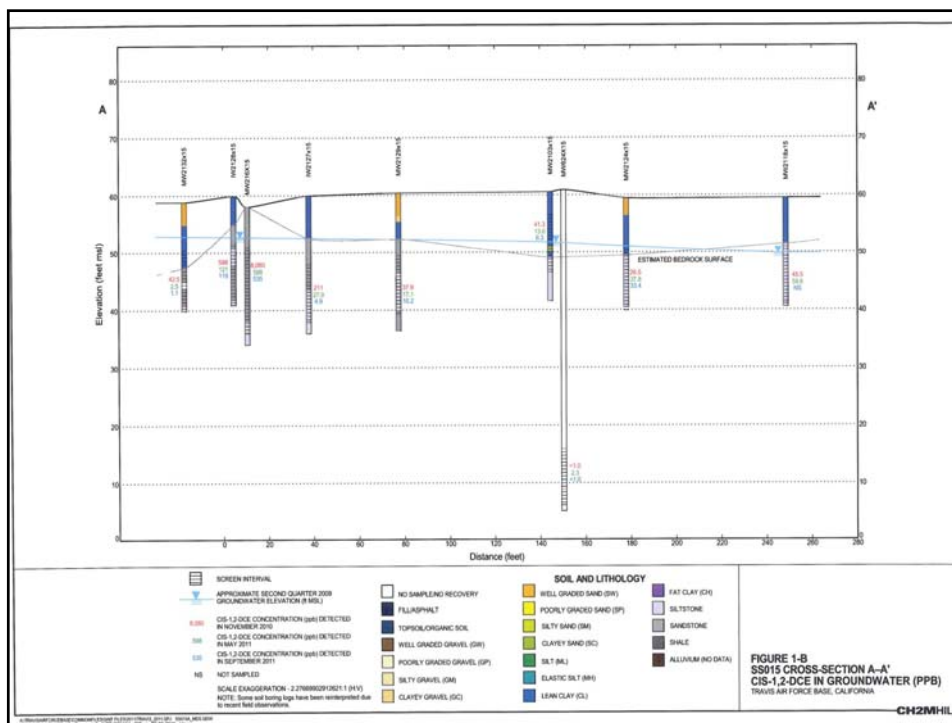


**August/September 2011
Performance Monitoring Program
Quarterly Analytical Results
Travis AFB**

RPM Meeting
October 20, 2011

Site SS015 EVO Injection (2nd Quarter)

- Significant reductions in the hot spot area (IW2128x15 & MW216x15) in TCE, DCE, and vinyl chloride.
 - Cis-1,2-DCE from 8,800 µg/L to 535 µg/L.
 - Vinyl chloride from 5,140 µg/L to 80.7 µg/L.
- Detections of ethane and ethene in MW216x15 confirm the complete destruction of vinyl chloride.
- Significant reductions of TCE, DCE, and vinyl chloride observed IW2126x15, IW2127x15, IW2128x15, MW2129x15, and MW2132x15.
- Dissolved TOC supply in the hot spot injection area remains high and is sustaining a rapid rate of ERD.
 - TOC in MW216x15 increased from 13.8 to 1,310 mg/L. Now at 645 mg/L.
 - Four wells in hot spot area still contain >50 mg/L TOC.
- High methane, dissolved iron and manganese, and significantly depleted sulfate are all positive geochemical signatures for anaerobic conditions favoring ERD.
- Will drop MW624x15, MW2119x15, & MW2125x15 from monitoring.
- Will add TOC at MW2124x15, MW2103x15, & MW2104x15.
- Will add Sulfate, dissolved iron and manganese at MW2104x15 to evaluate upgradient vs. source area geochemistry.

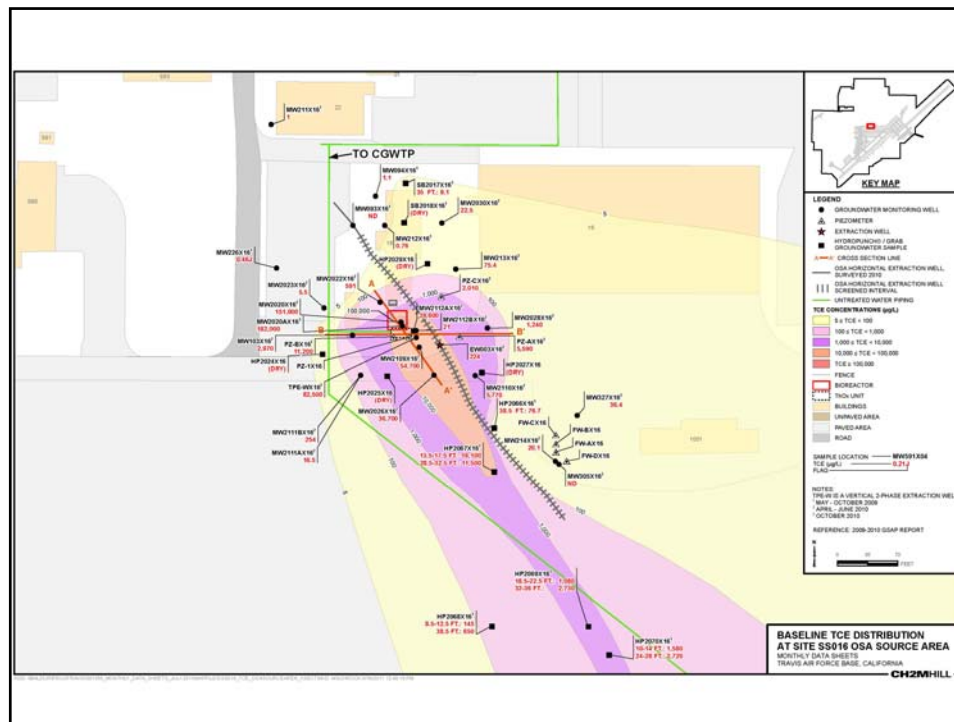


Site SS016 Bioreactor (3rd Quarter)

- In November 2010, the in situ bioreactor began operation in the SS016 OSA Source Area.
- Continuing to show high rates of TCE, DCE, and VC removal in the bioreactor.
- The bioreactor is removing 99% of the TCE and 92% of the total molar CVOCs.
- Due to the saturated interval surrounding the bioreactor is in bedrock, the downgradient distribution of TOC has been slow and ERD slow to develop downgradient, however:
 - MW2112Ax16 (10 feet downgradient of the bioreactor) continues to show evidence of ERD. DCE and VC are increasing in the well and TOC has increased from a baseline of 4.2 mg/L to 17.1 mg/L.
 - A similar pattern of vinyl chloride, ethene, and methane increase is beginning to occur at well TPE-Wx16 which is located 20 feet downgradient of the bioreactor.
 - MW2022x16 (15 feet upgradient of the bioreactor) shows increasing TCE due to groundwater mounding around the bioreactor.
- The dissolved TOC supply inside the bioreactor has decreased from 866 to 210 mg/L over the first 9 months and is sustaining a rapid rate of ERD inside the bioreactor.

Site SS016 Bioreactor (3rd Quarter)

- TOC has recently increased from 8.8 to 16 mg/L in TPE-Wx16 (20 feet downgradient of the bioreactor).
- Geochemical data collected from the bioreactor supports ERD. High methane, high dissolved iron and manganese, and totally depleted sulfate are all positive geochemical signatures for anaerobic conditions favoring ERD.
- Will drop PZAx16 from monitoring since too far crossgradient to provide useful information.

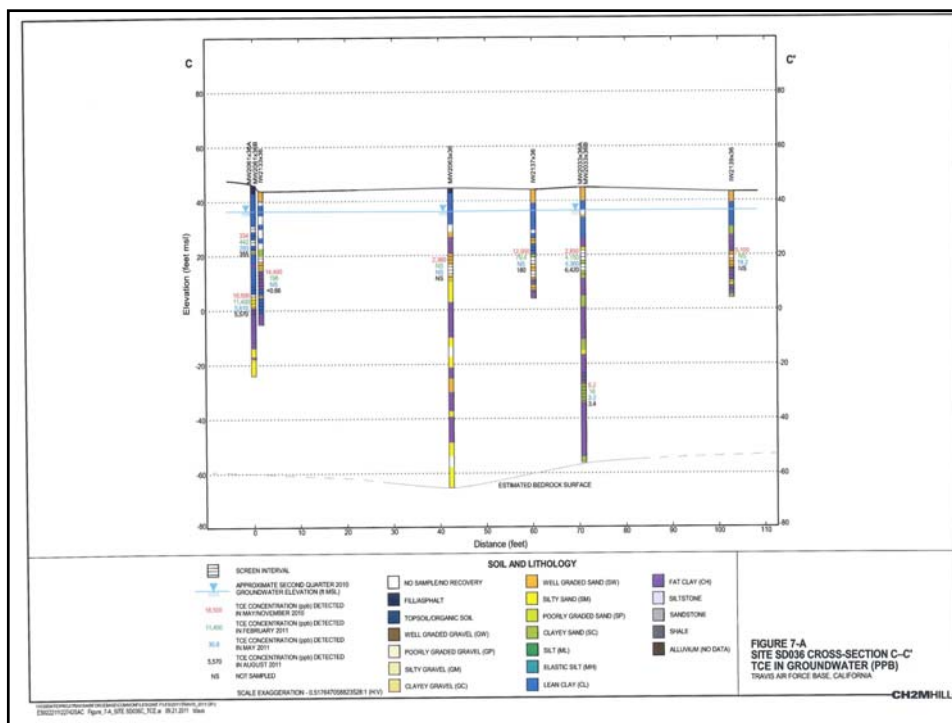


SD036 EVO Injection (3rd Quarter)

- The TCE hot spot area targeted for the EVO injection (MW2031Bx36, MW2061Bx36, and PZ550Cx36) are showing significant reductions in TCE and increases in DCE when compared to baseline concentrations. Little vinyl chloride is being generated.
- Ethane and ethene are being detected indicating that complete dechlorination of the DCE and VC seems to be in progress.
- There is a general increase in DCE in monitoring wells in the treatment area.
- MW2033Ax36 showed an increase in TCE when compared to baseline.
 - May be caused by the emulsified oil which acts as a co-solvent and increases the solubility of TCE in the aquifer matrix.
 - May be due to localized lateral displacement.
- TOC in the hot spot area remains high and is sustaining ERD.
 - TOC in MW2031Bx36 increased from <1 mg/L to 2,410 in May, then decreased to 1,040 mg/L in August – so being used up as degradation progresses.

SD036 EVO Injection (3rd Quarter)

- Geochemical data collected for the hot spot area supports ERD. High methane, high dissolved iron and manganese, and significantly lower sulfate levels are all positive geochemical signatures favoring ERD.
- Sulfate reduction is competing with TCE reduction.
 - Continuing influx of sulfate will deplete the TOC supply and slow TCE and DCE removal.
- MW2033Bx36 is not needed for quarterly sampling and will be dropped from the performance monitoring for this site.

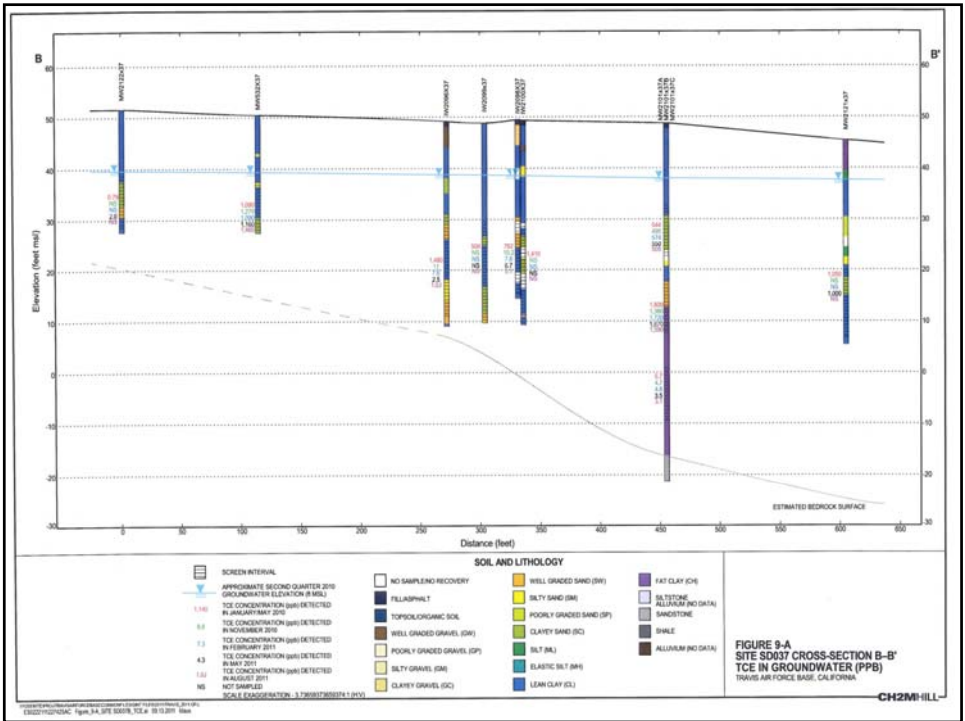
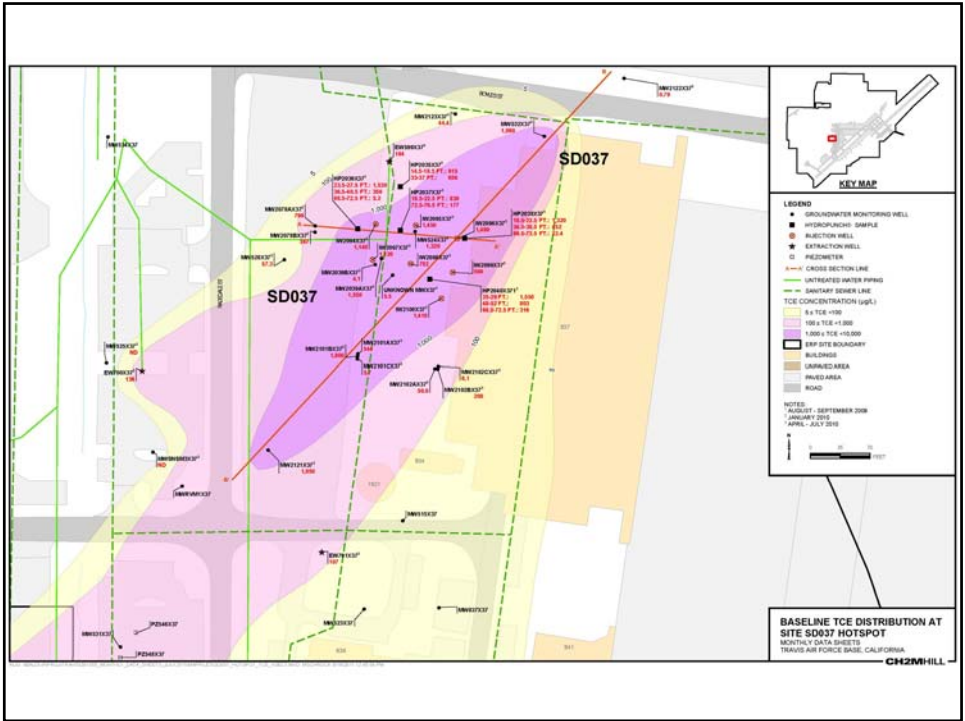


SD037 EVO Injection (4th Quarter)

- The TCE hot spot area targeted for the EVO injection (MW524x37 and MW2039Ax37) are showing significant reductions in TCE. Increases in DCE are significant in MW2039Ax37 and also apparent in MW524x37.
 - Very high TOC concentrations in MW524x37 (306 mg/L) are creating conditions for total destruction of TCE and DCE.
- Trace levels of vinyl chloride are being generated.
- Ethane and ethene are being detected in MW2039x37 indicating complete dechlorination of the DCE and vinyl chloride is in progress.
- At MW524x37, a total molar reduction of 94% has occurred in the first nine months of ERD treatment.
- The other wells being monitored at Site SD037 are all over 50 feet from injection wells and are not yet showing evidence of ERD.

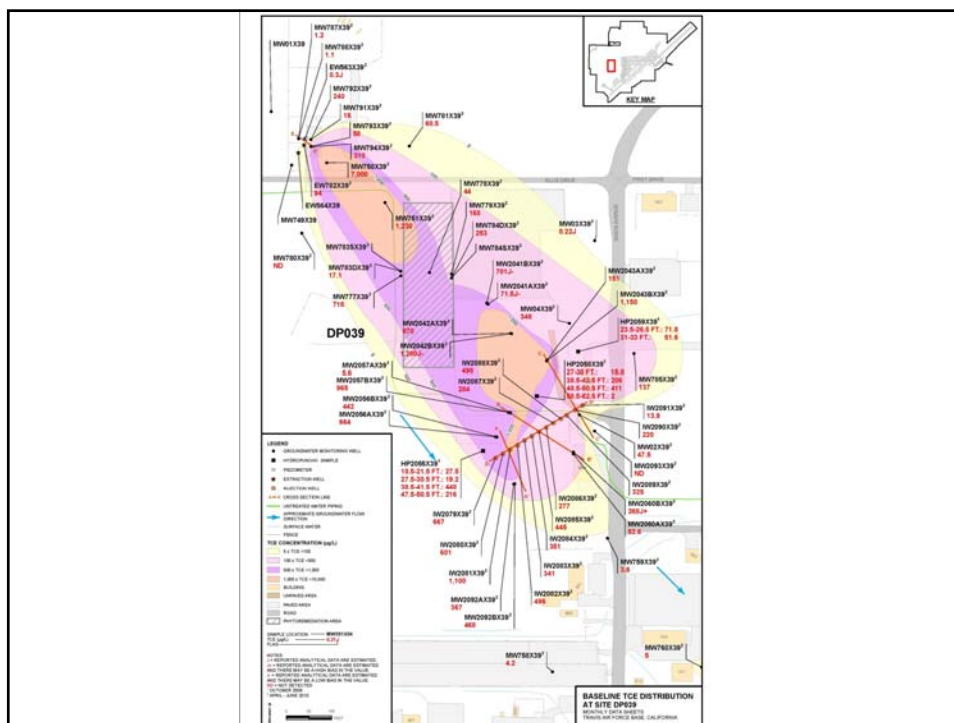
SD037 EVO Injection (4th Quarter)

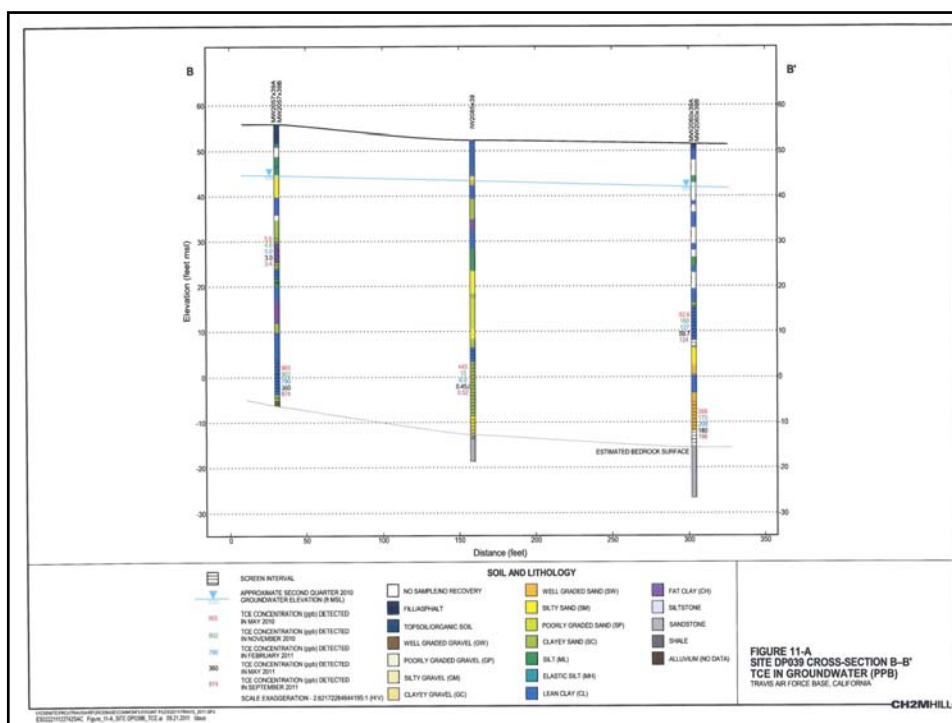
- The dissolved TOC supply in the hot spot injection area remains high and is sustaining a rapid rate of ERD.
 - TOC concentrations in the target well MW524x37 increased from a baseline concentration of 1.16 mg/L to 2,155 mg/L one month after EVO injections and are down to 306 mg/L nine months after injection.
 - MW2039Ax37 has not experienced a rise in TOC levels, yet TCE levels are down and DCE levels are up. MW2039Ax37 may be located at the edge of the TOC influence.
- Geochemical data collected from the hot spot area supports ERD. High methane, high dissolved iron and manganese, and significantly lower sulfate levels are all positive geochemical signatures for anaerobic conditions favoring ERD.
 - Sulfate levels are in excess of 200 mg/L at Site SD037 and sulfate reduction will be competing with TCE reduction.
 - A continuing influx of sulfate will deplete the TOC supply and eventually slow TCE and DCE removal.
- To better support the ROD, this site will be sampled next quarter rather than go to annual sampling.



Site DP039 Permeable Reactive Barrier EVO Injection (4th Quarter)

- Significant TCE reductions, minor DCE accumulation, and no VC accumulation is occurring along the PRB line of injection wells.
- High TOC in the PRB treatment zone has degraded most the TCE, DCE, and vinyl chloride in the treatment zone.
- TOC supply along the line of injection wells is still adequate for ERD (average of 426 mg/L) and is well above EPA recommended 20 mg/L.
- TOC is dropping in each of the three injection wells that were sampled.
 - We will watch the rate of TOC depletion to better estimate the recharge frequency for the PRB.
- Downgradient impact of injection is minimal based on sampling wells that are 80 to 150 feet downgradient of the injection wall, however:
 - MW2093x39 may be seeing some TOC impact
 - MW2092AX39 has elevated methane and may be seeing the leading edge of the treatment zone passing through the PRB.
- Geochemical data collected from the line of injection wells supports ERD. High methane, high dissolved iron and manganese, and depressed sulfate are all positive geochemical signatures for anaerobic conditions favoring ERD.





Site DP039 Bioreactor

- During the past 30 months of operation, TCE reductions of over 99% and total molar reductions of over 95% have occurred in the aquifer within 30 feet of the source are bioreactor.
- The most contaminated well in the source area (MW793x39) had a baseline concentration of 8,000 µg/L, which has been reduced to 5.3 µg/L in the May 2011 sampling event.
- The bioreactor could continue to operate with very limited monitoring on an annual basis.
- The bioreactor is most efficient with higher levels of TCE to treat in the recirculated water.
- An intermittent or pulsed operation such as one week on and four weeks off may be more effective and conserve the small quantities of TOC being generated in the bioreactor.
- Previous attempts to increase the TOC being generated from the bioreactor into the surrounding aquifer have not been successful.
- It appears that daily recirculation of sulfate rich groundwater through the bioreactor is rapidly decreasing the TOC that was added to the bioreactor as vegetable oil in October 2010.





Optimization of Existing Groundwater Interim Remedial Action at Site LF007C

- Approach:
 - Data Gaps Investigation
 - Site characterization
 - Groundwater Modeling
 - Evaluate contaminant distribution
 - Conduct numerical modeling for capture zone analysis
 - IRA Optimization
 - Install new monitoring wells and extraction wells (if needed)
 - Install pumps and conveyance
 - Modify treatment system
- Work Plan submitted March 2009
- USFWS approved work in August 2011

Background

- Site LF007C is one of three off-base plumes
- The site is on privately owned pasture land
- The site is generally flat with expansive shallow depressions where vernal pools develop
- Most (all) of the off-base LF007C plume is beneath a large vernal pool
- The Air Force has an easement to allow remediation work

Hydrogeology

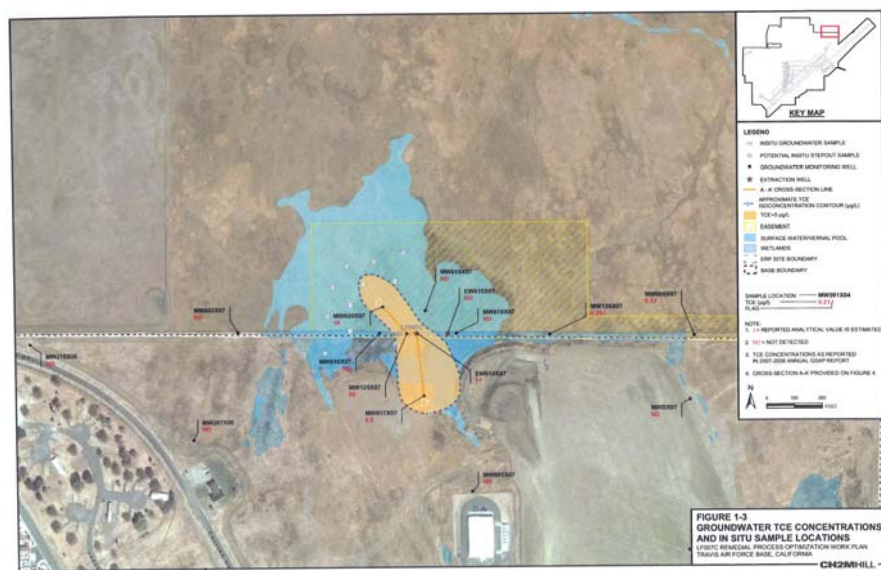
- 30 to 40 feet of fine grained alluvium overlies shale bedrock (Nortonville Shale)
- The alluvium is very fine grained, with few sand lenses
- Regional groundwater flow is to the south and southeast
- Bedrock “high” influences groundwater flow - locally to north-northwest
- Depth to water is 13 to 16 feet below ground surface

Nature & Extent of Groundwater Contamination

- TCE is the only Contaminant Of Concern (COC) detected above Interim Remediation Goals (IRGs)
- The TCE plume is migrating off base
- The TCE plume extent is not defined off base
- The GSAP reports statistically decreasing trends in the TCE concentrations in two plume wells (MW617x07 and EW614x07)

Data Gaps Investigation

- Objective of defining the off-base portion of the TCE plume
- Conduct in situ sampling, followed by installation of monitoring wells and extraction wells (if needed)
- Delineate plume in phases – in situ sampling until defined
- Samples to be analyzed for VOCs using EPA 8260B, on 24-hour turn-around.
- The plume lies beneath a very large vernal pool, which is governed by USFWS
- Consulted with USFWS for Biological Opinion
- Received BO on August 11, 2011 (late in dry season)
- Initial in situ sampling scheduled for October 2011



Data Gaps Investigation (cont'd)

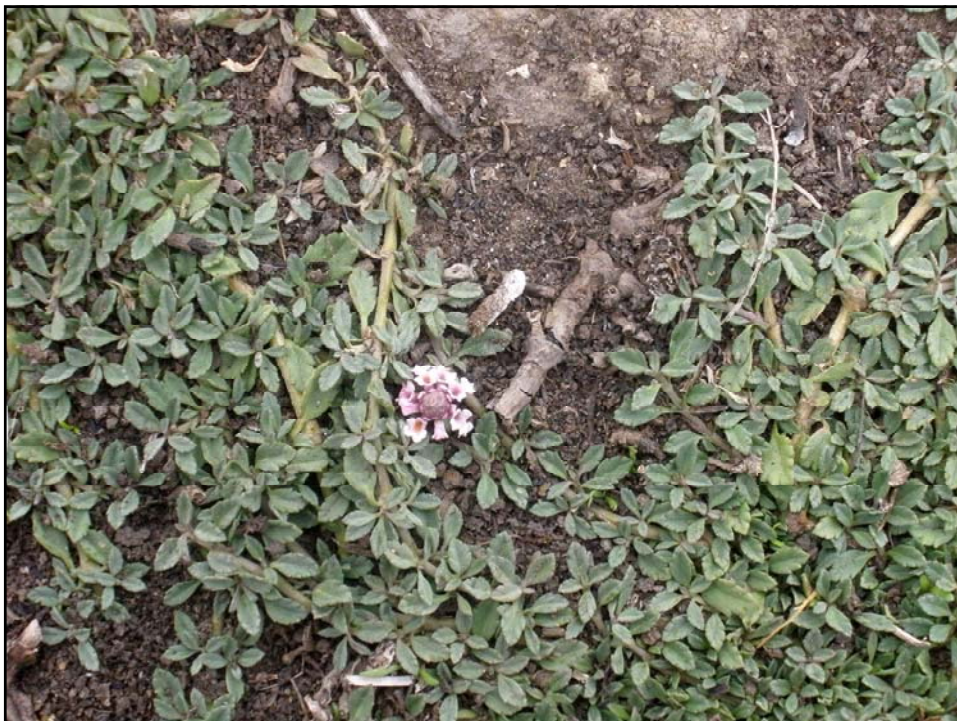
- Started drilling on 03 October & drilled through 14 October
- Placed planking out to all drill sites
- Full time Biological Monitor
- Drilled 9 soil borings
- Collected 16 hydropunch samples











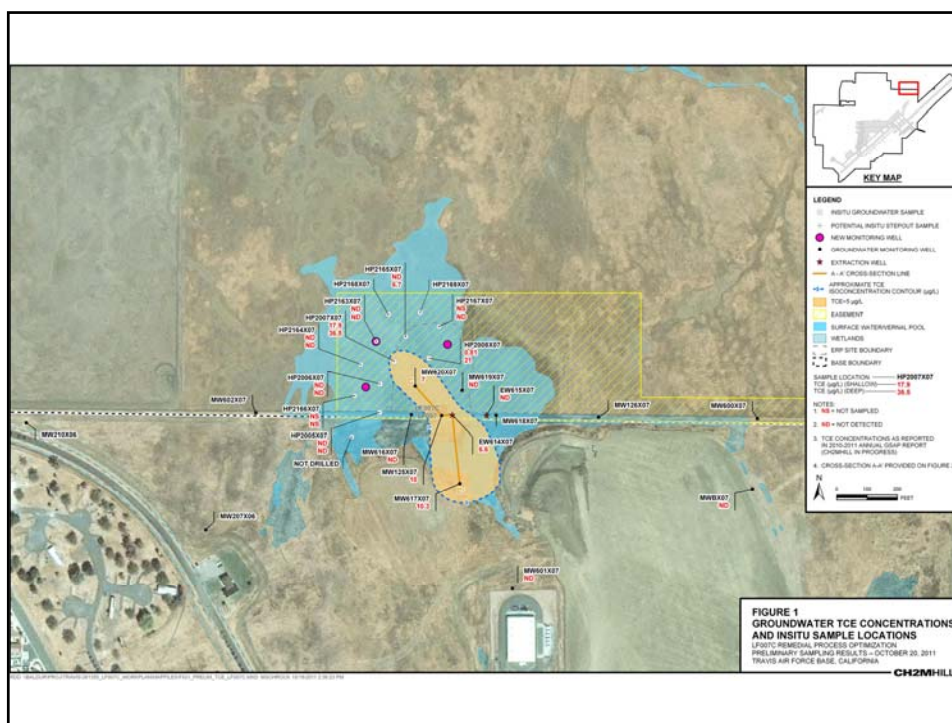


Results of Investigation – Phase 1

- Drilled and logged 4 soil borings
- Collected 2 hydropunch samples from each boring (one shallow, and one deep), on 24-hr turnaround
- Received sample results, then drilled 4 stepout borings and collected 2 hydropunch samples from the stepouts
- Received stepout sample results

Results of Investigation – Phase 1

- Bedrock at about 29 to 42 feet below ground surface
- Shallow groundwater samples collected ranged from about 11 to 22 feet (4-ft screen sections varied between borings)
- Deep groundwater samples collected ranged from about 25 to 42 feet (same as above)
- Defined plume to non-detect on all sides except the northern end
- Identified 2 additional stepout boring locations to the north of the plume
- Identified 3 locations for installation of monitoring wells
- Surveyed all boring locations, including the 2 additional drill locations and 3 monitoring well locations



Investigation Plan – Phase 2

- Next phase will be conducted October 24 to 27 (next week)
- Drill and sample the 2 stepout borings
- Install, develop, and sample 3 monitoring wells
- Although there is no rain in the immediate forecast, the rainy season is expected to start soon, and ponded water in the vernal pools will halt any further field work at the site

Future Tasks

- Groundwater modeling to evaluate capture zone
- Evaluate placement of extraction & monitoring wells, and pumps (if needed),
- Installation of pumps and conveyance
- Connect to (and possibly upgrade) the treatment system
- Conduct performance monitoring
- Future field work will not be able to commence until the vernal pool dries out in the Spring

Travis AFB Restoration Program

Management Overview Briefing

RPM Meeting
October 20, 2011

Completed Documents

- Basewide Health & Safety Plan (HSP)
- Action Plan
- 2007/2008 GSAP Annual Report
- LF007C RPO Work Plan
- LF008 Rebound Study Work Plan
- SS014 Tier 1 POCO Evaluation WP
- ST027B Site Characterization WP
- SS030 RPO Work Plan
- ST032 POCO Technical Memo
- DP039 Bioreactor Work Plan
- 2008 Annual GWTP RPO Report
- Passive Diffusion Bag (PDB) Technical Memo
- RD/RA QAPP Update
- ST032 Tier 1 POCO Evaluation WP
- Phytostabilization Demonstration Tech Memo
- Model QAPP
- LF008 Rebound Test Tech Memo
- Comprehensive Site Evaluation Phase II Work Plan
- Field Sampling Plan (FSP)
- SS016 RPO Work Plan
- ST018 POCO RA Work Plan
- Vapor Intrusion Assessment Report
- GSAP 2008/2009 Annual Report
- FT005 Data Gap Work Plan
- First, Second, & Third Site DP039 Sustainable Bioreactor Demonstration Progress Reports
- DP039 RPO Work Plan
- SD036/SD037 RPO Work Plan
- ST027B Site Characterization Report
- 2009 GWTP RPO Annual Report
- Natural Attenuation Assessment Report (NAAR)
- Union Creek Sites SD001 & SD033 Remedial Action Report
- CAMU 2008-2009 Monitoring Annual Report
- Phytostabilization Study Report
- 2009/2010 Annual GSAP Report
- SS015 Remedy Optimization Field Implementation Plan
- Sites SS014 and ST032 Tier 1 POCO Evaluation Report
- SD036 Remedy Optimization Field Implementation Plan
- 2010 Annual CAMU Inspection Report
- Site ST018 POCO Baseline Implementation Report
- FT005 Data Gaps Investigation Report
- Comprehensive Site Evaluation Phase II Report
- **2010 Groundwater RPO Annual Report 2**

Completed Field Work

- ST027B Gore Sorber Survey – Ph 1
- ST027B Field Sampling – Phase 2
- GSAP 2008 Semi-annual Event
- ST027B Installation of Wells – Phase 3
- SS014 Site Characterization
- LF008 Rebound Study
- GSAP Annual Sampling Event - 2009
- SS030 Site Characterization – Ph 1
- ST027 Site Characterization -Ph 3
- ST014 Monitor Well Install - Subsite 3
- SD001/SD033 Sediment RA
- SS016 Site Characterization (OSA source area)
- ST018 Site Characterization
- SS030 Site Characterization (Off-base VOC Plume)
- DP039 Site Characterization (for Biobarrier Placement)
- SS014 & ST032 Q1 2010 MNA Sampling (2nd of 4 quarterly events)
- SD036 Additional Site Characterization (north & east)
- Therm/Ox System Removal
- SS016 Monitoring Well Installation
- SD037 EVO Injection Well Installation
- DP039 Monitoring Well & Injection Well Installation
- DP039 EVO Injection
- SD037 Monitoring Well Installation
- GSAP 2010 Annual Sampling Event
- SD037 EVO Injection
- SS015 Site Characterization
- South Plant GAC Change-out
- FT005 Data Gap Investigation
- SS016 Position Survey of EW03
- SS016 Bioreactor Installation
- SS016 Bioreactor Baseline Sampling
- DP039 Biobarrier Q'ly Performance Sampling
- DP039 Bioreactor Q'ly Performance Sampling
- SD037 EVO Quarterly Performance Sampling
- SS015 EVO Baseline Sampling
- SD036 EVO Baseline Sampling
- SS016 Bioreactor Startup
- SD036 Injection Well Installation (8)
- SS015 Injection Well Installation (5)
- ST018 GETS Installation
- SD036 EVO Injection
- Semiannual GSAP
- SS015 EVO Injection
- Q'ly RPO Performance Monitoring (Feb 2011)
- ST018 GETS Startup
- Q'ly RPO Performance Monitoring (May 2011)
- 2011 Annual GSAP Sampling
- SS029 GET Shutdown Test (System Optimization analysis)
- Q'ly RPO Performance Monitoring (Aug 2011)

3

In-Progress Documents & Field Work

Documents

- Focused Feasibility Study (FFS)
- Site ST027-Area B Human Health Risk Assessment
- Site ST027-Area B Ecological Risk Assessment
- Baseline Implementation Report (Sites SS015, SS016, SD036, SD037, and DP039)
- ***Work Plan for Assessment of Aerobic Chlorinated Cometabolism Enzymes***
- ***Old Skeet Range Engineering Evaluation/Cost Analysis***

Field Work

- FT005 Soil Remedial Action
- ***LF007C Site Characterization (Wetlands)***

4

Upcoming Documents

- Technical and Economic Feasibility Analysis (TEFA) Nov
- 2010/2011 Annual GSAP Report Nov
- Proposed Plan (PP) Jan
- Work Plan for Site SS029 System Optimization Analysis TBD
- ***FT005 Remedial Action Completion Report*** ***TBD***

5

Upcoming Field Work

- Quarterly RPO Performance Monitoring Nov
- ***Semiannual GSAP Sampling*** ***Nov***
- Sampling for Assessment of Aerobic Chlorinated
Cometabolism Enzymes TBD
- SS029 System Optimization Analysis TBD

6

Travis AFB Field Schedule - 2011

RPM Meeting
October 20, 2011

2011 Field Schedule

- FT005 Soil Remedial Action Aug - Oct
- LF007C Investigation (2nd Phase hydropunch & wells) Oct 24 – Oct 28
Recently received USFWS approval to sample from vernal pool area
- Quarterly RPO Performance Monitoring Nov 1 – Nov 11
(sites SS015 EVO injection, SS016 bioreactor, SD036 EVO injection, SD037 EVO injection, DP039 bioreactor, & DP039 EVO biobarrier)
- 2011 Semiannual GSAP Sampling Nov – Dec
- Sampling for Assessment of Aerobic Chlorinated Cometabolism Enzymes TBD
- Site SS029 System Optimization Analysis Investigation TBD