Final

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

20 July 2011, 0930 Hours

Mr. Mark Smith, Travis Air Force Base (AFB), conducted the Remedial Program Manager's (RPM) meeting on 20 July 2011 at 0930 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
• Merrie Schilter-Lowe	Travis AFB
• Dave Leeson	AFCEE
• 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	ITSI
• Glenn Leong	Trihydro
• Craig Carlson	Trihydro
• Mike Wray	CH2M HILL
• Loren Krook	CH2M HILL
• Leslie Royer	CH2M HILL
• George Tangalos	CH2M HILL (via phone, for Enzyme Assessment Work Plan discussion only)

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 (June 2011)
• Attachment 4	CGWTP Monthly Data Sheet (June 2011)
• Attachment 5	NGWTP Monthly Data Sheet (June 2011)

- Attachment 6 Site ST018 Monthly Data Sheet (June 2011)
- Attachment 7 Presentation: Management Overview Briefing
- Attachment 8 Presentation: 2011 Field Schedule Update
- Attachment 9 Presentation: Work Plan for Assessment of Aerobic Chlorinated Cometabolism Enzymes at Travis AFB
- Attachment 10 Presentation: Bio-Barrier Design Analysis Cometabolism Enzymes at Travis AFB

1. ADMINISTRATIVE

A. Previous Meeting Minutes

The 15 June 2011 RPM meeting minutes were approved and finalized as written.

B. Action Item Review.

Action items from June were reviewed.

Action item one still open. No change.

Action item two still open. No change.

Action item three still open. No change.

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 17 August 2011.

Travis AFB Master Document Schedule

— Focused Feasibility Study (FFS): The response to comments (RTC) meeting date has been changed to 20 July 2011, the date will be a moving target due to the size of the document and ongoing discussions with the regulatory agencies. The rest of the dates will be changed accordingly. Travis is requesting that the Draft Final document be presented in CD format only for regulatory review, to confirm Travis properly and correctly included all the revisions to the document that was agreed upon before going to print. The agencies agreed to receive Draft Final in CD format only.

— Proposed Plan (PP): The predraft submittal, AF/Service Center Comments Due, Draft to Agencies, Draft to RAB, Agency Comments Due, and Response to Comments Meeting will continue as “TBD” until the FFS is completed: No change.

— Groundwater Record of Decision (ROD): Travis will hold a scoping meeting with the agencies for the ROD on 30 November 2011.

— Comprehensive Site Evaluation Phase II: Presently in the Draft Final phase of the document. The document will go Final on 17 August 2011. This document is in support of a removal action of PAH contaminated surface soil from an old skeet range.

— Potrero Hills Annex: (FS, PP, and ROD): No change.

— ISCO/ERD Technical Memorandum: No change.

— Site FT005 Data Gaps Investigation Report: No change.

— Site ST018 POCO Baseline Implementation Report: The dates were changed to reflect the actual submittal dates, as well as when the document went Final.

— Work plan for Assessment of Aerobic Chlorinated Cometabolism Enzymes at Travis AFB: This is a new document, so all due dates were added to the schedule.

— 2010 GWTP RPO Annual Report: The RTC date, and later submittal dates, were changed to allow time for more time critical document reviews.

— Baseline Implementation Report: This report will document the site investigations, remedy optimization actions, and baseline sampling results for the emulsified vegetable oil (EVO) injection sites and bioreactor sites. The document submittal and review dates have been moved back due to the heavy document review load.

— Technical and Economic Feasibility Analysis (TEFA): All dates remain TBD. The scoping meeting date was changed to 20 July 2011, to be held in the afternoon following the RPM meeting.

— Quarterly Newsletter (July 2011): The Draft to Agencies date changed, the draft will be submitted to the agencies tomorrow (21 July). The rest of the dates have changed accordingly.

— 2010 CAMU Annual Report: RTC date changed. The rest of the dates were changed accordingly.

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 100% uptime, and 3.2 million gallons of groundwater were extracted and treated during the month of June 2011. All of the treated water was discharged to Union Creek. The average flow rate for the SBBGWTP was 73.1 gallons per minute (gpm), and electrical power usage was 8,460 kWh. Approximately 11,590 pounds of CO_2 were created (based on DOE calculation); approximately 1.63 pounds of volatile organic compounds (VOCs) were removed in June. The total mass of VOCs removed since the startup of the system is 404 pounds.

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

Central Groundwater Treatment Plant (see Attachment 4)

The Central Groundwater Treatment Plant (CGWTP) performed at 93.7% uptime with approximately 1.4 million gallons of groundwater extracted and treated during the month of June 2011. All treated water was diverted to the storm drain. The average flow rate for the CGWTP was 35.3 gpm, and electrical power usage was 2,092 kWh for all equipment connected to the Central plant; approximately 2,866 pounds of CO_2 were created. Approximately 4.02 pounds of VOCs were removed from groundwater in June. The total mass of VOCs removed since the startup of the system is 11,228 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 June.

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

North Groundwater Treatment Plant (see Attachment 5)

The North Groundwater Treatment Plant (NGWTP) performed at 100% uptime with approximately 1,704 gallons of groundwater extracted and treated during the month of June 2011. The average flow rate of the NGWTP, while operating, was 0.04 gpm and electrical power use was 545 kWh for all the equipment connected to the North plant; approximately 747 pounds of CO_2 was created. Approximately 0 VOCs were removed from the groundwater in June. 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 June.

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

The Site ST018 (MTBE) Treatment Plant (S18GWTP) performed at 100% uptime with approximately 114 thousand gallons of groundwater extracted and treated during the month of June 2011. All treated water was diverted to the storm drain. The

average flow rate for the S18GWTP was 2.6 gpm, and electrical power usage was 79 kWh for all equipment connected to the S18GWTP plant; approximately 108 pounds of CO_2 were created. Approximately 0.29 pounds of BTEX, MTBE and TPH mass were removed from groundwater in June. The total BTEX, MTBE and TPH mass removed since the startup of the system is 3.2 pounds.

Note: electrical power use is for the alarm system and a pump that pushes water through the GAC.

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

3. Presentations

Program Update: Management Overview Briefing (see Attachment 7)

Mr. Wray reported on the status of field work and documents which are completed, in progress, and upcoming. See Attachment 7 for details.

Field Schedule (see Attachment 8)

Mr. Wray reported on the 2011 field schedule. See Attachment 8 for details.

Work Plan for Assessment of Aerobic Chlorinated Cometabolism Enzymes at Travis AFB (see Attachment 9)

Ms. Royer reported on the work plan for assessment of aerobic chlorinated cometabolism enzymes. Mr. Tangalos, subject matter expert from CH2M HILL, was connected to the discussion via telephone. Ms. Royer began by introducing Mr. Tangalos and his involvement in a similar environment at Hill AFB. The key points made for this presentation included:

Background:

- Natural attenuation is occurring at Travis AFB as documented by the Natural Attenuation Assessment Report (NAAR).

- The NAAR concluded that natural attenuation at Travis AFB is primarily due to physical processes, because the predominantly aerobic environment is not conducive to anaerobic biological degradation.

- The NAAR assessment focused on the anaerobic biological degradation process. Cometabolism is a biological process that occurs under aerobic conditions and may be contributing to natural attenuation at Travis AFB.

The objective of the enzyme study is to evaluate whether the biological process of cometabolism is a mechanism contributing to natural attenuation at Travis. Travis is following the approach taken at Hill AFB to evaluate whether aerobic cometabolism is a component of natural attenuation at Travis AFB.

The cometabolism evaluation at Hill AFB has been reviewed by Dr. John Wilson (subject matter expert with EPA) and it is our understanding that he agrees that cometabolic enzymes play a role in natural attenuation of chlorinated solvent contaminated aquifers at Hill AFB.

The Hill AFB OU 9, 10 and 11 RODs will propose natural attenuation for TCE at several sites using microbiological and cometabolism enzyme data as a line of evidence supporting natural attenuation (Tier 3 evidence).

Cometabolism:

- Cometabolism is a secondary, non-metabolic enzyme reaction occurring incidentally to the primary metabolic energy-producing reaction.

- Example – Methanotrophs produce the enzyme soluble methane monooxygenase (sMMO) to oxidize methane for both their energy and carbon requirements (the primary substrate). The sMMO enzyme also fortuitously degrades chlorinated ethenes, like TCE (the secondary substrate) in a reaction that is of no metabolic benefit to the microorganism. It is a fortunate coincidence that the enzymes produced also degrade TCE.

- Many investigations have shown aerobic cometabolism to be an efficient and effective natural attenuation mechanism.

Approach (Travis AFB is using the same approach taken at Hill AFB):

- Analyze microbial deoxyribonucleic acid (DNA) using real time quantitative polymerase chain reaction (qPCR) analyses to look for genetic material required to build cometabolic enzymes (biological oxygenase genes), and for microorganisms that are present in the environment that may have the potential for degradative activity. Although qPCR is a valuable tool for determining the presence of genes and microorganisms that are potentially capable of a cometabolic response, it does not indicate whether the organisms and enzymes are actually cometabolically active.

- Analyze for the presence and activity of a specific enzyme using Enzyme Activity Probes (EAP). We want to observe if the genes that can produce those enzymes are present and if they are active and working.

Enzyme Activity Probes (EAPs)

- EAPs are recently developed tools that can provide direct evidence that the mechanism for aerobic cometabolic oxidation is present and active in the aquifer.

- EAPs serve as an alternate substrate for enzymes capable of cometabolic activity.

- EAPs have been developed for a suite of aromatic compounds. Depending upon the enzyme being screened, there is an EAP specific to that enzyme. The probes are enzyme specific.

- If the appropriate enzyme is not present, or is present but not active in a sample, then the probes will not be transformed and no fluorescence will be detected.

- If the sample has EAP response, then there is direct evidence of degradative activity.

- The data interpretation suggests that if there is a biological as well as physical component to natural attenuation at Travis AFB, and if there are active cometabolic enzymes as well as genes that produce those enzymes present at Travis AFB, we can then conclude that there is a biological as well as a physical component contributing to the natural attenuation at Travis. Mr. Tangalos said it provides a biological mechanism and a higher level of evidence that EPA requires for monitoring natural attenuation approaches.

Mr. Leeson: if the enzyme is present but not active, then the probe would not detect anything. Ms. Royer: that is correct. The enzyme has to be active in order to be detected. If the enzyme is active, the lab can run a DNA test to determine which genes are producing the enzymes. Mr. Leeson asked if there was a way to stimulate the enzymes that are not active. Mr. Anderson said Travis is not looking at an active remedy; our focus is trying to get a line of evidence to see if this is occurring, and if this can work across the base. Mr. Wray adding that the data already shows that natural attenuation is occurring, the plumes are shrinking. There has been an assumption that there is not a lot of biological activity associated with it, mostly dilution and dispersion. This study will show if the enzymes are a component of the natural attenuation. It may or may not be part of the natural attenuation. This study will give us more knowledge on why we are getting attenuation.

Mr. Anderson said he understands that the enzymes are the main component that transforms the contamination into something less harmful. For example, if there are fifty different types of genes that generate the enzymes and each enzyme has a different genome, then why it is important to know which specific gene produced that enzyme. Mr. Tangalos said the first reason to look for genes first verses enzymes is that the gene test is less expensive. You can take a bulk groundwater sample and run it through the qPCR process to see what kind of bacteria are present in the environment and find the right kind of bacteria that produce aerobic cometabolic enzymes. Then you take the next step forward and look for those specific enzymes. It is a two step process. Mr. Anderson asked that, depending on the results of the first step, would that determine which probe should be used. Mr. Tangalos said it could, but because we are specifically interested in TCE, we target a set of bacteria known to be associated with those enzymes.

Mr. Smith stated that Travis AFB is approximately 6,000 acres, and the lithology is about the same all across the base, sort of a heterogeneous mix. If bacteria are found in one location on base, is it safe to assume that those same bacteria would be found in another location. Mr. Tangalos replied it was a very good assumption. Hill AFB performed this study at several of their sites and has determined that the geochemistry, the lithology, and the groundwater contamination concentrations are very similar. They made the assertion that the bacteria is also present at other locations on base and that confirmation samples weren't necessary.

Sample Collection:

- Groundwater samples will be collected from sites FT004 and DP039, different geographical areas of the base where aerobic conditions are predominant.

- A total of seven groundwater samples will be collected (includes one field duplicate).

- Each sample will be analyzed for VOCs by EPA method 8260B, for genes by qPCR, and for enzymes by EAP.

- The enzyme sMMO, the most common and effective TCE oxidizing enzyme, will be targeted by the EAP.

Mr. Friedman asked if Travis is following the same approach as Hill AFB and, if so, what were the analytical results found at Hill AFB. Ms. Royer said that Travis is using the same approach that was used at Hill AFB. Mr. Tangalos said that Hill's lithology is composed of anaerobic shallow aquifers with TCE contamination, similar to Travis AFB. The first step was to perform the qPCR that identified genes in the environment associated with the cometabolism enzymes. The next step was the EAP to determine that sMMOs are present and active in the environment. That study produced a line of evidence that shows there are microbial mechanisms present that are involved in biodegradation of the contaminants. This evidence was combined with other natural attenuation parameters, such as stable plumes, no continuing source, and declining contaminant mass. Hill AFB is using this data to prepare a Focused Feasibility Study (FFS) and a Proposed Plan (PP), and will use this information in the Record of Decision (ROD) for OU9. It is our understanding that Dr. John Wilson from EPA agrees that enzymes are a line of evidence for microbial degradation.

Ms. Royer provided a map to show where the proposed sample sites are located at Travis AFB. See attachment 9 for details.

Bio-Barrier Design Analysis (see Attachment 10)

Mr. Leong reported on the work plan that describes the bio-barrier design analysis**.**

Mr. Leong began by stating that the title of the presentation on the agenda was intended to indicate that their work is to look at different alternatives for Remedial Process Optimization at sites SS016 and SS029, and not only a biobarrier.

Background:

- Groundwater plumes: Site SS016 plume currently has several extraction wells (horizontal and vertical) to address the source area and down gradient area of the plume. The extracted groundwater is treated at the Central Groundwater Treatment Plant (CGWTP) using liquid-phase granular activated carbon (LGAC). However, the plume is still slowly migrating underneath the runway.

- Site SS029 has several extraction wells located within the VOC plume, and is providing containment to keep the plume from migrating off-base.

- Both sites have TCE and cis-1,2-DCE contaminants. It appears that the plumes are starting to commingle, although it is hard to confirm, there are not enough data points. The plume is migrating under an active runway and drilling on an active runway is not permissible.

- The South Base Boundary Groundwater Treatment Plant (SBBGWTP) has been operating for over ten years, and also uses LGAC for treatment.

Remedial Process Optimization Alternatives:

- Continue operation of existing SBBGWTP as it is.

- Enhance the current SBBGWTP system by using other pump and treat technology, such as pulsing, or addition of more extraction wells.

- Install a permeable reactive barrier (PRB) system. Turn off the GET system and let the groundwater flow naturally through the PRB. Before this alternative can be evaluated, a site investigation would need to be conducted.

- Or maybe use a combination of both the SBBGWTP and a PRB.

Mr. Leeson asked about the depth to water at Site SS029. Mr. Leong said it is about ten feet. Mr. Leeson asked what the groundwater flow rate is. Ms. Royer said approximately seventy to eighty feet per year.

Information Requirements:

- Review all the current treatment system operational information.

- Evaluate the subsurface condition at site SS029, including geotechnical, physical, chemical, and groundwater parameters.

- Refine the base groundwater flow model.

- Conduct bench scale testing of passive treatment options.

Investigation Components:

- Conduct aquifer testing at site SS029: Install new groundwater monitoring wells. Use existing wells. Temporarily shut down the extraction wells to measure water levels.

- Drill soil borings at site SS029 in the area of the leading edge of plume. Perform lithologic logging and chemical testing.

- Conduct groundwater sampling on new and existing monitoring wells.

Investigation Report and Design Analysis:

- Prepare an investigation report of the subsurface conditions. Refine the groundwater flow modeling results.

- Conduct design analysis to include an evaluation of possible optimization alternatives.

Next Steps:

- Temporary shutdown of the Site SS029 extraction wells to determine the non-pumping gradient, and to finalize boring and well locations. Mr. Wray added that after the system has been shut down for a few of days, water levels would be collected at all the wells at site SS029. At the lower end of the plume there is a narrow trough, and it has not been determined if that plume shape is natural or if it was created by pumping.

- Prepare a work plan, to include a field sampling and analysis plan, a health and safety plan, and a quality assurance project plan addendum.

Ms. Burke raised concerns about this investigation and where it is coming from and how it fits into where we are at right now. She was surprised to hear about a new investigation while in the middle of selecting a remedy. Mr. Smith said Travis needs to look at long term alternatives for treatment as well as needing to incorporate this in the next PBC. Mr. Anderson said this is very long term, and at this point it is just data gathering. This investigation is taking a proactive step toward guiding the long term cleanup of the largest plume on the base, since the treatment plants have been in operation for a long time and are slowly becoming less efficient. It is looking at every option for optimization and the associated costs. The SBBGWTP cannot and will not be permanently shut down until the off base plumes at FT005 and SS030 are cleaned up. Because of the significant cleanup progress the base has already made at those sites, this investigation is very timely. Mr. Anderson stressed that only the extraction wells at site SS029 will be shut down temporarily, for a week or less. The extraction systems at sites FT005 and SS030 will remain operational. Ms. Burke requested written notification for the temporary shutdown. Ms. Burke agreed an email will suffice. Ms. Burke will review the email and give her decision at a later date.

4. New Action Item Review

Mr. Smith will send an email requesting permission for a temporary shutdown (a week or less) of the SS029 extraction wells, noting the purpose of the shutdown. The email will state that the extraction systems at sites FT005 and SS030 will continue to operate.

5. PROGRAM/ISSUES/UPDATE

None.

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	Mr. Smith will send an email to EPA requesting permission for a temporary shutdown (a week or less) of the SS029 extraction wells, noting the purpose of the shutdown. Stating FT005 and SS030 will continue to operate.	TBD	Open

TRAVIS AIR FORCE BASE
ENVIRONMENTAL RESTORATION PROGRAM
REMEDIAL PROGRAM MANAGER'S MEETING
BLDG 570, Main Conference Room
20 July 2011, 9:30 A.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. ENZYME ASSESSMENT WORK PLAN
   D. TRI-HYDRO BIO-BARRIER DESIGN ANALYSIS

4. NEW ACTION ITEM REVIEW

5. PROGRAM/ISSUES/UPDATE

NOTE: WE HAVE SCHEDULED THE ENZYME ASSESSMENT WORK PLAN PRESENTATION BETWEEN 10:15 AND 10:30 IN ORDER TO BRING A SUBJECT MATTER EXPERT INTO THE DISCUSSION VIA TELECONFERENCE.

NOTE: FOLLOWING THE RPM MEETING, WE HAVE SET ASIDE THE 12:30 TO 4 O'CLOCK TIMEFRAME TO DISCUSS TEFA SCOPING ISSUES, FOLLOWED BY THE REMAINING RESPONSES TO EPA COMMENTS ON THE DRAFT FOCUSED FEASIBILITY STUDY REPORT.

Travis AFB Master Meeting and Document Schedule

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	—	—
—	—	—

Travis AFB Master Meeting and Document Schedule

PRIMARY DOCUMENTS			
Life Cycle	**Basewide Groundwater**		
	Focused Feasibility Study **Travis, Glenn Anderson** **CH2M Hill, Loren Krook**	**Proposed Plan** **Travis, Glenn Anderson** **CH2M HILL, Loren Krook**	**Record of Decision** **Travis, Glenn Anderson** **CH2M HILL, Tony Jaegel**
Scoping Meeting	**03-30-10**	**NA**	**01-24-07 (11-30-11)**
Predraft to AF/Service Center	12-30-10	**TBD**	12-08-11
AF/Service Center Comments Due	01-13-11	**TBD**	01-11-12
Draft to Agencies	01-27-11	**TBD**	01-25-12
Draft to RAB	01-27-11	**TBD**	01-25-12
Agency Comments Due	03-31-11	**TBD**	03-28-12
Response to Comments Meeting	**07-20-11**	**TBD**	04-18-12
Agency Concurrence with Remedy	NA	NA	05-09-12
Public Comment Period	NA	10-13-11 to 11-14-11	NA
Public Meeting	**NA**	***10-20-11**	**NA**
Response to Comments Due	08-04-11	09-01-11	05-29-12
Draft Final Due (CD)	08-04-11	09-13-11	05-29-12
Final Due	09-09-11	10-13-11	06-27-12

*Public meeting to coincide with RAB meeting.

Travis AFB Master Meeting and Document Schedule

PRIMARY DOCUMENTS	
	Comprehensive Site Evaluation Phase II **Travis AFB, Glenn Anderson** **Sky Research, Ian Roberts**
Life Cycle	**Report**
Scoping Meeting	**NA**
Predraft to AF/Service Center	04-23-10
AF/Service Center Comments Due	05-04-10
Draft to Agencies	10-14-10
Draft to RAB	10-14-10
Agency Comments Due	11-24-10
Response to Comments Meeting	**06-13-11 (teleconference)**
Agency Concurrence with Remedy	NA
Public Comment Period	NA
Public Meeting	**NA**
Response to Comments Due	07-18-11
Draft Final Due	07-18-11
Final Due	08-17-11

Travis AFB Master Meeting and Document Schedule

PRIMARY DOCUMENTS			
	Potrero Hills Annex Travis, Glenn Anderson		
Life Cycle	FS	**Proposed Plan**	**ROD**
Scoping Meeting	**180 days after Water Board Order Rescinded**	**+470 days**	**+735 days**
Predraft to AF/Service Center	+ 270 days	+530 days	+ 915 days
AF/Service Center Comments Due	+ 300 days	+560 days	+ 975 days
Draft to Agencies	+330 days	+590 days	+ 1035 days
Draft to RAB	+ 330 days	+590 days	+ 1035 days
Agency Comments Due	+390 days	+650 days	+ 1095 days
Response to Comments Meeting	**+ 405 days**	**+665 days**	**+ 1110 days**
Agency Concurrence with Remedy	NA	NA	+ 1130 days
Public Comment Period	NA	+735 to 765 days	NA
Public Meeting	**NA**	**+745 days**	**NA**
Response to Comments Due	+430 days	+695days	+ 1190 days
Draft Final Due	+430 days	+695 days	+ 1190 days
Final Due	+460 days	+725 days	+ 1250 days

Travis AFB Master Meeting and Document Schedule

SECONDARY DOCUMENTS			
Life Cycle	**ISCO/ERD Technical Memorandum Travis AFB, Glenn Anderson CH2M HILL, Loren Krook**	**Site FT005 Data Gaps Investigation Report Travis AFB, Lonnie Duke ITSI, Rachel Hess**	**Baseline Implementation Report POCO Site ST018 Travis AFB, Lonnie Duke CH2M HILL, Gavan Heinrich**
Scoping Meeting	**NA**	**NA**	**NA**
Predraft to AF/Service Center	08-25-10	04-15-11	04-18-11
AF/Service Center Comments Due	09-08-10 (09-10-10)	04-29-11	05-02-11
Draft to Agencies	10-06-10	05-13-11 (06-03-11)	05-20-11
Draft to RAB	10-06-10	05-13-11 (06-03-11)	05-20-11
Agency Comments Due	11-05-10	06-13-11 (07-05-11)	06-19-11 (06-16-11)
Response to Comments Meeting	**05-26-11**	**06-15-11 (07-20-11)**	**07-20-11 (06-16-11)**
Response to Comments Due	04-27-11	07-07-11 (07-22-11)	08-02-11 (06-22-11)
Draft Final Due	NA	NA	NA
Final Due	TBD	07-07-11(07-25-11)	08-02-11 (06-22-11)
Public Comment Period	NA	NA	NA
Public Meeting	**NA**	**NA**	**NA**

Travis AFB Master Meeting and Document Schedule

SECONDARY DOCUMENTS				
Life Cycle	**Assessment of Aerobic Chlorinated Cometabolism Enzymes at Travis AFB** **Travis AFB, Glenn Anderson** **CH2M HILL, Leslie Royer**	**2010 Groundwater RPO Annual Report** **Travis AFB, Lonnie Duke** **CH2M HILL, Doug Berwick**	**Baseline Implementation Report** **Travis AFB, Lonnie Duke** **CH2M HILL, Tony Chakurian**	**Technical and Economic Feasibility Analysis** **Travis AFB, Glenn Anderson** **CH2M HILL, Loren Krook**
Scoping Meeting	**NA**	**NA**	**NA**	**07-20-11**
Predraft to AF/Service Center	08-09-11	04-05-11	07-27-11	TBD
AF/Service Center Comments Due	08-19-11	04-19-11	08-10-11	TBD
Draft to Agencies	09-02-11	05-18-11	08-24-11	TBD
Draft to RAB	09-02-11	05-18-11	08-24-11	TBD
Agency Comments Due	10-03-11	06-18-11	09-23-11	TBD
Response to Comments Meeting	**10-11-11**	**07-20-11(08-17-11)**	**10-20-11**	**TBD**
Response to Comments Due	10-14-11	09-20-11	11-03-11	TBD
Draft Final Due	NA	NA	NA	TBD
Final Due	10-14-11	09-20-11	11-03-11	TBD
Public Comment Period	NA	NA	NA	NA
Public Meeting	**NA**	**NA**	**NA**	**NA**

Travis AFB Master Meeting and Document Schedule

INFORMATIONAL DOCUMENTS		
Life Cycle	**Quarterly Newsletters (July 2011) Travis, Glenn Anderson**	**2010 CAMU Annual Report Travis AFB, Lonnie Duke ITSI, Rachel Hess**
Scoping Meeting	**NA**	**NA**
Predraft to AF/Service Center	NA	01-18-11
AF/Service Center Comments Due	NA	01-31-11
Draft to Agencies	07-18-11	03-01-11
Draft to RAB	NA	03-01-11
Agency Comments Due	08-01-11	04-01-11 (05-03-11)
Response to Comments Meeting	**TBD**	(07-20-11)
Response to Comments Due	08-03-11	(07-22-11)
Draft Final Due	NA	**NA**
Final Due	08-09-11	(07-22-11)
Public Comment Period	NA	**NA**
Public Meeting	**NA**	**NA**

Travis AFB Master Meeting and Document Schedule

Historical	
Life Cycle	**Site SD036 RPO Field Implementation Plan** **Travis AFB, Lonnie Duke** **CH2M HILL, Doug Berwick**
Scoping Meeting	**NA**
Predraft to AF/Service Center	11-30-10
AF/Service Center Comments Due	12-10-10
Draft to Agencies	02-03-11
Draft to RAB	02-03-11
Agency Comments Due	03-05-11
Response to Comments Meeting	03-16-11
Response to Comments Due	06-07-11
Draft Final Due	NA
Final Due	06-07-11
Public Comment Period	NA
Public Meeting	**NA**

South Base Boundary Groundwater Treatment Plant Monthly Data Sheet

Report Number: 130 **Reporting Period: 31 May – 30 June 2011** **Date Submitted: 18 July 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 June 2011 reporting period.

Table 1 – Operations Summary – June 2011

Operating Time:	Percent Uptime:	Electrical Power Usage:
SBBGWTP: 718 hours	**SBBGWTP:** 100%	**SBBGWTP:** 8,460 kWh (11,590 lbs CO_2 generated[a])

Gallons Treated: **3.2 million gallons**

Gallons Treated Since July 1998: **741 million gallons**

Volume Discharged to Union Creek: **3.2 million gallons**

VOC Mass Removed: **1.63 lbs**[b]

VOC Mass Removed Since July 1998: **404 lbs**

Rolling 12-Month Cost per Pound of Mass Removed: $3,790[c]

Monthly Cost per Pound of Mass Removed: $3,788

Lbs = pounds

[a] Based on Department of Energy estimate that 1 kilowatt hour generated produces 1.37 pounds of GHG.

[b] Calculated using June 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	Off line	EW736x05	Off line	EW01x29	0.5	EW01x30	11.6
EW02x05	2.0	EW737x05	Off line	EW02x29	0.2	EW02x30	1.3
EW03x05	Off line	EW742x05	Off line	EW03x29	Off line[d]	EW03x30	3.6
EW731x05	Off line	EW743x05	Off line	EW04x29	5.8	EW04x30	25.2
EW732x05	Off line	EW744x05	Off line	EW05x29	10.2	EW05x30	7.8
EW733x05	Off line	EW745x05	Off line	EW06x29	12.6	EW06x30	Dry
EW734x05	Off line[c]	EW746x05	Off line	EW07x29	6.3	EW711x30	10.0[e]
EW735x05	Off line[c]						
FT005 Total:		**2.0**		**SS029 Total:**	**35.6**	**SS030 Total:**	**59.5**
SBBGWTP Average Monthly Flow[f]: 73.1 gpm							

[a] Extraction well flow rates are based on the monthly readings.
[b] Most extraction wells at FT005 were taken off line 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] EW734x05 and EW735x05 off line intermittently during June 2011 due to inoperable water level transducer and pump, respectively.
[d] EW03x29 off line due to low VOC concentrations but will be brought back on line in July 2011.
[e] Extraction well online, but has a faulty flow meter. Flow rate is measured at the well head.
[f] 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
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	None				

SBBGWTP = South Base Boundary Groundwater Treatment Plant

Summary of O&M Activities

Monthly groundwater samples at the SBBGWTP were collected on 20 June 2011. Sample results are presented in Table 4. The total VOC concentration (62.1 µg/L) in the influent sample has decreased since the May 2011 sample (87.4 µg/L) was collected. Contaminant concentrations were not detected in the effluent process stream.

EW07x29 was brought back on line on 30 June. The variable frequency drive controller was adjusted to account for increased amperage during pump startup.

Optimization Activities

No optimization activities occurred at the SBBGWTP in June 2011.

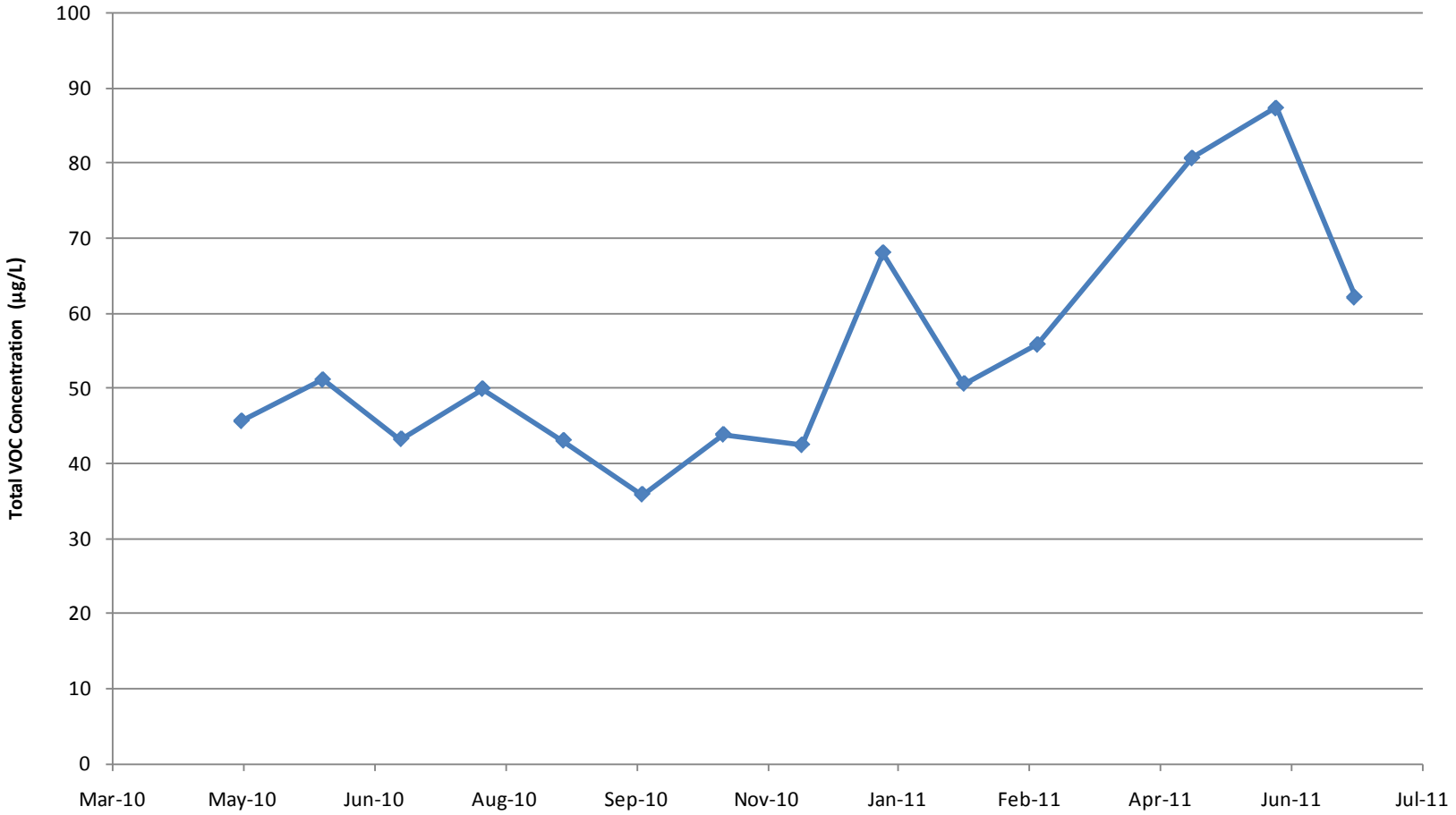
Table 4
Summary of Groundwater Analytical Data for June 2011 – South Base Boundary Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	20 June 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	0.22 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	ND	0.19 J	ND
1,1-Dichloroethene	5.0	0.19	0	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.19	0	4.2	1.8	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	57.9	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
Total Suspended Solids (mg/L)	NE	1.0	0	81	NM	NM

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

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



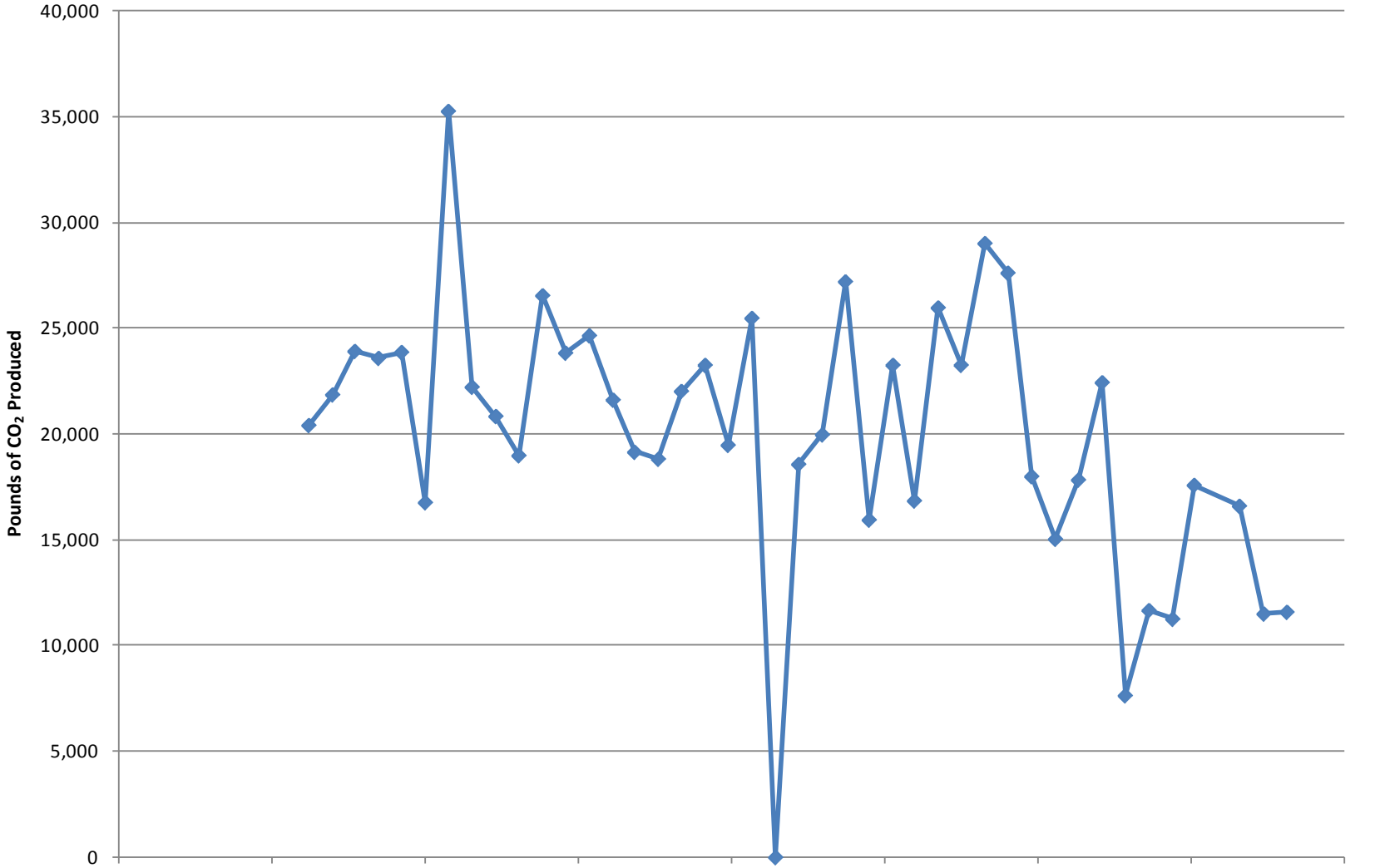
Sustainability

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 11,590 pounds of GHG during June 2011. This is a slight increase from May 2011. 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 on line.

Figure 2

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



Central Groundwater Treatment Plant Monthly Data Sheet

Report Number: 143 **Reporting Period: 31 May – 30 June 2011** **Date Submitted: 18 July 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 (WTTP). 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 June 2011 reporting period.

Table 1 – Operations Summary – June 2011

Operating Time:		Percent Uptime:		Electrical Power Usage:	
CGWTP:	674 hours	**CGWTP:**	93.7%	**CGWTP:**	2,092 kWh (2,866 lbs CO_2 generated[a])
WTTP:	Water: 0 hours Vapor: 0 hours	**WTTP:**	Water: 0% Vapor: 0%	**WTTP:**	0 kWh

Gallons Treated: **1.4 million gallons**

Gallons Treated Since January 1996: **445 million gallons**

VOC Mass Removed:

4.02 lbs[b] (groundwater only)

0 lbs (vapor only)

VOC Mass Removed Since January 1996:

2,542 lbs from groundwater

8,686 lbs from vapor

Rolling 12-Month Cost per Pound of Mass Removed: $1,625[c]

Monthly Cost per Pound of Mass Removed: $1,197

[a] Based on Department of Energy estimate that 1 kilowatt hour generated produces 1.37 pounds of GHG.

[b] Calculated using June 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.

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	20.9	Off line
EW02x16	7.6	Off line
EW03x16	0.5[c] (21,146 gallons in June 2011)	Off line
EW605x16	3.9	Off line
EW610x16	3.5	Off line
CGWTP	35.3	--
WTTP	Off line	Off line

[a] Measured by the effluent discharge to the storm drain divided by the operating time during the month
[b] No vapor was treated in June 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	Off line	EW705x37	Off line	EW501x33	Off line	EW593x36	Off line
EW700x37	Off line	EW706x37	Off line	EW503x33	Off line	EW594x36	Off line
EW701x37	Off line	EW707x37	Off line	EW01x34	Off line	EW595x36	Off line
EW702x37	Off line	EW510x37	Off line	EW03x34	Off line		
EW703x37	Off line	EW511x37	Off line				
EW704x37	Off line	EW555x43	Off line				

[a] Extraction wells are offline due to the ongoing rebound study in the WIOU.

gpm—gallons per minute
NA – not available / not recorded

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	1 June 2011		30 June 2011		Intermittent high water level alarms on influent tank due to high ambient temperature in addition to power outages.
WTTP					
WTTP (Vapor)	24 August 2009				System shutdown for rebound study
WTTP (Water)	27 April 2010				System shutdown for rebound study

CGWTP = Central Groundwater Treatment Plant

WTTP = West Transfer Treatment Plant

Summary of O&M Activities

Monthly groundwater samples at the CGWTP were collected on 20 June 2011. Sample results are presented in Table 5. The total VOC concentration (338 µg/L) in the influent sample has increased since the May 2011 sample (233 µg/L) was collected. The increase was likely caused by resumed pumping from wells EW605x16 and EW610x16, which had both been off line while undergoing electrical repair. Contaminant concentrations were not detected in the effluent process stream.

Extraction well EW605x16 was replaced and brought back on line in June 2011. Additionally, a new 24-volt DC power supply module was installed at the EW605x16 and EW610x16 well vault to transmit flow totals to the CGWTP SCADA. Both wells are now operational. The EW605x16 and EW610x16 vapor lines were capped to prevent backflow from EW003x16, which pumps extracted water through the former vapor line, into the Bioreactor.

Optimization Activities

The WTTP remained off line since being shut down in April 2010 for the ongoing rebound study. The WTTP will be brought back on line briefly in July 2011 during the soil vapor sample collection event from eight (8) dual phase extraction wells.

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

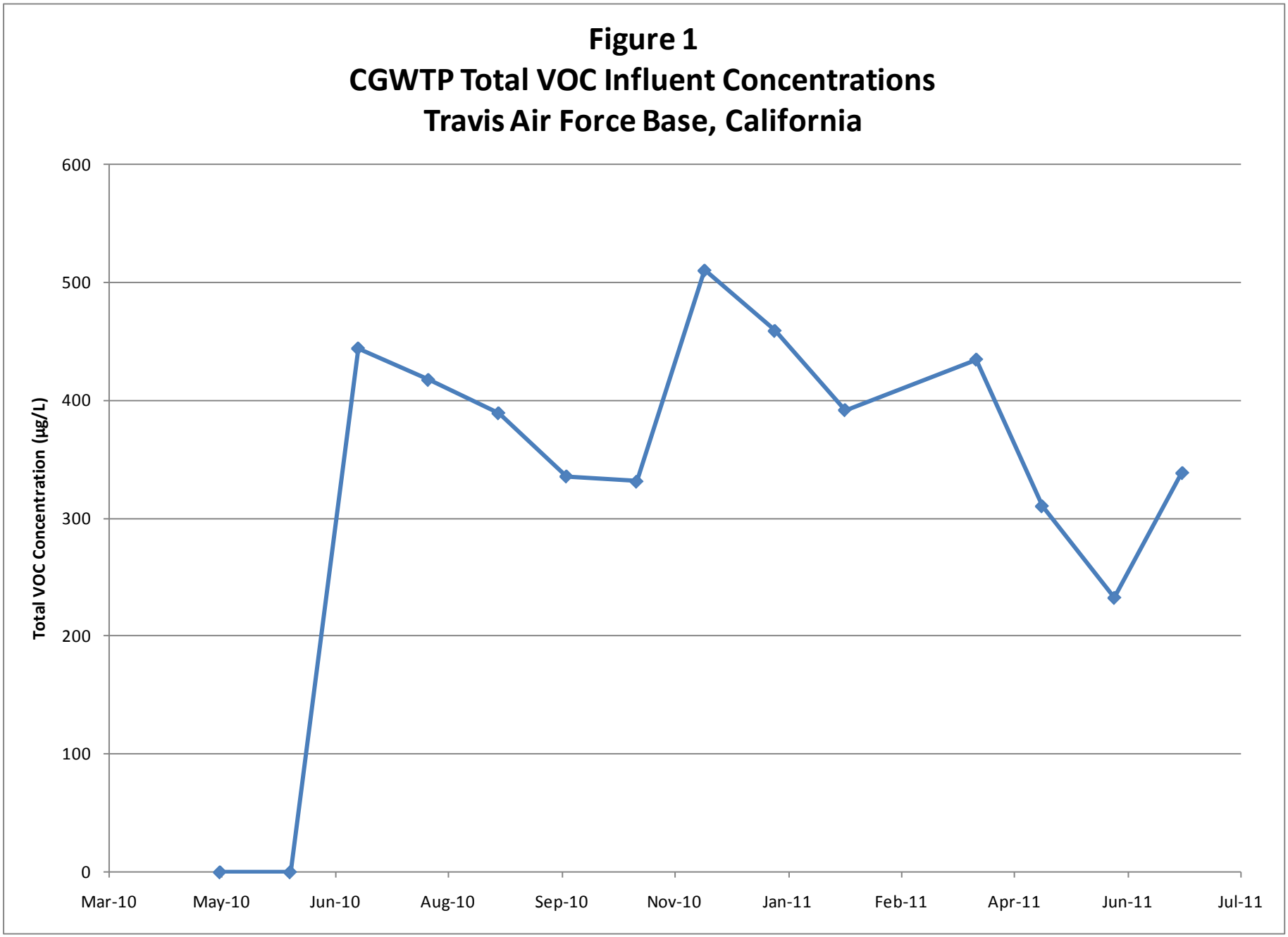
Table 5
Summary of Groundwater Analytical Data for June 2011 – Central Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	20 June 2011 (µg/L) N/C	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	ND	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	0.77 J	ND	ND	ND
1,2-Dichlorobenzene	5.0	0.25	0	0.45 J	ND	ND	ND
1.3-Dichlorobenzene	5.0	0.15	0	0.4 J	ND	ND	ND
1,4-Dichlorobenzene	5.0	0.15	0	ND	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	0.73	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.19	0	73.1	ND	ND	ND
trans-1,2-Dichloroethene	5.0	0.33	0	3.2	ND	ND	ND
Methylene Chloride	5.0	0.66	0	ND	ND	ND	ND
Tetrachloroethene	5.0	0.21	0	0.58	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	259	ND	ND	ND
Vinyl Chloride	0.5	0.18	0	0.26 J	ND	0.36 J	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

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

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



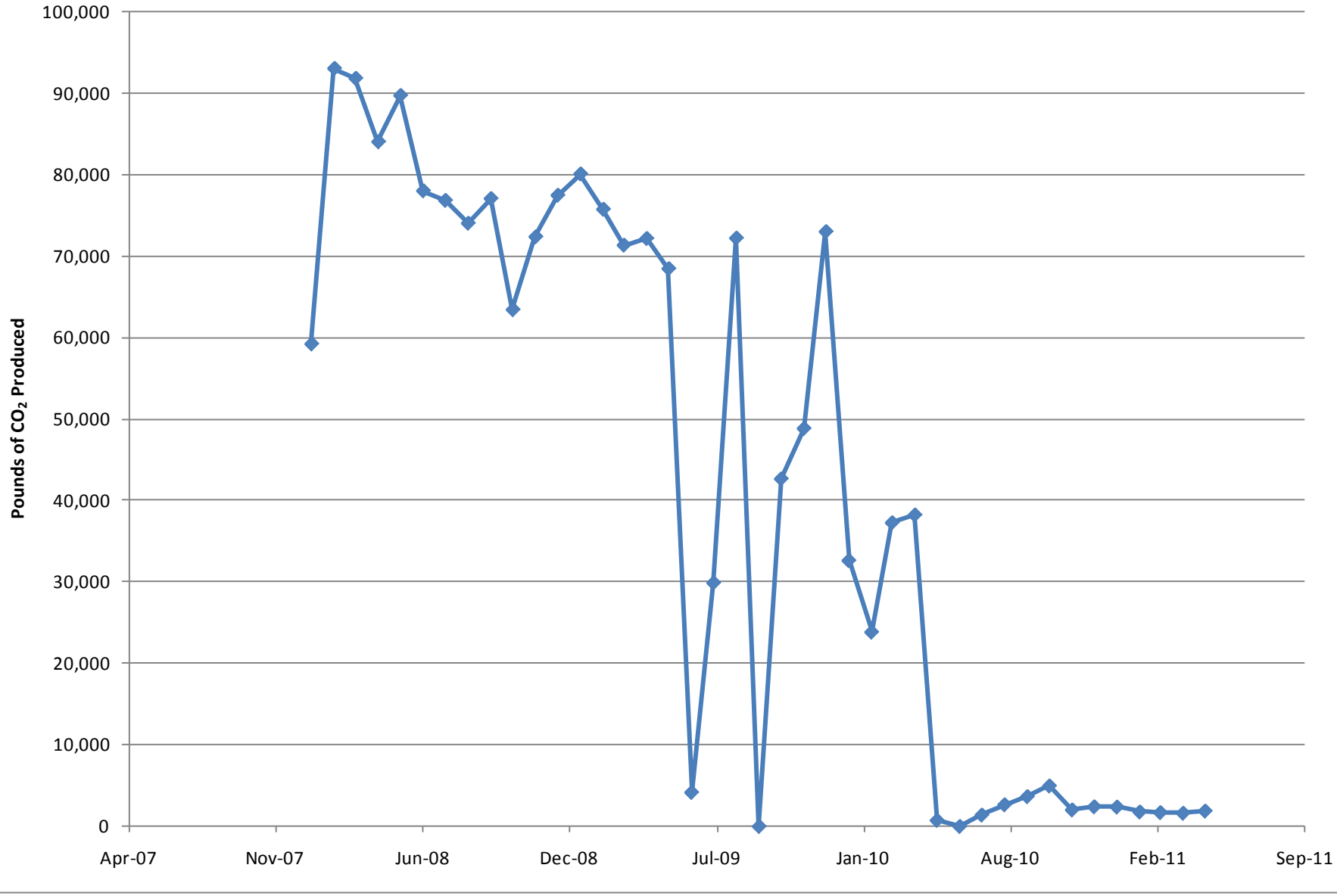
Sustainability

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. These include the WTTP and ThOx systems. The CGWTP produced approximately 2,866 pounds of GHG during June 2011. This is an increase from May 2011. The increase in GHG is attributed to the two extraction wells (EW605x16 and EW610x16) which were brought back into operation following repairs to the pumps and electrical system.

Figure 2

Equivalent Pounds of CO2 Produced by the Central Groundwater Treatment Plant



North Groundwater Treatment Plant Monthly Data Sheet

Report Number: 115 **Reporting Period: 31 May – 30 June 2011** **Date Submitted: 18 July 2011**

This monthly data sheet presents information regarding the North Groundwater Treatment Plant (NGWTP) and associated remedial process optimization (RPO) activities. NGWTP resumed operation in May after the wet season which required system shutdown from December 2010 to May 2011. June 2011 system operation denotes the first full month of system operation since shutdown.

System Metrics

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

Table 1 – Operations Summary – June 2011

Operating Time:	Percent Uptime:	Electrical Power Usage:
NGWTP: 716 hours	**NGWTP:** 100%	**NGWTP:** 545 kWh (747 lbs CO_2 generated[a])

Gallons Treated: **1,704 gallons**

Gallons Treated Since March 2000: **82.5 million gallons**

Volume Discharged to Duck Pond: **1,704 gallons**

Volume Discharge to Storm Drain: **0 gallons**

VOC Mass Removed: **0 pounds**[b]

VOC Mass Removed Since March 2000: **174.3 pounds (Groundwater)**

Rolling 12-Month Cost per Pound of Mass Removed: **Not Measured**[c]

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] TCE (<0.001 lbs) only VOC reported from influent sample.
[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.

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	NA[a]
EW615x07	0.04[b]
NGWTP	0.04

[a] Extraction well not operational. New pump ordered and will be replaced in August 2011.
[b] Average flow rate calculated by dividing the system discharge volume into the duck pond by the operating time since EW615x07 is the only pump in operation.

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		Cause
	Date	Time	Date	Time	
NGWTP	10 December 2010		19 May 2011		Taken off line for the wet season. Site LF007C extraction wells restarted in May 2011 when vernal pools dissipated.

NGWTP = North Groundwater Treatment Plant

Summary of O&M Activities

The NGWTP was brought on line in May 2011 due to the dissipation of vernal pools. Since the other Sites associated with the NGWTP (Sites FT004 and SD031) are currently undergoing rebound studies, Site LF007C is the only site contributing extracted groundwater to the NGWTP. Currently, one of the two Site LF007C extraction wells (EW614x07) remains off line due to pump failure. A new pump has been ordered and is scheduled to be brought back on line in August 2011.

Leakage was observed from the lagging (third) carbon vessel drum at the NGWTP and was replaced with a spare drum. The leaking drum was drained of all remaining water into the sump. A new spare carbon vessel drum is being procured.

Analytical data from the 20 June 2011 sampling event are presented in Table 4. Contaminant concentrations were not detected in the effluent process stream.

Optimization Activities

No optimization activities occurred at the NGWTP in June 2011.

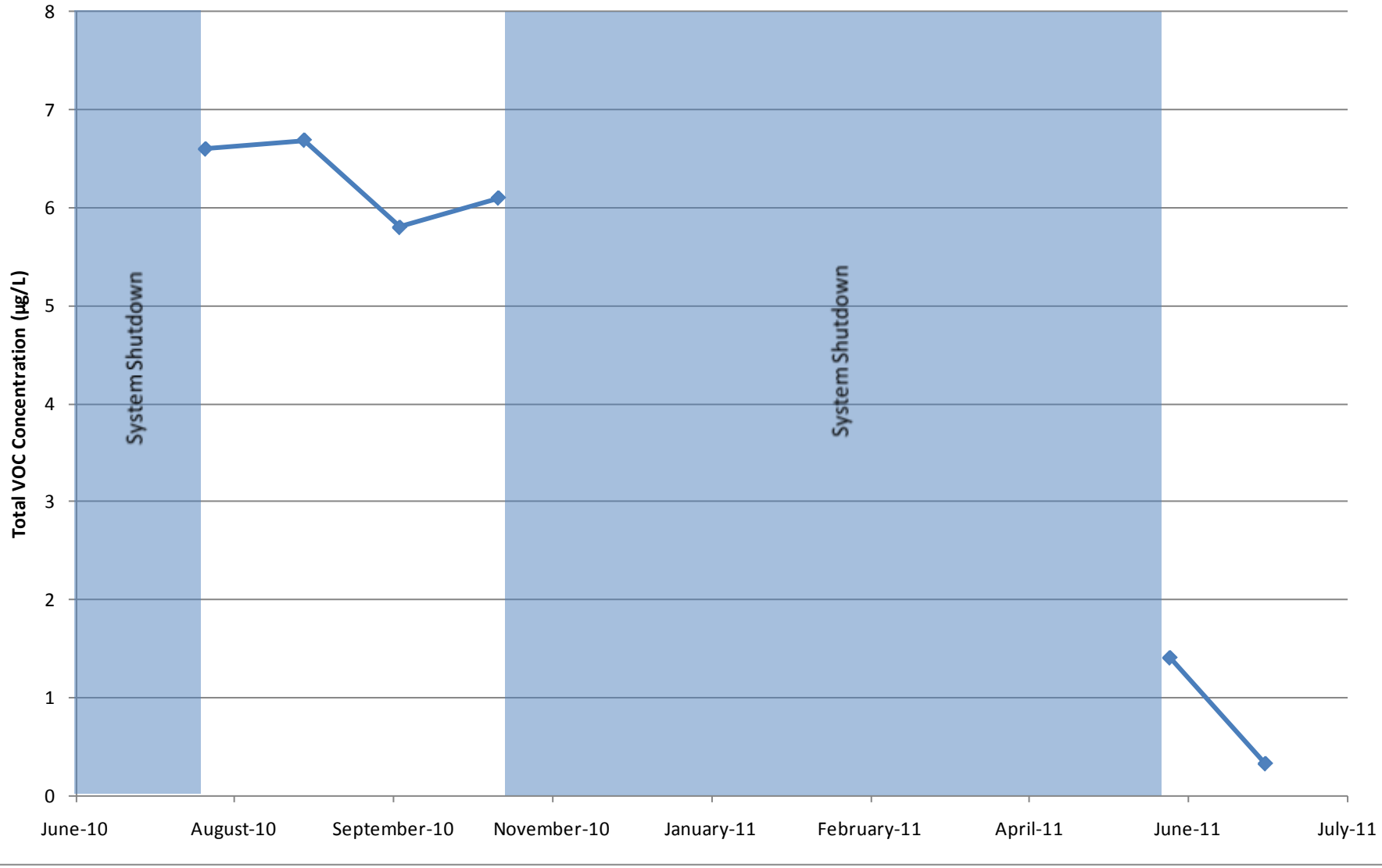
Table 4
Summary of Groundwater Analytical Data for June 2011 – North Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	20 June 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	ND	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	0.33 J	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

[a] 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).

J = analyte concentration is considered an estimated value
B = analyte reported in trip blank
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



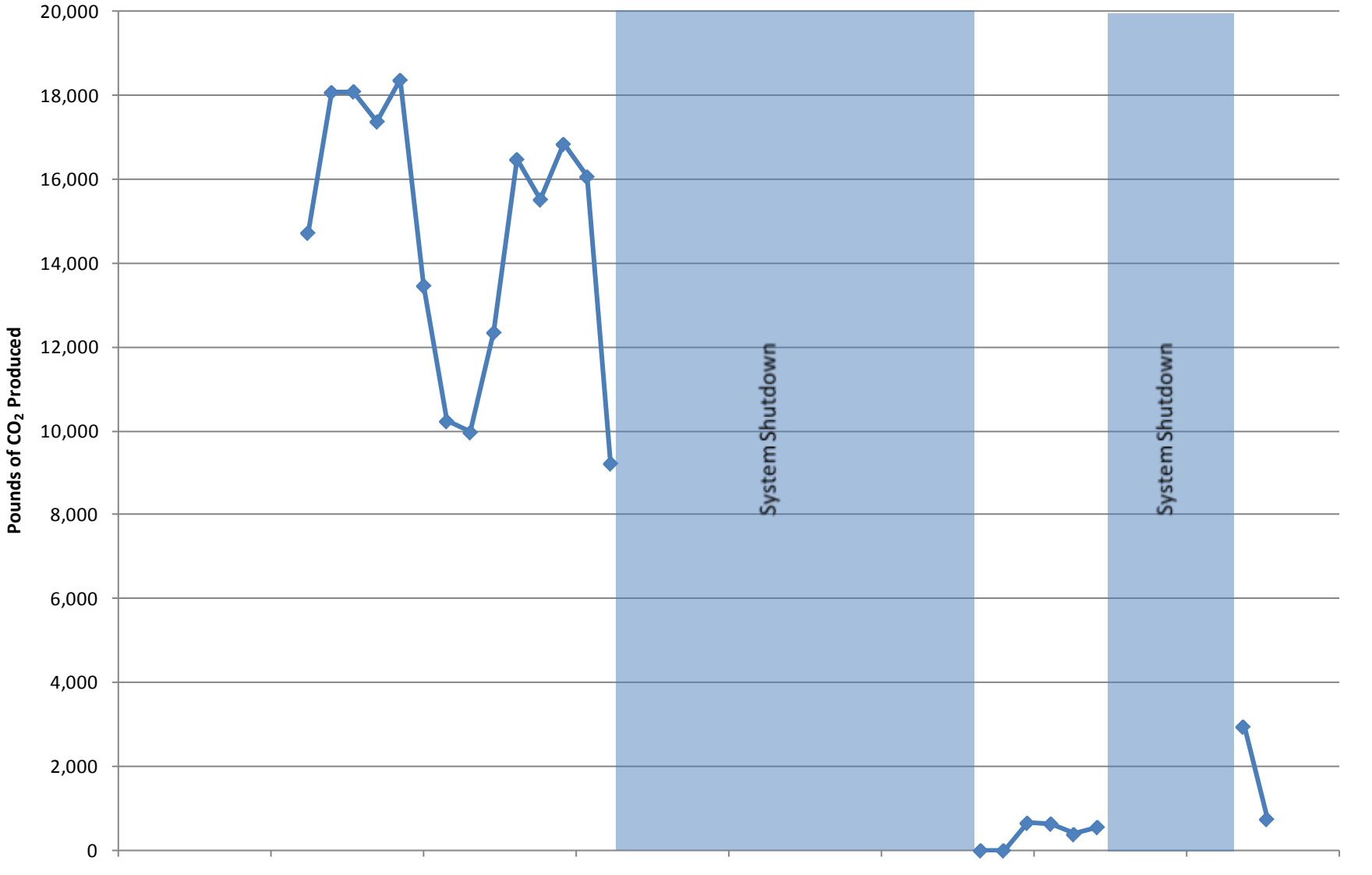
Sustainability

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 with solar arrays employed to power a system.

Figure 2 presents the historical GHG production from the systems associated with the NGWTP. The NGWTP used 545 kWh which produced approximately 747 pounds of GHG during June 2011. The overall GHG generation remains considerably lower than traditional GWTPs since the system is predominantly powered by solar arrays.

Figure 2

Equivalent Pounds of CO2 Produced by the North Groundwater Treatment Plant



Site ST018 Groundwater Treatment Plant Monthly Data Sheet

Report Number: 004 **Reporting Period: 31 May – 30 Jun 2011** **Date Submitted: 18 July 2011**

This monthly data sheet presents information regarding the Site ST018 Groundwater Treatment Plant (S18GWTP). With EW2014x18 back on line in June, S18GWTP resumed operation with all extraction wells on line.

System Metrics

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

Table 1 – Operations Summary – June 2011

Operating Time:	Percent Uptime:	Electrical Power Usage:
S18GWTP: 716 hours	**S18GWTP:** 100%	**S18GWTP:** 79 kWh (108 lbs CO_2 generated[a])

Gallons Treated: **114 thousand gallons** Gallons Treated Since March 2011: **477 thousand gallons**

Volume Discharged to Union Creek: **114 thousand gallons**

BTEX, MTBE, TPH Mass Removed: **0.29 lbs**[b] BTEX, MTBE, TPH Mass Removed Since March 2011: **3.2 lbs**

Rolling 12-Month Cost per Total Pounds of Mass Removed: $5,109[c]

Monthly Cost per Pound of Mass Removed: $19,027[d]

Lbs = pounds

[a] Based on Department of Energy estimate that 1 kilowatt hour generated produces 1.37 pounds of GHG.

[b] Calculated using June2011 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; however the system is only in its third month of operation.

[d] The monthly cost for Site ST018 in June 2011 was approximately $5,600, but the cost per pound of mass removed will be large when less than a pound of mass is removed.

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	1.8
EW2016x18	0.3
EW2019x18	0.4
Site ST018 GWTP	2.6

[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	None				

S18GWTP = Site ST018 Groundwater Treatment Plant

Summary of O&M Activities

Monthly groundwater samples at the S18GWTP were collected on 17 June 2011. Sample results are presented in Table 4. No contaminant concentrations from the effluent sample exceeded trigger or effluent limitation values. The quarterly total VOC concentration is 331.6 µg/L (influent is only sampled quarterly per the NPDES permit). The next influent sample is scheduled for collection in July 2011. The low VOC concentration (April 2011) is likely the result of intermittent operation of extraction well (EW2014x18) during April 2011.

Well vault EW2016x18 continues to experience frequent shut downs due to flooding. The flooding is likely a result of rainfall and landscape maintenance (watering the lawn) surrounding the well vault. When discovered, the well vault is pumped out and the pump is brought back on line. If frequent flooding continues to occur during summer months, the float switch may be adjusted to a higher elevation within the well vault to promote longer pump operation.

The hose barb that connects the well tubing to the pump at EW2016x18 was found to be defective, and part of the extracted groundwater from the pump flowed back into the well. As a result, EW2016x18 experienced low flow. The hose barb and clamps will be replaced in July 2011. Additionally, the hose clamps at EW2019x18 were loose at the hose barb-well tubing connection, and resulted in limited flow from the well. The hose clamps were tightened at EW2019x18 in June 2011 and normal flow has resumed.

During system start up in March 2011, arsenic was detected at concentrations greater than the trigger value (10 µg/L) listed in the NPDES permit. The permit requires, when trigger values are exceeded, that the system be sampled for three consecutive months to evaluate the presence of that particular compound. June 2011 concludes the three consecutive sampling months in which arsenic was analyzed as required in the NPDES permit. Over the three month sampling period no arsenic concentrations were detected greater than the trigger value. As directed by the NPDES permit, future sampling events will return to the standard sampling schedule.

The monthly data sheet for May 2011 erroneously reported the mass removed during May 2011 as 1.27 pounds, but should have been reported as 0.33 pounds. The monthly cost per pound mass removed for May 2011 was likewise erroneously reported as $3,525, but should have been reported as $13,525. These changes have been reflected as necessary (e.g. cumulative mass removed since system startup) in this June 2011 Data Sheet.

Optimization Activities

No optimization activities occurred at the S18GWTP in June 2011.

Table 4
Summary of Groundwater Analytical Data for June 2011 – Site ST018 Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	17 June, 2011 (µg/L)		
				Influent[b]	After Carbon 2	System Effluent
Fuel Related Constituents						
MTBE	5	0.1	0	71	ND	ND
Benzene	5	0.1	0	0.3 J	ND	ND
Ethylbenzene	5	0.1	0	ND	ND	ND
Toluene	5	0.1	0	0.3 J	ND	ND
Total Xylenes	5	0.1	0	ND	ND	ND
Total Petroleum Hydrocarbons – Gasoline	50	14	0	140 Y	ND	ND
Total Petroleum Hydrocarbons – Diesel	50	16	0	120 Y	32 J	21 J
Total Petroleum Hydrocarbons – Motor Oil	--	74	0	ND	ND	ND

[a] In accordance with the National Pollutant Discharge Elimination System (NPDES) Effluent Limitations
[b] Values taken from April 2011 sample data. Influent sampling is conducted on a quarterly basis.

J = analyte concentration is considered an estimated value

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

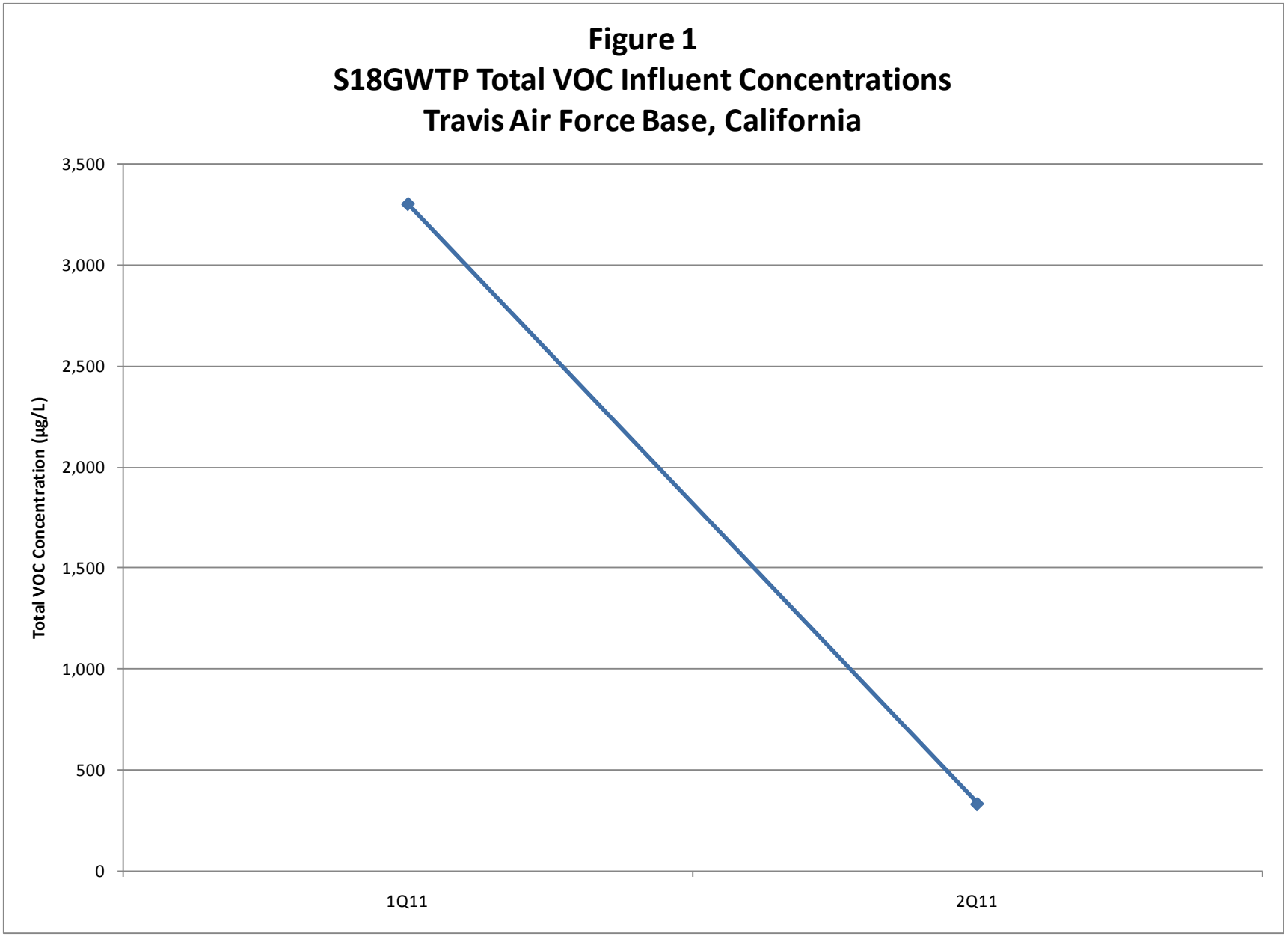
ND = not detected above method detection limit

NS = not sampled

Y = Sample exhibits chromatographic patterns which does not resemble standard

µg/L = micrograms per liter

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



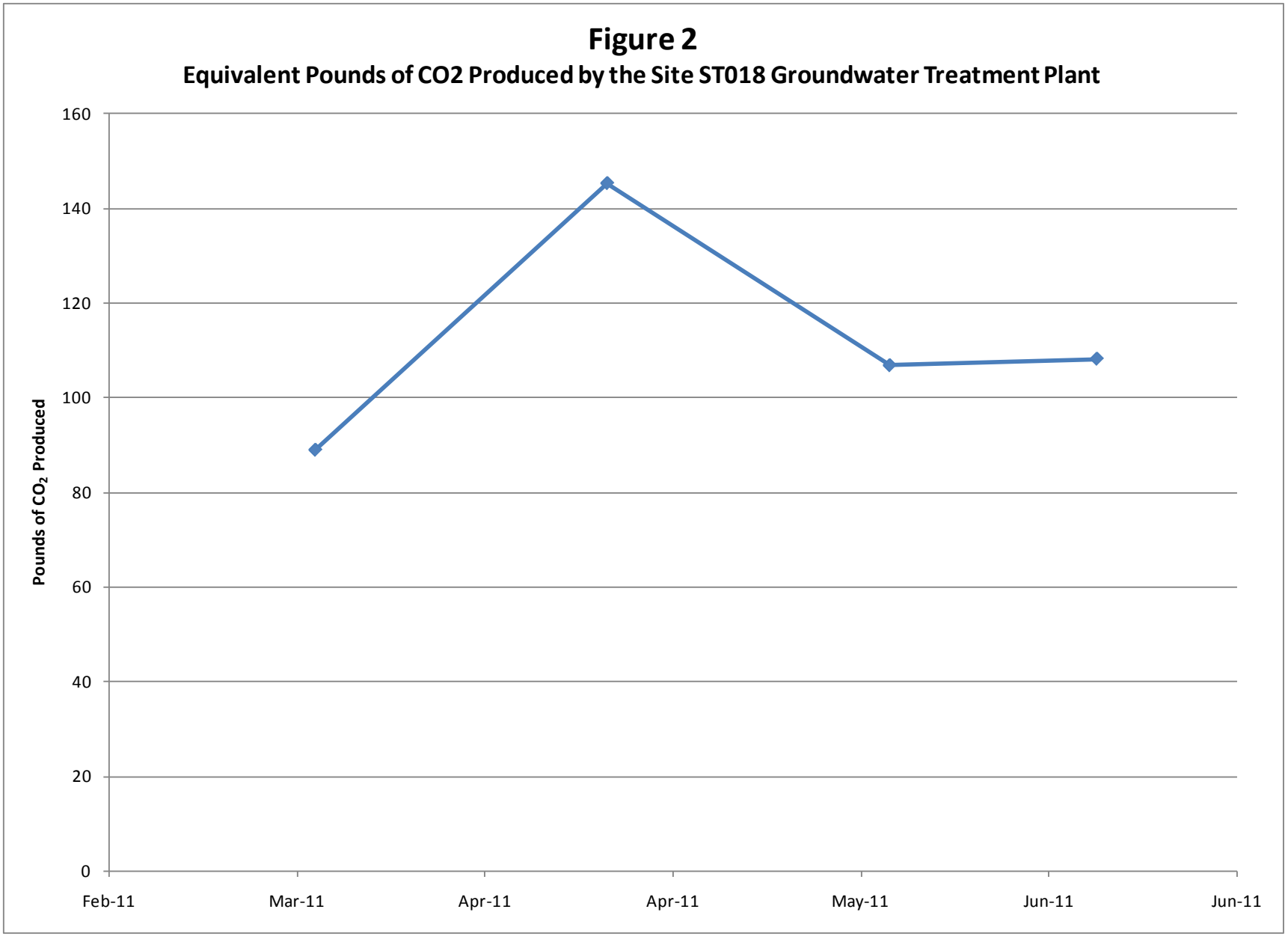
Sustainability

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.

The system produced approximately 108 pounds of GHG during June 2011, all of which is the result of running the transfer pump in the treatment compound. This value is a slight increase (107 pounds) from May 2011. The overall GHG generation remains considerably lower than traditional GWTPs since the extraction system is predominantly powered by solar arrays.

Figure 2

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



Travis AFB
Restoration Program

Management Overview Briefing

RPM Meeting

July 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***

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 Quarterly Performance Sampling
- DP039 Bioreactor Quarterly 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
- Quarterly RPO Performance Monitoring (Feb 2011)
- ST018 GETS Startup
- Quarterly RPO Performance Monitoring (May 2011)
- ***2011 Annual GSAP Sampling***

In-Progress Documents & Field Work

Documents

- Comprehensive Site Evaluation Phase II Report
- ISCO/ERD Tech Memo
- Focused Feasibility Study (FFS)
- 2010 Groundwater RPO Annual Report
- FT005 Data Gaps Investigation Report

Field Work

- None

Upcoming Documents

- Baseline Implementation Report (Sites SS015, SS016, SD036, SD037, and DP039) — Aug
- ***Work Plan for Enzyme Assesement*** — ***Sep***
- Technical and Economic Feasibility Analysis (TEFA) — TBD
- Proposed Plan (PP) — TBD
- ***Work Plan for Site SS029 Biobarrier Design Analysis*** — ***TBD***

Upcoming Field Work

- FT005 Soil Remedial Action — Aug
- Quarterly RPO Performance Monitoring — Aug
  - SS015 EVO Second Quarterly Performance Sampling
  - SS016 Bioreactor Third Quarterly Performance Sampling
  - SD036 EVO Third Quarterly Performance Sampling
  - SD037 EVO Fourth Quarterly Performance Sampling
  - DP039 Biobarrier Fourth Quarterly Performance Sampling
- ***Sampling for Enzyme Assessment*** — ***Oct***
- ***Site SS029 Biobarrier Design Analysis*** — ***TBD***
- LF007C Site Characterization (Wetlands) — TBD*

* Dependent on USFWS approval to sample in the vernal pool footprint

Travis AFB
Field Schedule - 2011

RPM Meeting

July 20, 2011

2011 Field Schedule

- FT005 Soil Remedial Action — Aug
- Quarterly RPO Performance Monitoring — Aug

  (sites SS015 EVO injection, SS016 bioreactor, SD036 EVO injection, SD037 EVO injection, & DP039 EVO biobarrier)
- LF007C Remedy Optimization Investigation — TBD

  Dependent on USFWS approval to sample from vernal pool area (Pending)
- Site SS029 Biobarrier Design Analysis Investigation — TBD
- Sampling for Enzyme Assessment — Oct
- Quarterly RPO Performance Monitoring — Nov

  (sites SS015 EVO injection, SS016 bioreactor, SD036 EVO injection, SD037 EVO injection, DP039 bioreactor, & DP039 EVO biobarrier)
- 2011 Semiannual GSAP Sampling — Nov - Dec

Assessment of Aerobic Chlorinated Cometabolism Enzymes at Travis AFB

Background

- Natural attenuation is occurring at Travis AFB as documented by the Natural Attenuation Assessment Report (NAAR).
- The NAAR concluded that natural attenuation at Travis AFB is primarily due to physical processes, because the predominantly aerobic environment is not conducive to anaerobic biological degradation.
- However, the NAAR assessment focused on the anaerobic biological degradation process. Cometabolism is a biological process that occurs under aerobic conditions and may be contributing to natural attenuation at Travis AFB.

Objective

Evaluate whether the biological process of cometabolism is a mechanism contributing to natural attenuation at Travis AFB.

Regulatory Acceptance

- Following the approach taken at Hill AFB to evaluate whether aerobic cometabolism is a component of natural attenuation.
- The cometabolism evaluation at Hill AFB has been reviewed by Dr. John Wilson (subject matter expert with the EPA); he agrees cometabolic enzymes play a role in natural attenuation of chlorinated solvent contaminated aquifers at Hill AFB.
- The Hill AFB OU 9, 10 and 11 RODs will propose natural attenuation for TCE at several sites using microbiological and cometabolism enzyme data as a line of evidence supporting natural attenuation (e.g., Tier 3).

Cometabolism

- Cometabolism is a secondary nonmetabolic enzyme reaction occurring incidentally to a primary metabolic energy-producing reaction.
- Example
  - Methanotrophs produce the enzyme soluble methane monooxygenase (sMMO) to oxidize methane for both their energy and carbon requirements (i.e., the primary substrate). The sMMO enzyme also fortuitously degrades chlorinated ethenes (i.e., the secondary substrate) in a reaction that is of no metabolic benefit to the microorganism.
- Many investigations have shown aerobic cometabolism to be an efficient and effective natural attenuation mechanism.

Approach

- Analyze microbial deoxyribonucleic acid (DNA) using real time quantitative polymearse chain reaction (qPCR) analyses to look for genetic material required to build cometabolic enzymes (i.e., biological oxygenase genes), and for microorganisms that are present in the environment that may have the potential for degradative activity .
  - Although qPCR is a valuable tool for determining the presence of genes and microorganisms potentially capable of a cometabolic response, it does not indicate whether the organisms and enzymes are actually cometabolically active.
- Analyze for the presence and activity of specific enzymes using Enzyme Activity Probes (EAP).

Enzyme Activity Probes (EAPs)

- Recently developed tools that can provide direct evidence that the mechanism for aerobic cometabolic oxidation is present and active in an aquifer.
- EAPs serve as alternate substrates for enzymes capable of cometabolic activity.
- EAPs have been developed for a suite of aromatic compounds.
- These probes undergo transformation to yield a strongly fluorescent product only when the enzyme of interest is actively functioning.

Enzyme Activity Probes (EAPs)

- If the appropriate enzyme is not present, or is present but not active in a given sample, then the probes will not be transformed and no fluorescence will be detected.
- If the sample has EAP response, then there is direct evidence of degradative activity.

Data Interpretation

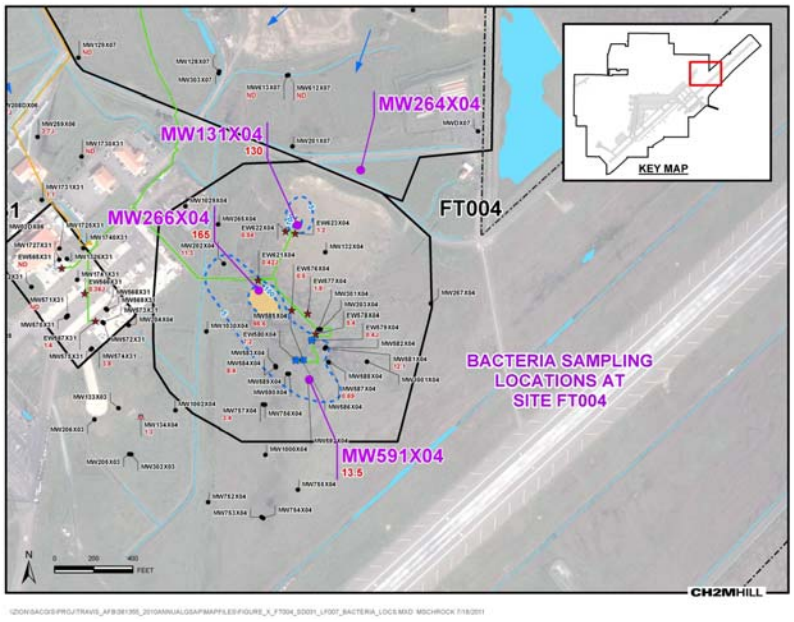
There is a biologic as well as physical component to natural attenuation at Travis AFB if active cometabolic enzymes as well as genes that produce those enzymes are present at Travis AFB.

Sample Collection

- Groundwater samples will be collected from Sites FT004 and DP039 (different geographical areas of the Base where aerobic conditions predominate).
- Total of 7 groundwater samples (6 normal and one FD) will be collected.
- Each sample will be analyzed for VOCs by EPA Method 8260B, qPCRs, and EAP.
- The enzyme sMMO (the most common and effective TCE oxidizing enzyme) will be targeted by the EAP.

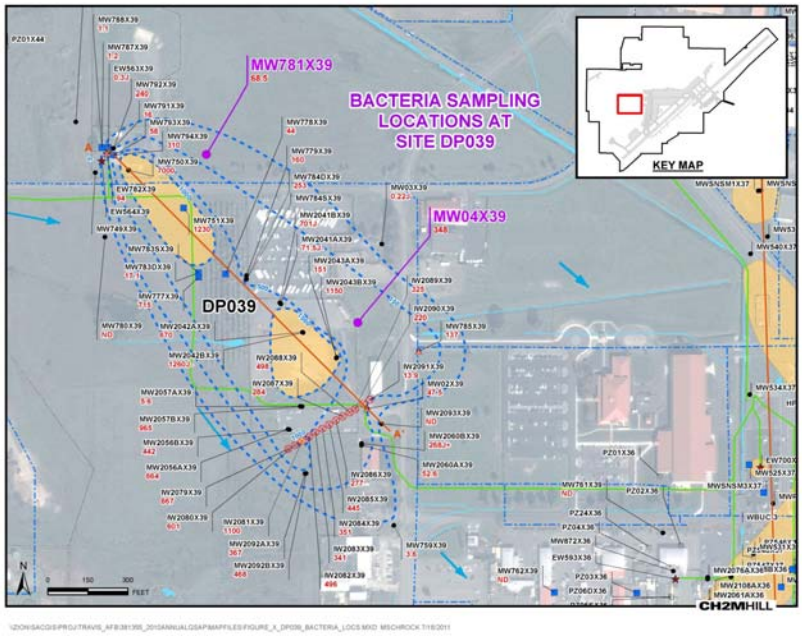
Site FT004

- Site FT004 was selected for sampling because:
  - Natural attenuation assessment site
  - Aerobic conditions are predominant
  - Extraction wells have been off since December 2007 (not contributing to oxygenation)
  - TPH (carbon source) is not present in groundwater
  - Minimal TCE daughter products (indication of anaerobic degradation)
- 5 Groundwater samples will be collected from Site FT004
  - 1 background sample (MW264x04)
  - 2 hotspot samples (MW131x04 and MW266x04)
  - 1 distal portion of the plume sample (MW591x04)
  - 1 field duplicate (MW266x04)



Site DP039

- Site DP039 was selected for sampling because:
  - Natural attenuation assessment site
  - Outside of EVO/bioreactor treatment zones, aerobic conditions are predominant
  - Minimal TCE daughter products (particularly in eastern portion of plume)
  - TPH is not present in groundwater
- 2 Groundwater samples will be collected from Site DP039
  - 2 samples along eastern edge of plume (MW781x39 and MW04x39)



Schedule

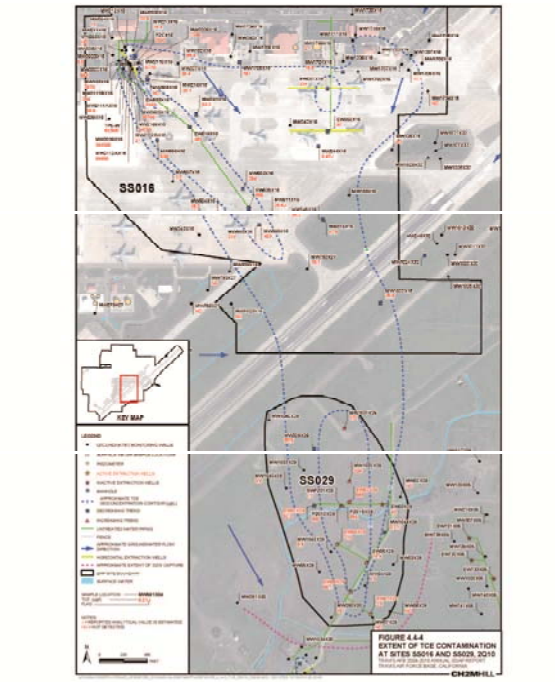
- Draft Work Plan: September 2011
- Sampling in October 2011
- Tech memo documenting results: December 2011

Remedial Process Optimization Investigation

SS016 and SS029 South Base Boundary
Groundwater Treatment Plant
Travis AFB, California

Overview

- Background
- Remedial Process Optimization Alternatives
- Information Requirements
- Investigation Report and Design Analysis
- Next Steps



Background

- Groundwater Plumes at SS016 and SS029
  - TCE and cis-1,2-DCE
  - Plumes Starting to Commingle
- South Base Boundary Groundwater Treatment Plant (SBBGWTP)
  - Pump and Treat (Granulated Activated Carbon)
  - Over 10 Years of Operation and Maintenance
- Remedial Process Optimization
  - Trihydro Corporation/CH2M Hill Team
  - Alternatives

Remedial Process Optimization Alternatives

- Continued Operation of Existing SBBGWTP
  - Baseline –Continue Current O&M
- Optimization of the SBBGWTP
  - Enhance Current System
  - Other Pump and Treat Technology
- Installation of Permeable Reactive Barrier (PRB)System
  - Consideration of Configurations and Treatment Media
- Combination of both options?
  - Optimize SBBGWTP and install PRB

Information Requirements

- Current Treatment System Operational Information
- Subsurface Conditions (SS029)
  - Geotechnical, physical, chemical, groundwater parameters, etc.
- Refinement of Base Groundwater Flow Model
- Bench-Scale Testing of Passive Treatment Options

Investigation Components

- Aquifer Testing – SS029
  - Up to 12 New Groundwater Wells
  - Use existing wells
  - Temporary System Shutdown
  - Groundwater Levels/Slug Tests
- Soil Borings – SS029
  - Leading Edge of Plume
  - Lithologic Logging
  - Physical and Chemical Testing
- Groundwater Sampling
  - New and Existing Wells

Investigation Report and Design Analysis

- Investigation Report
  - Subsurface Conditions
  - Refined Groundwater Flow Model Results
  - Summary of Operational System Evaluation
- Design Analysis
  - Evaluation of Alternatives
  - Conceptual Designs

Next Steps

- Temporary SS029 System Shutdown
  - Develop Initial Non-Pumping Gradient
  - Finalize Boring and Well Locations
- Work Plan
  - Field Sampling and Analysis Plan
  - Health and Safety Plan
  - Quality Assurance Project Plan Addendum