Final

Travis Air Force Base
Environmental Management
Building 570, Travis AFB, California
Environmental Restoration Program
Remedial Program Manager's
Meeting Minutes

28 January 2009, 0930 Hours

Mr. Mark Smith, Travis Air Force Base (AFB), conducted the Remedial Program Manager's (RPM) meeting on 28 January 2009 at 0930 in the Environmental Flight Conference Room, Building 570, Travis AFB, California. Attendees included:

• Mark Smith	Travis AFB
• Lonnie Duke	Travis AFB
• Glenn Anderson	Travis AFB
• Gregory Parrott	Travis AFB
• Mary Snow	TechLaw
• James Chang	U.S. Environmental Protection Agency (USEPA)
• Alan Friedman	California Regional Water Quality Control Board (CRWQCB)
• Jose Salcedo	Department of Toxic Substances Control (DTSC)
• Karen Scheuermann	U.S. Environmental Protection Agency (USEPA)
• Dezso Linbrunner	USACE, Omaha District
• Mike Wray	CH2M Hill
• Chuck Elliott	CH2M Hill
• Loren Krook	CH2M Hill
• Rachel Hess	Innovative Technical Solutions, Inc. (ITSI)
• Erica Becvar	Air Force Center for Engineering and the Environment (AFCEE) (via teleconference)

Handouts distributed at the meeting and presentations included:

• Attachment 1	Meeting Agenda
• Attachment 2	Master Meeting, Teleconference, and Document Schedules
• Attachment 3	SBBGWTP Monthly Data Sheet (December 2008)
• Attachment 4	CGWTP Monthly Data Sheet (December 2008)
• Attachment 5	NGWTP Monthly Data Sheet (December 2008)
• Attachment 6	Romic Remediation Presentation, USEPA
• Attachment 7	2008-2009 Plan and Schedule
• Attachment 8	ST027B Gore-Sorber Results
• Attachment 9	ST032 Tech Memo
• Attachment 10	SS030 RPO Work Plan

1. PRESENTATIONS AND DISCUSSIONS

A. Ms Becvar of AFCEE joined the meeting by teleconference

B. Romic Remediation

Ms. Scheuermann of USEPA gave a presentation of a green remediation study at the Romic Environmental Technologies facility. This is a pilot study looking at maximizing the net environmental benefit of various cleanup actions, including green technologies. Slides were presented (see Attachment 6) explaining the process of the pilot study and parameters involved, which was to compare the environmental effects of several alternative remedies at the Romic site.

Ms. Becvar questioned if the manufacture of equipment (i.e., trucks for transport) used for remediation was taken into account. Ms. Scheuermann stated not at this time, but may be included in the future. In the study, only fresh water usage was looked at; water used for pump and treat applications is considered brackish and so was not included. Ms. Becvar pointed out that this is a good point to bring out: the intended use of the water, its value and the value of the land (possibly industrial to residential).

At Romic, Alternative 3, (which is Bioremediation) was chosen as the selected remedy. The system is not in place but construction is starting. Future pilot studies, would benefit more from a system already in place. However, Ms. Scheuermann pointed out that this type of study is also helpful in assisting in remedy selection. Mr. Krook asked how this information fits into CERCLA decision making process where there are nine criteria to selecting a remedy and sustainability is not one of them. Ms. Scheuermann answered that RCRA has more leeway for factoring in this information for decision making (the Romic study is at a RCRA site). Mr. Chang added that green remediation does not trump the existing decision making criteria, and Ms. Becvar agreed, stating that this conversation does come up at meetings but no one offers suggestions to tackle the subject. Ms. Scheuermann also added that RCRA does not address green remediation directly, but it has been worked in as a balancing factor, as described in slide 21 of the presentation.

CO2 emissions still need to be factored in for this pilot study and electricity production needs to be included. Ms. Becvar asked about other parameters for air; however, those numbers have not been completed at this time.

The thought process for the selection of a remedy was shown, with a comparison of the alternatives, including resources used and wastes generated. Just looking at numbers in an alternative comparison table is not that helpful; decision-makers have to balance local and global effects. Ms. Becvar agreed, stating that a stakeholder forum can weigh in different concerns and is always come down to balance.

The table presented is a qualitative decision-making tool. It gets the user to look for ways to refine information so that it can be put to good practical use. Other areas to consider is to reduce impact on water usage, optimize existing systems and reduce diesel emissions with low sulfur fuel. This pilot study did not take into account the potential risks associated with ground transportation.

There are five additional pilot studies planned for this year. Ms. Scheuermann would like to refine the process and methodology in these pilots. Ms. Becvar asked if she was working directly with anyone from ITRC. Ms. Scheuermann answered that her group has coordinated with many teams, but not directly with ITRC.

Mr. Smith commented that it is important to look at energy consumed when deciding on an environmental cleanup remedy and the processes involved. Mr. Friedman added that this presentation represents a shift in thinking. Usual business is to look at the bottom line instead of all that is involved. Mr. Wray stated that this is a good guide in making decisions; of course protection of human health and environment is the most important factor but using this information can balance the decision.

Ms. Becvar was curious as to how long this study took to get to this stage. An intern gathered information over the summer, approximately eight weeks, and it has taken about four months to put that information in this presentation. Ms. Scheuermann anticipates that the next study should be quicker.

Mr. Smith mentioned that TAFB will offer candidate sites for Ms Scheuermann's consideration.

2. ADMINISTRATIVE

A. Previous Meeting Minutes

The 3 December 2008 RPM meeting minutes were approved and finalized with no changes.

B. Action Item Review

None.

C. Meeting Dates and Master Document Schedule Review

The Travis AFB Master Meeting, Teleconference, and Document Schedules were discussed during this meeting (see Attachment 2).

Travis AFB Annual Meeting and Teleconference Schedule

— The next RPM meeting will be 25 February at Travis.

- Basewide GW ROD: Two dates are presented in the schedule – Proposed Plan and ROD. To meet the official Air Force goal of September 2010, the proposed plan will need to be finalized before the ROD. The structure of the schedule is based on the RAB meetings. These should be considered soft dates.
- Portrero Hills Annex ROD: No change.
- HSP Update: No comments from agencies.
- QAPP Update: Draft to agencies, chemists will review.
- Comprehensive Site Evaluation Phase II Work Plan: This is similar to a site inspection work plan. This is a follow-up of the munitions response effort that identified potential Military Response Areas of Concern (MRA). The CSE Phase II Report will identify sites and make recommendations for investigative field work.
- LF008 Rebound Study WP: Final has been sent electronically.
- Action Plan: Mr. Anderson handed out copies of plan to agencies. Electronic copy will be sent to DTSC. Cover letter and distribution list for this plan will be sent separately. Action Plan is a blueprint for the transition from interim groundwater remedies to remedy selection to remedy implementation. It takes into account existing technologies and green considerations. It does not take the place of any work plans, nor is it a detailed report. It is a big step towards getting agency acceptance of remedies. Mr. Wray pointed out that this document was presented at the December RPM meeting.
- Site ST027 Plume Delineation Work Plan: Document is out for agency review. Response from EPA is expected next month. Presentation given today on Gore-Sorber results.
- Bioreactor Work Plan: Plan is final. The bioreactor was turned on. Rebound has occurred as shown by downgradient TCE results. Local Oxidation-Reduction Potential (ORP) conditions have dropped since the last rain event, which means the bioreactor is working.
- LF007C Groundwater Work Plan: Undergoing agency review.
- Phases 1 & 2 Vapor Intrusion Report: Undergoing agency review. All results from work last summer and EPA's results, and the plan for work this summer are included. TAFB requested to be notified if an agency review resulted in no comments. Mr. Chang asked if any samples were taken in hangars, as some have offices inside. Some hangars do have offices, but they are located mainly on a second floor level. At the moment, focus has been on smaller business buildings that may be above plumes or affected by one.

— SS016 IRA Work Plan: Pointed out that site is on the flight line; so coordination will be needed to get out in the field.

— Site ST032 Tech Memo: Site is in the middle of the airfield. Presentation given today on progress.

— Site SS030 Work Plan: Southeast area and off base. Presentation given today on progress.

— 2008 Annual RPO Report: Optimize groundwater treatment processes.

— Field Sampling Plan Addendum: Foundation for this addendum is the WABOU FSP from 1990's. Upgrades include latest methods and sampling procedures. Mr. Krook added that for brevity of upcoming work plans, a Basewide FSP is needed for reference.

— SS014 Tier 1 POCO Evaluation Work Plan: No update.

— Natural Attenuation Assessment Report (NAAR): Includes lots of data collected over the years. Presented as a summary. Considered a first step to obtain regulatory acceptance of monitored natural attenuation (MNA). Mr. Chang asked if it is more than a data dump. Mr. Elliott answered yes, the report includes evaluation of the data, which was collected at approximately nine sites all together.

— Quarterly Newsletter (Guardian): This edition does not support a RAB. However, it is eight pages long! The main topic was the bioreactor, how it works and its benefits. Mr. Anderson appreciated the viewpoints from Mr. Cooper and the AFCEE Subject Matter Expert. Ms. Scheuermann mentioned it was helpful and a good read. Mr. Smith praised the efforts of the ERP staff in developing this issue of the Guardian.

— 2007/2008 GSAP Annual Report: TAFB looking forward to comments from the agencies.

Mr. Duke has put together a comment tracking spreadsheet to aid in the progress of various documents.

3. CURRENT PROJECTS

A. Treatment Plant Operation and Maintenance Update

Mr. Duke reported on the water treatment plant status.

South Base Boundary Groundwater Treatment Plant

The South Base Boundary Groundwater Treatment Plant (SBBGWTP) performed at 97.2% uptime, and 3.5 million gallons of groundwater were extracted and treated during the month of December 2008. All of the treated water was discharged to Union Creek. The average flow rate for the SBBGWTP was 82.5 gallons per minute (gpm) and electrical power usage was 17,400 kWh; 23,838 pounds of CO2 was

created (based on DOE calculation). Approximately 2.0 pounds of volatile organic compounds (VOCs) was removed during December. The total mass of VOCs removed since the startup of the system is 355 pounds (see Attachment 3).

One shutdown occurred on 22 December due to computer (PLC) issues. The system was restarted on 23 December without any issues. In addition, the Supervisory Control and Data Acquisition (SCADA) system was having computer communication problems; these issues are currently being investigated.

No optimization activities were planned or performed during December.

Central Groundwater Treatment Plant

The Central Groundwater Treatment Plant (CGWTP) performed at 97.7% uptime with approximately 3.0 million gallons of groundwater extracted and treated during the month of December 2008. All treated water was diverted to the storm drain. The average flow rate for the CGWTP was 71.5 gpm and electrical power usage was 35,521 kWh for all plants; 48,664 pounds of CO2 was created. Natural gas usage for the ThOx was 2,518 therms. Approximately 10.7 pounds of VOCs were removed from groundwater, and 5.2 pounds from vapor, during December. The total mass of VOCs removed since the startup of the system is 11,001 pounds. (see Attachment 4).

There were two shutdowns connected with the CGWTP in December, both due to a UV/Ox lamp high current alarm. Two shutdowns of the Therm/Ox occurred for sampling. High results for the mid-treatment sampling at the WTTP may be due to a labeling error and is being investigated.

No optimization activities were conducted in December 2008.

North Groundwater Treatment Plant

The North Groundwater Treatment Plant (NGWTP) performed at 96.3% uptime with approximately 270,000 gallons of groundwater extracted and treated during the month of December 2008. All treated water was discharged to the duck pond. The average flow for the NGWTP was 6.6 gpm and electrical power usage was 12,296 kWh; 16,846 pounds of CO2 was created. Approximately 2.5 ounces of VOCs were removed during December. The total mass of VOCs removed since the startup of the system is 5,414.2 pounds (see Attachment 5).

One shutdown occurred on 9 December due to an air stripper high level alarm. Due to a lack of rain, the wetland area where the LF007 extraction wells are located has not yet filled with water, thus wells have not been turned off. Travis AFB will inspect after every rain event to determine if the wetland area has any standing water.

No optimization activities were planned or performed during December.

B. LF008 Rebound Tech Memo

Mr. Duke reported on the rebound study at LF008. The system is off now.

C. CAMU Maintenance

Mr. Duke reported on the CAMU maintenance. The re-compacted area looks better and there doesn't appear to be any more settling. Vegetation regrowth is occurring.

D. Bioreactor Status

Mr. Anderson covered the update on the work done at the bioreactor in the above discussion (2C). The bioreactor was turned on yesterday; a field technician will be monitoring and optimizing the system. It was reading a low flow, which may be a result of the extraction well running out of water or it was low on power. A high flow is not needed for this system.

E. Vapor Intrusion Assessment Status

Mr. Anderson gave an update on the VI Assessment status. The document is on schedule. The paperwork needs to catch up before the upcoming field work starts!

F. Annual Land Use Control Report

Mr. Anderson reported on the Land Use Control (LUC) report. The input from EPA from the last report has been taken into consideration. Information from the Five Year Review has also been included, as well as a discussion on groundwater issues.

G. LF044 Land Use Change

Mr. Anderson presented notification on a probable land use change for LF044. This site is located just south of the hospital. The LUC is for ecological risk from construction debris, and have used base training activities to keep critters away. Base would like to build new aboveground storage tank and proposed to place them on LF044. Mr. Parrott emphasized that this is still a proposed site; other locations have been looked at also. An environmental assessment is needed for final decision to be made. Debris would be removed when construction begins. No feedback is expected from the agencies; this is a notification so any LUC concerns may be addressed. The LUC itself may not change, as there will still be institutional controls.

H. Munitions Response Work Plan

Mr. Anderson covered the update on this plan in the above discussion (2C).

4. PRESENTATIONS

A. 2008-2009 Plan/Schedule

Mr. Wray gave a presentation on the overall view of upcoming activities. This covered only 2008-2009; there will be more for 2010! See Attachment 7 for details.

Mr. Smith commented that is good to see the program finally reach this stage. Mr. Duke added that the funding is in place for the sediment sites also.

Mr. Chang expressed concern about the number of upcoming plans on the schedule. Mr. Anderson acknowledged this concern, and emphasized the need to keep on target with the schedule. TAFB is attempting to spread out the reviews so agencies are not hit all at once, but keeping a steady pace through the wet season in anticipation of being in the field when it is dry.

Mr. Elliott added that the Basewide QAPP, HSP and FSP will allow future work plans to be shorter, twenty pages or less, in keeping with a triad approach. In addition, these presentations map out the process of each plan. Mr. Smith commented that this was a concern from the beginning and attempts have been made to streamline the process.

B. ST027B Gore-Sorber Results

Mr. Elliott presented the results from the Gore-Sorber survey (see Attachment 8). Phase one results were presented. Gore-Sorbers were analyzed for trichloroethene (TCE), cis-1,2-dichloroethene (cis-12DCE) and vinyl chloride (VC). Vinyl chloride was not detected. Based on results, the conceptual model will be updated. Next phase of work will require coordination with TAFB, because this site is along the flight line. Ms. Hess suggested taking more samples in that area since so much is involved to get there. Mr. Duke mentioned getting an extended waiver from the base.

Mr. Elliott confirmed that there is consensus for the next phase at ST027B. The process for obtaining waivers will be started. He acknowledged that the Gore-Sorber survey helped pinpoint the hotspots for this site.

C. ST032 Tech Memo

Mr. Elliott presented the ST032 tech memo which described the moving of the site from CERCLA to POCO (see Attachment 9). History of the site and reasons for the change were addressed in the slides. The document will be ready in February as discussed in 2C. Analytical results for fuels only; chlorinated hydrocarbons have not been seen in a long time. The tech memo will draw conclusions and document decision made for this site.

D. SS030 RPO Work Plan

Mr. Krook presented the work plan for SS030 RPO (see Attachment 10). The plume is offbase on private property. The current easement may not cover all of the lateral extent of the plume; which still needs to be defined. TCE has decreased in all areas except the east. The plan is to install wells and piezometers to fill in data gaps; a decision to increase the easement will be made based on these results.

5. NEW ACTION ITEM REVIEW

None.

6. PROGRAM/ISSUES/UPDATE

A. Upcoming Document Review Periods (RAB and Agencies)

Mr. Duke put together a spreadsheet with the documents in review as addressed in 2C above.

5. Action Items

ITEM	RESPONSIBLE	ACTION ITEM	DUE DATE	STATUS
1.	Air Force	Update document schedule to include dates for GW ROD	Jan 2009	**Open**
2.	Air Force	Update document schedule to include dates for Work Plan for Sediment Sites	Jan 2009	**Open**
3.	Air Force	Update document schedule to include dates for interim plans for FT005	Jan 2009	**Open**
4.	Air Force	Update document schedule to include dates for Vapor Intrusion Assessment	Jan 2009	**Open**
5.	Air Force	Coordinate site visit of sediment excavations with RAB members	TBD	**Open**

TRAVIS AIR FORCE BASE
ENVIRONMENTAL RESTORATION PROGRAM
REMEDIAL PROGRAM MANAGER'S MEETING
28 Jan 2009, 9:30 A.M.
AGENDA

1. PRESENTATIONS AND DISCUSSIONS

   A. DIAL IN MS BECVAR OF AFCEE 210-930-9202
   B. ROMIC REMEDIATION (MS Scheuermann US EPA)

2. ADMINISTRATIVE

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

3. CURRENT PROJECTS

   A. TREATMENT PLANT OPERATION AND MAINTENANCE UPDATE (LONNIE)
   B. LF008 REBOUND TECH MEMO (LONNIE)
   C. CAMU MAINTENANCE (LONNIE)
   D BIOREACTOR STATUS (GLENN)
   E. VAPOR INTRUSION ASSESSMENT STATUS (GLENN)
   F. ANNUAL LAND USE CONTROL REPORT (GLENN)
   G. LF044 LAND USE CHANGE (GLENN)
   H. MUNITIONS RESPONSE WORK PLAN (GLENN)

4. PRESENTATIONS

   A. 2008-2009 PLAN /SCHEDULE
   B. ST027B GORE-SORBER RESULTS
   C. ST032 TECH MEMO
   D. SS030 RPO WORK PLAN

5. NEW ACTION ITEM REVIEW

6. PROGRAM/ISSUES/UPDATE

   A. UPCOMING DOCUMENT REVIEW PERIODS (RAB AND AGENCIES)

Document Title	Date Submitted for Review	Date Comments Due	Date Comments/Concurrence Received		
			EPA	DTSC	Water Board
LF008 Tech Memo	13-Nov-08	17-Dec-08	03 Dec 08 R	03 Dec 08 R	05 Dec 08 E
Annual GSAP Report	1-Dec-08	2-Feb-09	21-Jan-09		
ST027 Work Plan	10-Dec-08	16-Jan-09			20 Jan 09 E
Health & Safety Plan	10-Dec-08	10-Feb-09	31 Dec 08 E	20 Jan 09 T	23 Dec 08 E
LF007C Work Plan	10-Dec-08	10-Feb-09			16 Dec 09 E
Qrtly Newsletter	15-Dec-08	6-Jan-09	14 Jan 09 E	21 Jan 09 T	
Vapor Intrusion Rpt	12-Jan-09	17-Feb-09			
Action Plan	28-Jan-09	4-Mar-09			
QAPP Update	30-Jan-09	3-Apr-09			
SS030 Work Plan	11-Feb-09	11-Mar-09			
SS016 Work Plan	13-Feb-09	16-Mar-09			
ST032 Tech Memo	20-Feb-09	23-Mar-09			
MMRP CSE Phase II	5-Mar-09	9-Apr-09			
Field Sampling Plan	20-Mar-09	17-Apr-09			
Annual RPO Report	20-Mar-09	20-Apr-09			
SS014 Tier 1 POCO	27-Mar-09	27-Apr-09			
NAAR	10-Apr-09	11-May-09			

E=E-mail
R=RPM Meeting
L=Letter
T=Telephone

Travis AFB Master Document Schedule

Annual Meeting and Teleconference Schedule

Suppliers Teleconference (8:30 a.m. - 10:00 a.m.)	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.)
1-27-09	1-28-09	TBD	—
2-24-09	2-25-09		—
3-24-09	3-25-09		—
4-21-09	4-22-09		4-23-09
5-19-09	5-20-09		—
6-16-09	6-17-09		—
7-21-09	7-22-09		—
8-25-09	8-26-09		—
9-22-09	9-23-09		—
10-20-09	10-21-09		10-22-09
—	—	11-16-09	—
12-08-09	12-09-09		—

Travis AFB Master Document Schedule

PRIMARY DOCUMENTS						
	Basewide Groundwater **Travis, Glenn Anderson**		**Potrero Hills Annex** **Travis, Glenn Anderson**	**HSP Update** **Travis, Glenn Anderson** **CH2M Hill, Stephanie DeWitt**	**QAPP Update** **Travis, Glenn Anderson** **CH2M Hill, Mark Fesler**	**Comprehensive Site Evaluation Phase II** **Travis, Glenn Anderson** **Sky Research, John Maus**
Life Cycle	**Proposed Plan**	**ROD**	**ROD**	**Plan**	**Plan**	**Work Plan**
Scoping Meeting	**NA**	**1-24-07**	**180 days after Water Board Order Rescinded**	**NA**	**NA**	**NA**
Predraft to AF/Service Center	12-04-09	03-26-10	+ 360 days	11-12-08	12-18-08	01-15-09
AF/Service Center Comments Due	12-28-10	04-28-10	+ 420 days	11-26-08	01-09-09	02-12-09
Draft to Agencies	01-08-10	05-28-10	+ 480 days	12-22-08	01-30-09	03-05-09
Draft to RAB	01-08-10	05-28-10	+ 480 days	12-22-08	01-30-09	03-05-09
Agency Comments Due	02-17-10	07-30-10	+ 540 days	02-23-09	04-03-09	04-09-09
Response to Comments Meeting	**02-24-10**	**08-13-10**	**+ 555 days**	**02-25-09**	**04-22-09**	**04-22-09**
Agency Concurrence with Remedy	03-08-10	NA	+ 570 days	NA	NA	NA
Public Comment Period	04-14-10/05-14-10	NA	+ 615 to 645 days	NA	NA	NA
Public Meeting	**04-22-10**	**NA**	**+ 625 days**	**NA**	**NA**	**NA**
Response to Comments Due	03-08-10	08-30-10	+ 640 days	03-10-09	05-20-09	04-29-09
Draft Final Due	03-08-10	08-30-10	+ 640 days	NA	NA	04-29-09
Final Due	04-07-10	09-30-10	+ 700 days	03-10-09	05-20-09	05-29-09

SECONDARY DOCUMENTS					
Life Cycle	**LF008 Rebound Study Work Plan** **Travis, Lonnie Duke;** **CH2M Hill, Doug Berwick**	**Action Plan** **Travis, Glenn Anderson** **CH2M HILL, Chuck Elliott**	**Site ST027 Plume Delineation Work Plan** **Travis, Lonnie Duke** **CH2M HILL, Gavin Heinrich**	**Bioreactor Work Plan** **Travis, Glenn Anderson** **CH2M Hill, Travis Young**	**LF007C Groundwater Work Plan** **Travis, Glenn Anderson** **CH2M Hill, Loren Krook**
Scoping Meeting	**NA**	**NA**	**NA**	**NA**	**NA**
Predraft to AF/Service Center	10-24-08	11-21-08	11-21-08	10-21-08	11-28-08
AF/Service Center Comments Due	10-31-08	01-09-09	11-28-08	10-28-08	12-05-08
Draft to Agencies	11-13-08	01-28-09	12-10-08	10-21-08	12-10-08
Draft to RAB	11-13-08	01-28-09	12-10-08	10-21-08	12-10-08
Agency Comments Due	12-17-08	03-26-09	1-16-09	10-28-08	2-10-09
Response to Comments Meeting	**1-06-09**	**04-09-09**	**1-28-09**	**NA**	**2-25-09**
Response to Comments Due	1-20-09	04-30-09	2-05-09	11-18-08	3-10-09
Draft Final Due	NA	NA	NA	NA	NA
Final Due	1-20-09	04-30-09	2-05-09	1-30-09	3-10-09
Public Comment Period	NA	NA	NA	NA	NA
Public Meeting	**NA**	**NA**	**NA**	**NA**	**NA**

SECONDARY DOCUMENTS					
Life Cycle	**Phases 1 & 2 Vapor Intrusion Report Travis, Glenn Anderson CH2M Hill, Leslie Royer**	**SS016 IRA Work Plan Travis, Lonnie Duke CH2M Hill, Doug Berwick**	**Site ST032 Tech Memo Travis, Lonnie Duke CH2M Hill, Gavin Heinrich**	**Site SS030 Work Plan Travis, Lonnie Duke CH2M Hill, Loren Krook**	**2008 Annual RPO Report Travis, Lonnie Duke CH2M Hill, Daniel Chern**
Scoping Meeting	**NA**	**NA**	**NA**	**NA**	**NA**
Predraft to AF/Service Center	12-08-08	01-30-09	01-23-09	01-08-09	02-20-09
AF/Service Center Comments Due	12-15-08	02-06-09	02-06-09	01-15-09	03-06-09
Draft to Agencies	01-12-09	02-13-09	02-20-09	02-11-09	03-20-09
Draft to RAB	01-12-09	02-13-09	02-20-09	02-11-09	03-20-09
Agency Comments Due	02-17-09	03-16-09	03-23-09	03-11-09	04-20-09
Response to Comments Meeting	**02-25-09**	**03-25-09**	**03-25-09**	**03-25-09**	**04-22-09**
Response to Comments Due	03-25-09	03-27-09	04-03-09	04-08-09	05-06-09
Draft Final Due	NA	NA	NA	NA	NA
Final Due	03-25-09	03-27-09	04-03-09	04-08-09	05-06-09
Public Comment Period	NA	NA	NA	NA	NA
Public Meeting	**NA**	**NA**	**NA**	**NA**	**NA**

SECONDARY DOCUMENTS			
Life Cycle	**Field Sampling Plan Addendum Travis AFB, Glenn Anderson CH2M Hill, Loren Krook**	**SS014 Tier 1 POCO Evaluation Work Plan Travis AFB, Lonnie Duke CH2M Hill, Gavan Heinrich**	**Natural Attenuation Assessment Report Travis AFB, Glenn Anderson CH2M Hill, Leslie Royer**
Scoping Meeting	**NA**	**NA**	**NA**
Predraft to AF/Service Center	2-20-09	2-26-09	3-13-09
AF/Service Center Comments Due	3-6-09	3-5-09	3-27-09
Draft to Agencies	3-20-09	3-27-09	4-10-09
Draft to RAB	3-20-09	3-27-09	4-10-09
Agency Comments Due	4-17-09	4-27-09	5-11-09
Response to Comments Meeting	**4-22-09**	**5-4-09**	**5-18-09**
Response to Comments Due	5-8-09	5-11-09	5-25-09
Draft Final Due	NA	NA	NA
Final Due	5-8-09	5-11-09	5-25-09
Public Comment Period	NA	NA	NA
Public Meeting	**NA**	**NA**	**NA**

INFORMATIONAL DOCUMENTS		
Life Cycle	**Quarterly Newsletters (Jan 2009) Travis, Glenn Anderson**	**2007/2008 GSAP Annual Report Travis, Lonnie Duke CH2M HILL, Leslie Royer**
Scoping Meeting	**NA**	**NA**
Predraft to AF/Service Center	NA	10-22-08
AF/Service Center Comments Due	NA	11-05-08
Draft to Agencies	12-15-2008	12-01-08
Draft to RAB	NA	12-01-08
Agency Comments Due	01-06-2009	02-02-09
Response to Comments Meeting	**TBD**	**02-25-09**
Response to Comments Due	01-08-2009	03-16-09
Draft Final Due	NA	NA
Final Due	01-14-2009	03-16-09
Public Comment Period	NA	NA
Public Meeting	**NA**	**NA**

South Base Boundary Groundwater Treatment Plant
Monthly Data Sheet

Report Number: 101 **Reporting Period: 1 – 31 December 2008** **Date Submitted: 21 January 2009**

This data sheet includes the following: results for the operation of the South Base Boundary Groundwater Treatment Plant (SBBGWTP); a summary of flow rates for the individual extraction wells; a brief description of any shutdowns or significant events related to the system: and a summary of analytical results for selected samples collected.

Operations Summary – December 2008

Operating Time: **700 hours** Percent Uptime: 97.2**%**

Electrical Power Usage: 17,400 kWh

Gallons Treated: **3.5 million gallons** Gallons Treated Since July 1998: **635 million gallons**

Volume Discharged to Union Creek: **3.5 million gallons**

Volume Used for Dust Suppression: **0 gallons**

VOC Mass Removed: **2.0 pounds**[a] VOC Mass Removed Since July 1998: **355 pounds**

Rolling 12-Month Cost per Pound of Mass Removed: $3,480[b]

Monthly Cost per Pound of Mass Removed: $1,840[b]

[a] Calculated using December 2008 EPA Method SW8260B analytical results.
[b] Costs include operations and maintenance, reporting, analytical laboratory, project management, and utility costs related to operation of the system. High costs are due to low influent concentrations.

Flow Rates

Average Groundwater Total Flow Rate: 82.5 gpm[a]

Average Flow Rate (gpm)[b]							
FT005				**SS029**[c]		**SS030**	
EW01x05	4.9	EW736x05	3.3	EW01x29	0.0[f]	EW01x30	3.7
EW02x05	1.7	EW737x05	Off line[d]	EW02x29	10.3	EW02x30	2.3
EW03x05	4.3	EW742x05	Off line[d]	EW03x29	Off line[e]	EW03x30	Off line[e]
EW731x05	Off line[d]	EW743x05	Off line[d]	EW04x29	8.7	EW04x30	23.4
EW732x05	Off line[d]	EW744x05	Off line[d]	EW05x29	3.6	EW05x30	11.7
EW733x05	Off line[d]	EW745x05	Off line[d]	EW06x29	14.3	EW06x30	Off line[f]
EW734x05	Off line[f]	EW746x05	Off line[d]	EW07x29	Off line[f]	EW711x30	Off line[f]
EW735x05	3.6						
FT005 Total:	**17.8**			**SS029 Total:**	**36.9**	**SS030 Total:**	**41.1**

[a] The average groundwater flow rate was calculated using the Union Creek Discharge Totalizer and dividing it by the operating time of the plant.
[b] Average extraction well flow rates measured by each extraction well totalizer divided by the well's operating time.
[c] Extraction well flow rates are based on the average of the weekly readings.
[d] Extraction well was shutdown for a one-year rebound study in December 2007 based on the *Work Plan for RPO Actions at Sites SD031, FT004, and FT005* (CH2M HILL, 2007).
[e] Extraction well was off line due to low VOC concentrations.
[f] Extraction well was not operational during December 2008 due to malfunctioning equipment or recharging well.

gpm—gallons per minute

Shutdown/Restart Summary

Location	Shutdown		Restart		Cause
	Date	Time	Date	Time	
SBBGWTP (water)	22 December 2008	16:00	23 December 2008	12:00	PLC malfunctioned and froze. The system was restarted with any issues.

SBBGWTP = South Base Boundary Groundwater Treatment Plant

Summary of O&M Activities

Monthly groundwater sampling at the SBBGWTP was performed on 2 December 2008. Sample results are presented in Table 1. The total VOC concentration (70.8 µg/L) in the influent sample has decreased slightly since the November 2008 sample (80.9 µg/L). 1,2-Dichloroethane, the indicator chemical for Site FT005, was not detected in the influent sample. VOCs were not detected in the effluent sample.

The sequestering agent metering pump was leaking on 5 December 2008. The pump tubing was replaced, and the leaking stopped.

On 31 December 2008, EW04x30 was shut down due to a low flow rate (0.2 gpm). The previous flow rate was approximately 24 gpm. In addition, the SCADA system is not operating properly, and the system readings are not appearing in the data fields. These issues are currently being investigated.

Optimization Activities

On 4 December 2007, nine extraction wells (EW731x05, EW732x05, EW733x05, EW737x05, and EW742x05 through EW746x05) were shut down for rebound testing in accordance with the *Work Plan for Remedial Process Optimization (RPO) Actions at Sites SD031, FT004, and FT005* (CH2M HILL, 2007). These extraction wells remained off-line for one year. These wells were sampled in May and November 2008 as part of the GSAP events. The groundwater results will be assessed for rebound and plume stability.

No other optimization activities were conducted in December 2008.

Table 1
Summary of Groundwater Analytical Data for December 2008 – South Base Boundary Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	2 December 2008 (µg/L)	
				Influent	Effluent
Halogenated Volatile Organics					
Bromodichloromethane	5.0	0.17	0	ND	ND
Carbon Tetrachloride	0.5	0.18	0	ND	ND
Chloroform	5.0	0.17	0	ND	ND
Dibromochloromethane	5.0	0.17	0	ND	ND
1,1-Dichloroethane	5.0	0.24	0	ND	ND
1,2-Dichloroethane	0.5	0.22	0	ND	ND
1,1-Dichloroethene	5.0	0.24	0	ND	ND
cis-1,2-Dichloroethene	5.0	0.23	0	4.3	ND
trans-1,2-Dichloroethene	5.0	0.54	0	ND	ND
Methylene Chloride	5.0	0.61	0	ND	ND
Tetrachloroethene	5.0	0.20	0	ND	ND
1,1,1-Trichloroethane	5.0	0.16	0	ND	ND
1,1,2-Trichloroethane	5.0	0.20	0	ND	ND
Trichloroethene	5.0	0.20	0	66.5	ND
Vinyl Chloride	0.5	0.24	0	ND	ND
Non-Halogenated Volatile Organics					
Benzene	1.0	0.091	0	ND	ND
Ethylbenzene	5.0	0.15	0	ND	ND
Toluene	5.0	0.098	0	ND	ND
Xylenes	5.0	0.093 – 0.24	0	ND	ND
Other					
Total Petroleum Hydrocarbons – Gasoline	50	32	0	NM	ND
Total Petroleum Hydrocarbons – Diesel	50	84.2	0	NM	ND
Total Dissolved Solids (mg/L)	NE	10	0	1,140	NM
Total Suspended Solids (mg/L)	NE	2.5	0	ND	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

Central Groundwater Treatment Plant Monthly Data Sheet

Report Number: 113 **Reporting Period: 1 – 31 December 2008** **Date Submitted: 21 January 2009**

This data sheet includes the following: results for the operation of the Central Groundwater Treatment Plant (CGWTP), West Treatment and Transfer Plant (WTTP), and thermal oxidation (ThOx) system (previously referred to as the two-phase extraction [TPE] system). A summary of flow rates for the CGWTP, WTTP, ThOx, and extraction wells EW01x16, EW02x16, EW03x16, EW605x16, and EW610x16; a brief description of any shutdowns or significant events related to the systems, and a summary of analytical results for selected samples collected are also included on this data sheet.

Operations Summary – December 2008

Operating Time:		Percent Uptime:		Electrical Power Usage:	
CGWTP:	703.5 hours	**CGWTP:**	97.7%	**CGWTP:**	7,560 kWh
WTTP:	Water: 669.1 hours	**WTTP:**	Water: 92.9%	**WTTP:**	19.499 kWh
	Vapor: 667.2 hours		Vapor: 92.7%		
ThOx:	644 hours	**ThOx:**	89.4%	**ThOx:**	8,462 kWh

ThOx: Natural Gas Usage: 2,518 therms

Gallons Treated: **3.0 million gallons**

Gallons Treated Since January 1996: **400 million gallons**

VOC Mass Removed:

10.7 lbs (groundwater only)[a]

5.2 lbs (vapor only)[b]

VOC Mass Removed Since January 1996:

2,403 lbs from groundwater

8,598 lbs from vapor

UV/Ox DRE: 100%

ThOx DRE: 100%

Rolling 12-Month Cost per Pound of Mass Removed: $708[c]

Monthly Cost per Pound of Mass Removed: $539[c]

[a] Calculated using December 2008 EPA Method SW8260B analytical results.
[b] Total VOC vapor mass removed was calculated using December 2008 EPA Method TO-14 analytical results for the WTTP system and the ThOx system.
[c] Costs include operations and maintenance, reporting, analytical laboratory, project management, and electric and natural gas costs related to operation of the system.

DRE = destruction removal efficiency UV/Ox = ultraviolet oxidation

Flow Rates

Average Groundwater Flow Rate: **71.5 gpm**[a]

Location	Average Flow Rate	
	Groundwater (gpm)[b]	Soil Vapor (scfm)
EW01x16	22.8	NA
EW02x16	6.7	NA
EW03x16	0.30	NA[c]
EW605x16	13.6	NA[c]
EW610x16	NA[d]	NA[c]
WTTP	28.2[e]	196
ThOx	0.13[e]	56.3

[a] as measured by the effluent discharge to the storm drain divided by the operating time.
[b] as measured by extraction well totalizer divided by the operating time.
[c] soil vapor was extracted from this well; however, the flow rates are not measured.
[d] the extraction well pump was off-line in December 2008.
[e] as measured by the effluent groundwater pumped to the CGWTP divided by the operating time.

gpm = gallons per minute
NA = not applicable/not available
scfm = standard cubic feet per minute

Flow Rates

Flow Rate from the WIOU, DP039, and LF008 Extraction Wells on 31 December 2008 (gpm)							
SD037/ SD043				SD033/SD034/ DP039		LF008/SD036	
EW599x37	4.2	EW705x37	1.2	EW501x33	0.6	EW719x08	Off line[a]
EW700x37	4.4	EW706x37	0.7	EW503x33	1.7	EW720x08	Off line[a]
EW701x37	1.1	EW707x37	1.0	EW01x34	0.2	EW721x08	Off line[a]
EW702x37	2.6	EW510x37	4.2	EW03x34	1.0	EW593x36	2.6
EW703x37	1.2	EW511x37	1.7	EW563x39	Off line[a]	EW594x36	0.9
EW704x37	2.1	EW555x43	0.6	EW782x39	Off line[a]	EW595x36	0.2

gpm—gallons per minute

[a] Extraction wells were shut off to facilitate the Bioreactor Sustainability Study at Site DP039.

Shutdown/Restart Summary

Location	Shutdown		Restart		Cause
	Date	Time	Date	Time	
CGWTP (Groundwater):					
CGWTP	27 November 2008	09:15	1 December 2008	08:30	UV/Ox lamp #4 high current alarm
CGWTP	14 December 2008	16:45	15 December 2008	09:15	UV/Ox lamp #1 high current alarm
WTTP (Groundwater and Vapor):					
WTTP	27 November 2008	09:15	2 December 2008	12:00	CGWTP was shut down
WTTP	14 December 2008	16:45	15 December 2008	19:45	CGWTP was shut down
ThOx (Vapor):					
ThOx	27 November 2008	09:15	1 December 2008	09:15	CGWTP was shut down
ThOx	2 December 2008	16:00	5 December 2008	12:45	Collect groundwater sample from the TPE well.
ThOx	17 December 2008	11:00	17 December 2008	13:30	Collect groundwater sample from the TPE well.

CGWTP = Central Groundwater Treatment Plant
ThOx = Thermal Oxidation System
WTTP = West Treatment and Transfer Plant

Summary of O&M Activities

Monthly groundwater sampling at the CGWTP and quarterly groundwater sampling at the ThOx and WTTP were performed on 2 December 2008. Groundwater sample results are summarized in Table 1. In addition, quarterly vapor samples were collected at the ThOx unit, the WTTP SVE system, and the manifold at the WTTP SVE system on 2 December 2008. Vapor results are presented in Tables 2 through 4, respectively.

The total VOC concentration (426.2 µg/L) in the December 2008 CGWTP influent groundwater sample has increased since the November 2008 sampling (356.1 µg/L). Cis-1,2-dichloroethene and trichloroethene (TCE) were present in the treated water samples from the granular activated carbon (GAC) sample points. The detections in these samples may be attributed to desorption from the GAC. These VOCs were not detected in the system effluent. The groundwater total effluent VOC concentrations from the WTTP and ThOx are 128.5 µg/L and 290.9 µg/L, respectively. Both concentrations have decreased from previous quarterly results.

The ThOx system treats soil vapor from EW03x16, EW605x16, and the 2-Phase® well (TPE-W). Cis-1,2-DCE, PCE, TCE, and vinyl chloride were detected in the influent vapor sample; however, only TCE was detected at a concentration greater than 1,000 ppbv. This sample comprises soil vapor from EW03x16, EW605x16, and TPE-W. Previous samples contained soil vapor drawn only from TPE-W.

The WTTP SVE system continued to treat soil vapor from the WIOU; however, vapor extraction from Site DP039 has ceased in order to facilitate the Bioreactor Sustainability Study. The December 2008 influent VOC vapor concentration was approximately 74 ppbv. The mid-treatment sample exceeded the influent VOC vapor concentration at 315 ppbv. The labels for the influent and mid-treatment samples might have been swapped. To verify these concentrations, confirmation samples will be collected. From the manifolds at the WTTP SVE system, the highest VOC concentrations were reported in V-203 (WIOU East). However, the vapor VOC concentrations from each of manifolds were very low at less than 100 ppbv. The WTTP system also continues to extract groundwater and transfers it to the CGWTP for treatment.

The flow meters for three of the WIOU wells (EW501x33, EW705x37, and EW707x37) were replaced.

Optimization Activities

No optimization activities were conducted in December 2008.

Table 1
Summary of Groundwater Analytical Data for December 2008 – Central Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	2 December 2008 (µg/L) WTTP Effluent	TPE Effluent	Influent	After UV/OX	After Carbon 1 Effluent	After Carbon 2 Effluent	After Carbon 3 Effluent	System Effluent
Halogenated Volatile Organics											
Bromodichloromethane	5.0	0.17 – 0.85	0	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	0.5	0.18 – 0.90	0	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	5.0	0.17 – 0.70	0	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	5.0	0.17 – 0.85	0	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	5.0	0.22 – 1.1	0	ND	ND	ND	ND	ND	ND	ND	ND
1.3-Dichlorobenzene	5.0	0.08 – 0.41	0	ND	ND	0.94 J	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	5.0	0.10 – 0.50	0	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5.0	0.24 – 1.2	0	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.5	0.22 – 1.1	0	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	5.0	0.24 – 1.2	0	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.23 – 1.2	0	6.0	48.5	108	ND	0.39 J	0.60 J	0.72 J	ND
trans-1,2-Dichloroethene	5.0	0.54 – 2.7	0	1.0	1.0	ND	ND	ND	ND	ND	ND
Methylene Chloride	5.0	0.61 – 3.0	0	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5.0	0.20 – 1.0	0	0.46 J	0.44 J	1.3 J	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5.0	0.16 – 0.8	0	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	5.0	0.20 – 1.0	0	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5.0	0.20 – 1.0	0	121 J	241	317	ND	2.8	ND	ND	ND
Vinyl Chloride	0.5	0.24 – 1.2	0	ND	ND	ND	ND	ND	ND	ND	ND
Non-Halogenated Volatile Organics											
Benzene	1.0	0.09 – 0.46	0	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5.0	0.15 – 0.75	0	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5.0	0.10 – 0.49	0	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	5.0	0.09 – 1.2	0	ND	ND	ND	ND	ND	ND	ND	ND
Other											
Total Dissolved Solids (mg/L)	NE	10	0	NM	NM	NM	NM	NM	NM	808	NM
Total Suspended Solids (mg/L)	NE	2.5	0	NM	NM	NM	NM	NM	NM	ND	NM

[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
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
NS = not sampled
µg/l = micrograms per liter

TABLE 2
Soil Vapor Analytical Data for December 2008 – Central Groundwater Treatment Plant

Constituent	2 December 2008 (ppbv)	
	ThOx Influent[a]	ThOx Effluent
Volatile Organics		
Benzene	ND (4.3)	ND (0.22)
Carbon Tetrachloride	ND (3.0)	ND (0.15)
Chloroethane	ND (9.2)	ND (0.46)
Chloroform	ND (4.5)	ND (0.23)
Chloromethane	ND (7.3)	ND (0.36)
cis-1,2-Dichloroethene	970	ND (0.12)
1,2-Dichlorobenzene	ND (3.5)	ND (0.18)
1,3-Dichlorobenzene	ND (3.7)	ND (0.19)
1,4-Dichlorobenzene	ND (9.8)	ND (0.49)
1,2-Dichloroethane	ND (4.3)	ND (0.22)
1,1-Dichloroethene	ND (4.3)	ND (0.22)
Ethylbenzene	ND (2.2)	ND (0.11)
Freon 11	ND (4.7)	ND (0.24)
Freon 12	ND (5.5)	ND (0.27)
Methylene Chloride	ND (4.3)	0.46 J
Styrene	ND (3.1)	ND (0.16)
Tetrachloroethene	11	ND (0.13)
Toluene	ND (2.9)	0.53
1,1,1-Trichloroethane	ND (3.9)	ND (0.20)
1,1,2-Trichloroethane	ND (3.5)	ND (0.18)
1,2,4-Trimethylbenzene	ND (3.9)	ND (0.20)
1,3,5-Trimethylbenzene	ND (2.9)	ND (0.15)
Trichloroethene	6,100	ND (0.15)
Vinyl Chloride	20	ND (0.33)
Xylenes, m,p-	ND (9.6)	ND (0.48)
Xylene, o-	ND (4.7)	ND (0.24)

[a] ThOx influent sample consists of soil vapor from the TPE-well, EW03x16, and EW605x16.

J	=	analyte concentration is considered an estimated value
ND	=	not detected
NM	=	not measured
ppbv	=	parts per billion by volume
ThOx	=	thermal oxidation system
( )	=	detection limit

Table 3
Soil Vapor Analytical Data for December 2008 – West Transfer and Treatment Plant

Constituent	2 December 2008 (ppbv)		
	SVE Influent [a]	SVE Mid-Treatment [a]	SVE Effluent
Volatile Organics			
Benzene	0.40 J	ND (1.1)	ND (1.1)
Carbon Tetrachloride	ND (0.15)	ND (0.74)	ND (0.74)
Chloroethane	ND (0.46)	ND (2.3)	ND (2.3)
Chloroform	0.50	ND (1.1)	ND (1.1)
Chloromethane	0.41 J	ND (1.8)	ND (1.8)
cis-1,2-Dichloroethene	2.7	2.6	20
1,2-Dichlorobenzene	ND (0.18)	ND (0.88)	ND (0.88)
1,3-Dichlorobenzene	0.26 J	ND (0.93)	ND (0.93)
1,4-Dichlorobenzene	ND (0.50)	ND (2.5)	ND (2.5)
1,2-Dichloroethane	ND (0.22)	ND (1.1)	ND (1.1)
1,1-Dichloroethene	24	ND (1.1)	5.2
Ethylbenzene	0.37	ND (0.54)	ND (0.54)
Freon 11	1.1 J	ND (1.2)	ND (1.2)
Freon 12	0.55	ND (1.4)	ND (1.4)
Methylene Chloride	9.3	ND (1.1)	ND (1.1)
Styrene	1.2	ND (0.78)	ND (0.78)
Tetrachloroethene	0.39 J	ND (0.64)	ND (0.64)
Toluene	7.6	ND (0.74)	ND (0.74)
1,1,1-Trichloroethane	ND (0.20)	ND (0.98)	4.3
1,1,2-Trichloroethane	ND (0.18)	2.1	ND (0.88)
1,2,4-Trimethylbenzene	0.35 J	ND (0.98)	ND (0.98)
1,3,5-Trimethylbenzene	0.22 J	ND (0.74)	ND (0.74)
Trichloroethene	23	310	1.6 J
Vinyl Chloride	ND (0.33)	ND (1.7)	ND (1.7)
Xylenes, m,p-	1.2	ND (2.4)	ND (2.4)
Xylene, o-	0.32 J	ND (1.2)	ND (1.2)

[a] According to these results, the influent and mid-treatment samples may have been mixed up. Confirmation samples will be collected to confirm these results.

J = analyte concentration is considered an estimated value
ND = not detected
NM = not measured
ppbv = parts per billion by volume
SVE = soil vapor extraction
( ) = detection limit

Table 4
Soil Vapor Analytical Data for December 2008 – West Transfer and Treatment Plant

Constituent	2 December 2008 (ppbv)		
	WTTPV-202[a]	WTTPV-203[b]	WTTPV-204[c]
Volatile Organics			
Benzene	0.31 J	ND (0.22)	ND (0.22)
Carbon Tetrachloride	ND (0.15)	ND (0.15)	ND (0.15)
Chloroethane	ND (0.46)	ND (0.46)	ND (0.46)
Chloroform	0.41 J	0.29 J	1.1
Chloromethane	0.50	0.40 J	ND (0.36)
cis-1,2-Dichloroethene	2.1	4.6	2.8
1,2-Dichlorobenzene	ND (0.18)	ND (0.18)	ND (0.18)
1,3-Dichlorobenzene	ND (0.19)	ND (0.19)	ND (0.19)
1,4-Dichlorobenzene	ND (0.50)	ND (0.50)	ND (0.50)
1,2-Dichloroethane	ND (0.22)	ND (0.22)	ND (0.22)
1,1-Dichloroethene	ND (0.22)	ND (0.22)	ND (0.22)
Ethylbenzene	0.67	ND (0.11)	ND (0.11)
Freon 11	0.33 J	0.29 J	0.44 J
Freon 12	0.49	0.49	0.38 J
Methylene Chloride	1.6	ND (0.22)	0.44 J
Styrene	1.2	ND (0.16)	ND (0.16)
Tetrachloroethene	0.83	0.30 J	0.28 J
Toluene	27	ND (0.15)	ND (0.15)
1,1,1-Trichloroethane	ND (0.20)	ND (0.20)	ND (0.20)
1,1,2-Trichloroethane	ND (0.18)	ND (0.18)	ND (0.18)
1,2,4-Trimethylbenzene	0.66	ND (0.20)	ND (0.20)
1,3,5-Trimethylbenzene	ND (0.15)	ND (0.15)	ND (0.15)
Trichloroethene	23	17	91
Vinyl Chloride	ND (0.33)	ND (0.33)	ND (0.33)
Xylenes, m,p-	1.2	ND (0.48)	ND (0.48)
Xylene, o-	0.30 J	ND (0.24)	ND (0.24)

[a] The wells contributing soil vapor to manifold V-202 include: EW563x39 and EW782x39
[b] The wells contributing soil vapor to manifold V-203 include: EW593x36, EW594x36, EW595x36, EW510x37, and EW700x37
[c] The wells contributing soil vapor to manifold V-204 include: EW599x37, EW704x37, and EW707x37

J = analyte concentration is considered an estimated value
ND = not detected
NM = not measured
ppbv = parts per billion by volume
( ) = detection limit

North Groundwater Treatment Plant Monthly Data Sheet

Report Number: 103 **Reporting Period: 1 – 31 December 2008** **Date Submitted: 21 January 2009**

This data sheet includes the following: results for the operation of the groundwater extraction systems; a summary of flow rates for the individual extraction wells; a brief description of any shutdowns or significant events related to the systems: and a summary of analytical results for selected samples collected.

Operations Summary – December 2008

Operating Time: **Water:** 693 hours

Percent Uptime: **Water:** 96.3%

Electrical Power Usage: **12,296 kWh**

Gallons Treated: **0.27 million gallons**

Gallons Treated Since March 2000: **82.1 million gallons**

Volume Discharged to Duck Pond: **0.27 million gallons**

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

Percentage of Treated Water to Beneficial Use: **100%**

VOC Mass Removed:

0.16 lbs (groundwater only)[a]

VOC Mass Removed Since March 2000:

174.2 lbs from groundwater

Rolling 12-Month Cost per Pound of Mass Removed: $178,854[bc]

Monthly Cost per Pound of Mass Removed: $22,647[b]

[a] Calculated using December 2008 EPA Method SW8260B analytical results.
[b] Costs include operations and maintenance, reporting, analytical laboratory, project management, and utility costs related to operation of the system. High costs are due to low influent groundwater concentrations and low flow rates.
[c] The rolling 12-month cost per pound of mass removed is calculated by the sum of the monthly cost over the past 12 months divided by the sum of pounds removed during the same period.

Flow Rates

Average Groundwater Total Flow Rate: **6.6 gpm**[a]

Location	Groundwater Flow Rate on 31 December 2008 (gpm)
EW565x31	Off line[b]
EW566x31	Off line[b]
EW567x31	Off line[b]
EW576x04	2.3
EW577x04	2.0
EW578x04	Off line[b]
EW579x04	Off line[b]
EW580x04	Off line[b]
EW621x04	3.2
EW622x04	1.6
EW623x04	1.0
EW614x07	0.7[c]
EW615x07	0.9[c]

[a] The flow rate was calculated using the effluent discharge totalizer divided by the operating time of the plant.
[b] Extraction well was shutdown for a one-year rebound study in December 2007 based on the *Work Plan for RPO Actions at Sites SD031, FT004, and FT005* (CH2M HILL, 2007).
[c] LF007 extraction wells were turned on for the dry season on 30 April 2008.

gpm = gallons per minute

Shutdown/Restart Summary

Location	Shutdown		Restart		Cause
	Date	Time	Date	Time	
NGWTP (water)	9 December 2008	14:00	10 December 2008	15:15	Air stripper high level alarm.

NGWTP = North Groundwater Treatment Plant

Summary of O&M Activities

Monthly groundwater sampling at the NGWTP was performed on 2 December 2008. Sample results are presented in Table 1. The total VOC concentration (69.2 µg/L) in the influent sample has increased significantly since the November 2008 sample (19.0 µg/L). A similar trend was observed in November and December of 2007. Cis-1,2-dichloroethene, trichloroethene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene were detected in the influent sample. The SD031 extraction wells were shut down, and therefore, the indicator chemical for the site, 1,1-dichloroethene, was not detected. In addition, trans-1,3-dichloropropene was detected in the effluent sample.

Optimization Activities

On 4 December 2007, the six extraction wells (EW565x31, EW566x31, EW567x31, EW578x04, EW579x04, and EW580x04) were shut down for rebound testing. These extraction wells remained off-line for one year. These wells were sampled in May and November 2008 as part of the GSAP events. The groundwater results will be assessed for rebound and plume stability.

No other optimization activities were conducted in December 2008.

Table 1
Summary of Groundwater Analytical Data for December 2008 – North Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	2 December 2008 (µg/L)	
				Influent	Effluent
Halogenated Volatile Organics					
Bromodichloromethane	5.0	0.17	0	ND	ND
Bromoform	5.0	0.26	0	ND	ND
Carbon Tetrachloride	0.5	0.18	0	ND	ND
Chloroform	5.0	0.17	0	ND	ND
Dibromochloromethane	5.0	0.17	0	ND	ND
1,3-Dichlorobenzene	5.0	0.08	0	0.092 J	ND
1,4-Dichlorobenzene	5.0	0.10	0	0.14 J	ND
1,1-Dichloroethane	5.0	0.24	0	ND	ND
1,2-Dichloroethane	0.5	0.22	0	ND	ND
1,1-Dichloroethene	5.0	0.24	0	ND	ND
cis-1,2-Dichloroethene	5.0	0.23	0	0.9 J	ND
trans-1,2-Dichloroethene	5.0	0.54	0	ND	ND
trans-1,3-Dichloropropene	5.0	0.12	0	ND	0.57 J
Methylene Chloride	5.0	0.61	0	ND	ND
Tetrachloroethene	5.0	0.20	0	ND	ND
1,1,1-Trichloroethane	5.0	0.16	0	ND	ND
1,1,2-Trichloroethane	5.0	0.20	0	ND	ND
Trichloroethene	5.0	0.20	0	68.1	ND
Vinyl Chloride	0.5	0.24	0	ND	ND
Non-Halogenated Volatile Organics					
Benzene	1.0	0.091	0	ND	ND
Ethylbenzene	5.0	0.15	0	ND	ND
Toluene	5.0	0.098	0	ND	ND
Xylenes	5.0	0.093 – 0.24	0	ND	ND
Other					
Total Petroleum Hydrocarbons – Gasoline	50	32	0	NM	ND
Total Petroleum Hydrocarbons – Diesel	50	84.2	0	NM	ND
Total Dissolved Solids (mg/L)	NE	10	0	1,660	NM
Total Suspended Solids (mg/L)	NE	2.5	0	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
N/C = number of samples out of compliance with discharge limits
ND = not detected
NM = not measured
µg/L = micrograms per liter

Green Remediation

Estimating the Environmental Footprint at a Corrective Action Clean-up

Pilot Study at Romic East Palo Alto

Karen Scheuermann, US EPA Region 9
scheuermann.karen@epa.gov

28 January 2009

Green Remediation

In Theory:

Consider all environmental effects of remedy implementation and incorporate options to maximize the net environmental benefit of cleanup actions.

In Practice:

Case studies with greener remedies.

Tools, guides, and development of standards.

Pilot studies to estimate footprints.

Purpose of the Pilot Study

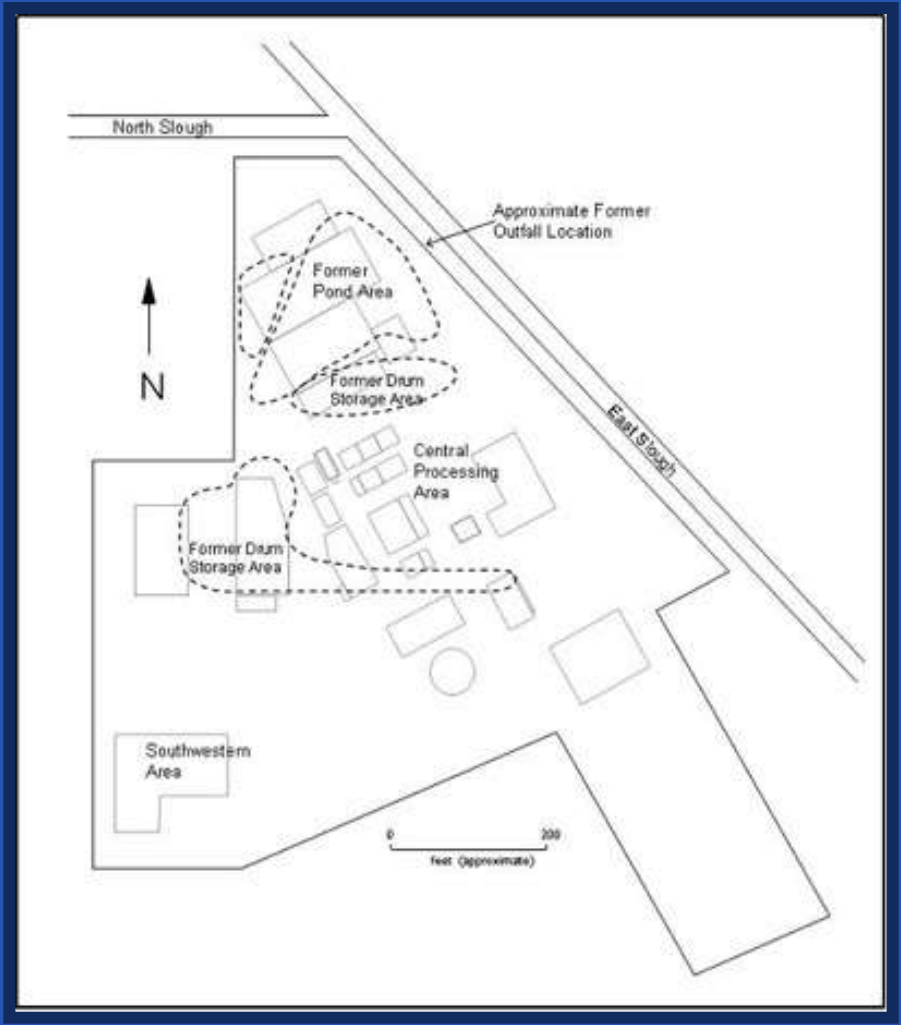
- Compare the environmental effects of the alternative remedies at a clean-up site
- Create a methodology for future calculations at other clean-up sites:
  - Deciding among alternative remedies
  - Improving existing remedies

Pilot study is still in progress and results at this stage are preliminary.

Pilot Site: Romic East Palo Alto

- 14 acre hazardous waste management facility
- Soil and ground water contaminants are VOCs (such as TCE and PCE)
- Area of contamination to a depth of 80 feet

Remedy Alternatives at Romic



Alternative 2 (Hybrid)

- Extraction wells *and* bioinjection wells
- 30 years to complete

Alternative 3 (Bioremediation)

- Bioinjection wells only
- 10 years to complete

Alternative 4 (Pump and Treat)

- Extraction wells only
- 40 years to complete

Alternative 3 has already been chosen for Romic, so this analysis did not affect the remedy decision.

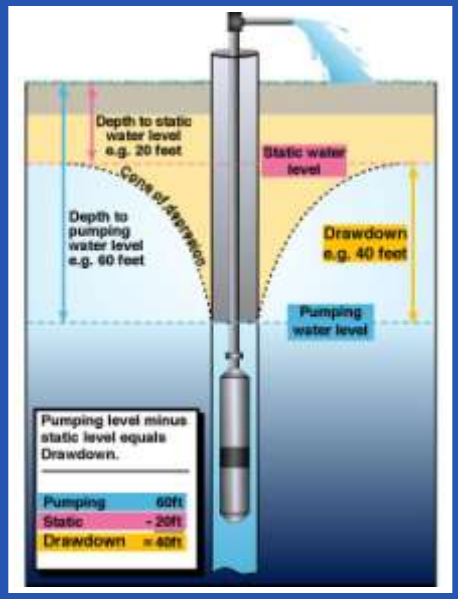
Remedy Alternatives at Romic

Bioremediation:

uses injections of cheese whey and molasses to the ground water

Pump and Treat:

includes treatment of ground water in an air stripper followed by carbon filters



Questions to Be Answered

- Is it possible to determine the environmental footprint of the alternative remedies?
- Did we select the "greenest" remedy?
- How important is it to take into account off-site manufacture of materials used on-site?

Boundaries of the Evaluation

System Boundary:

Ground water remediation.

Temporal Boundary:

Active life of each alternative remedy.

Geographic Boundary:

On-Site Activities (Level 1)

Transport To and From Site (Level 2)

Manufacture Off-Site (Level 3)

At Romic We Evaluated…

- *Resources and Energy Used*
  - Water
  - Construction Materials
  - Electricity
  - Fossil Fuel
- *Wastes Generated*
  - Spent Carbon
  - Wastewater
- *Air Emissions*
  - NO_X, SO_X, PM, CO_2



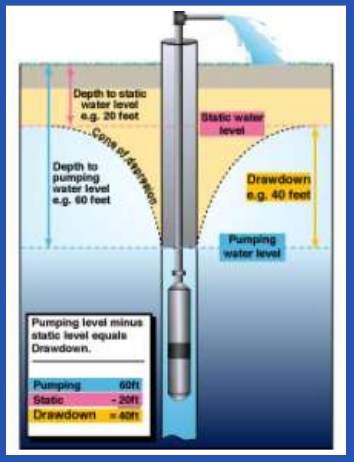




Level 1: On-Site Activities

Well Construction

Groundwater Extraction



BioInjections

Groundwater Treatment

Level 2: Transport To and From Site

Operators to Site

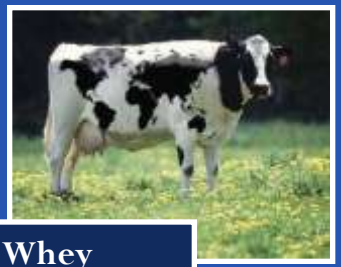
Wastes off Site

Materials to Site

Level 3: Off-Site Manufacture

PVC Pipe Manufacture

Gravel Mining



Cheese Whey Processing

Electricity Production

PVC Pipe Manufacture

Mine

Gravel to site

Level 2: Transport

Operators to Site

Operators to Site

Equipment Manufacture

PVC pipe to Site

Carbon to and from Site

Level 1: On Site

Well Construction

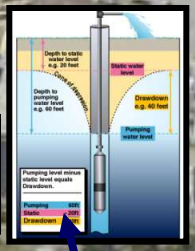
Groundwater Treatment

Drill Cuttings Off Site

Treated Water to Sewage

BioInjections

Groundwater Extraction

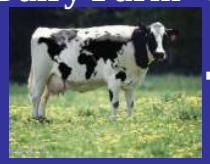


Operators and Equipment to Site

Electricity to Site

Cheese Whey to Site

Dairy Farm



Molasses to Site

Water to Site

Operators to Site

Power Plant

Molasses Manufacture

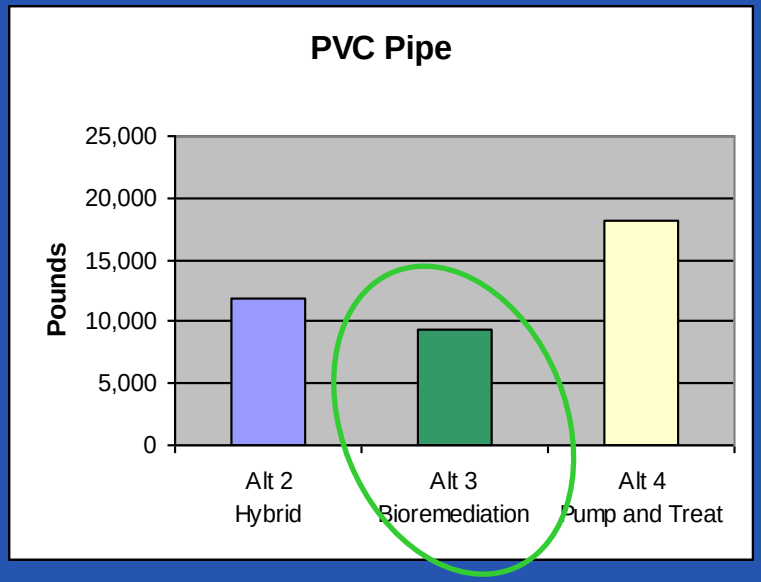
Level 3: Manufacture

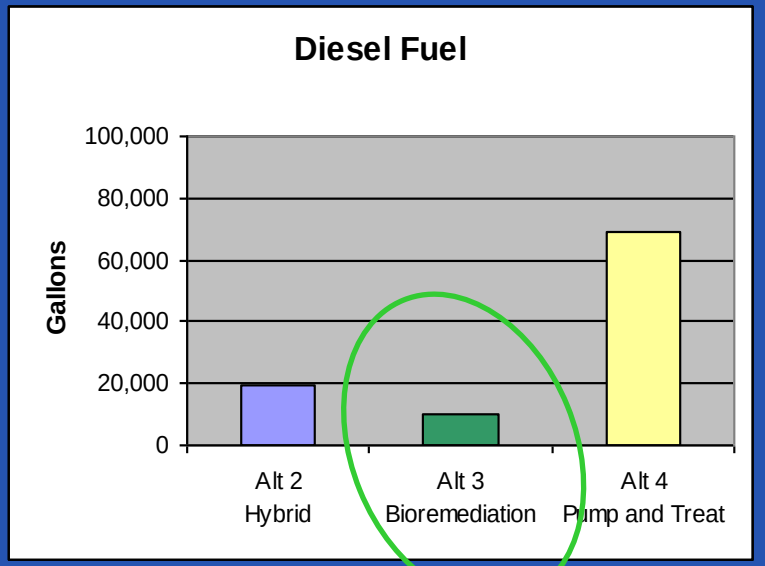
Sources of Information

1. EPA Project Managers
2. Official Documentation
3. Romic Staff and Consultants
4. Analyst Assumptions
5. Web Searches
6. Back-of the Envelope Estimates

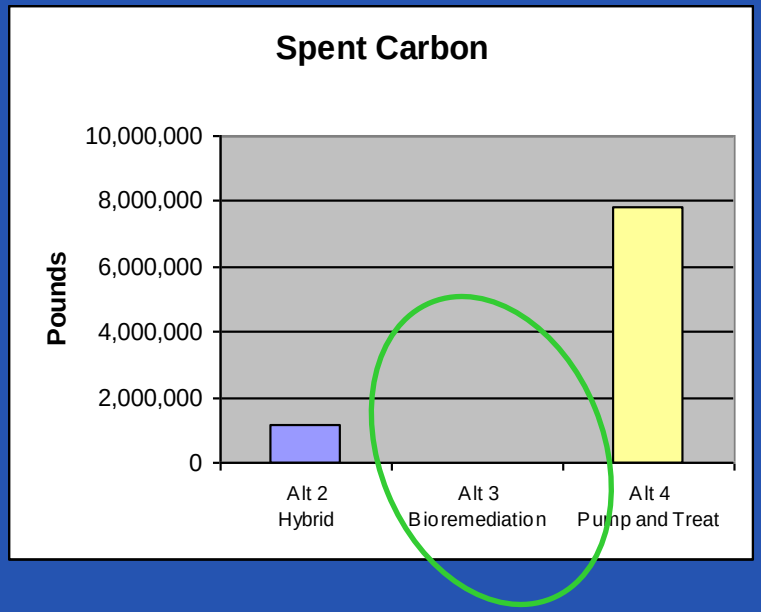

Results!

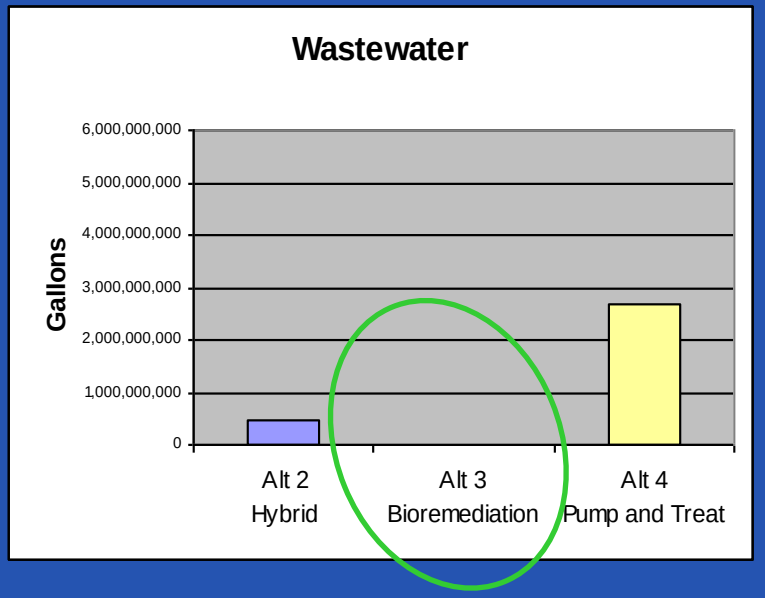
Results – Materials and Fuel



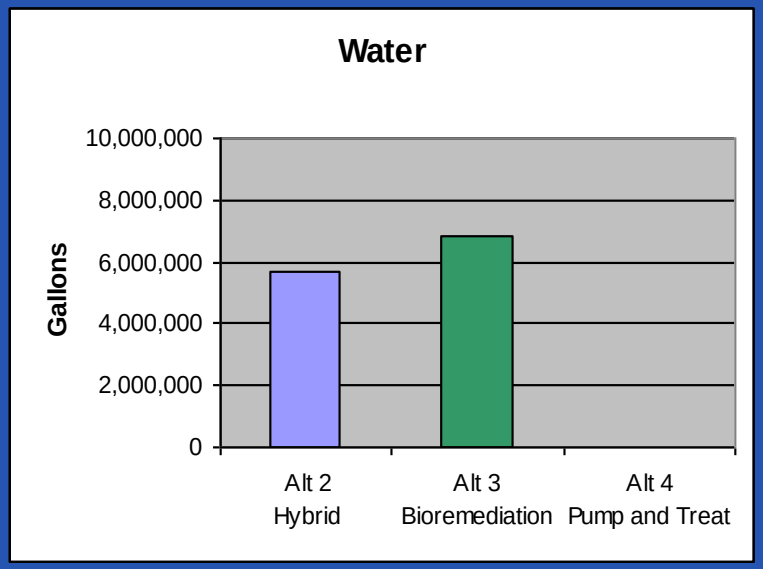


Results – Wastes Generated





Results – Water



Difference in water use between:

Alt 2 and Alt 3: 1,178,000 gallons

Alt 3 and Alt 4: 6,840,000 gallons

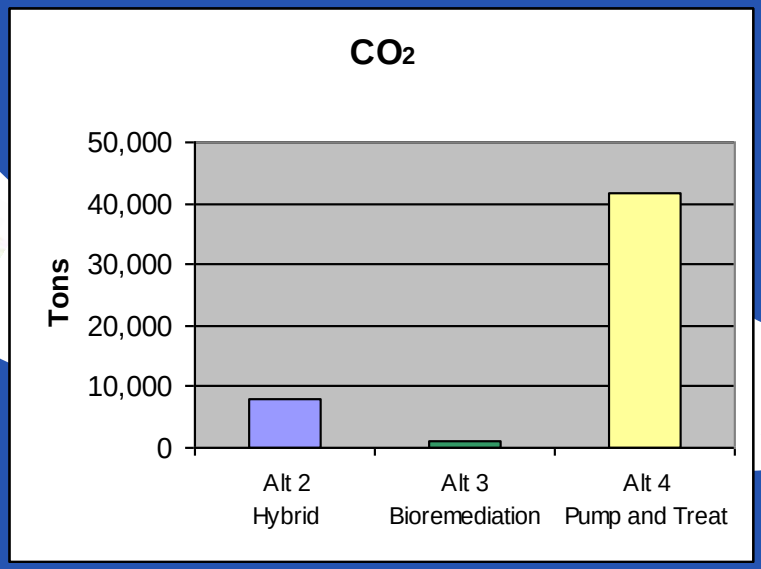
This is equivalent to annual water use in:

12 households

72 households

in East Palo Alto.

Results – CO_2 Emissions



Difference in CO_2 emissions between:

Alt 2 and Alt 3: 7,000 tons

Alt 3 and Alt 4: 40,000 tons

This is equivalent to annual emissions from:

1,200 passenger vehicles

6,600 passenger vehicles

Applying results to our decision-making

We need to balance the various aspects of each remedy.

Applying results to our decision-making

	Alternative 2 Hybrid	Alternative 3 Bioremediation	Alternative 4 Pump and Treat
Materials			
PVC Pipe (lbs)	12,000	9,000	18,000
Cement (ft3)	60	70	30
Molasses (gallons)	180,000	220,000	0
Water (gallons)	5,700,000	6,800,000	0
Energy			
Diesel Fuel (gallons)	19,000	10,000	69,000
Gasoline (gallons)	12,000	8,000	9,000
Electricity (kWh)	6,000,000	20,000	32,000,000
Waste Generation			
Spent Carbon (lbs)	1,200,000	0	7,800,000
Wastewater (gallons)	500,000,000	0	2,700,000,000
Air Emissions			
CO_2 (tons)	8,000	1,000	41,000
Other			
Road Distance (miles)	300,000	200,000	600,000
Remediation Time (years)	30	10	40

- Balance local effects with global effects
- Balance effects of disparate items:
  - environmental contamination
  - natural resource depletion
  - waste generation
  - years to complete remedy

Comparison of impacts among alternatives:

relatively high impact
relatively medium impact
relatively low impact
impacts similar

Reducing Impacts – Water

	Alternative 2 Hybrid	Alternative 3 Bioremediation	Alternative 4
Materials			
PVC Pipe (lbs)	12,000		18,000
Cement (ft3)	60		30
Molasses (gallons)	180,000	220,000	0
Water (gallons)	5,700,000	6,800,000	0
Energy			
Diesel Fuel (gallons)	19,000	10,000	69,000
Gasoline (gallons)	12,000	8,000	9,000
Electricity (kWh)	6,000,000	20,000	32,000,000
Waste Generation			
Spent Carbon (lbs)	1,200,000	0	7,800,000
Wastewater (gallons)	500,000,000	0	2,700,000,000
Air Emissions			
CO_2 (tons)	8,000	1,000	41,000
Other			
Road Distance (miles)	300,000	200,000	600,000
Remediation Time (years)	30	10	40

Look at opportunities to reduce fresh water use:

use reclaimed water for bioinjections of cheese whey and molasses

Comparison of impacts among alternatives:

relatively high impact
relatively medium impact
relatively low impact
impacts similar

Observations

- Transportation was a greater factor in CO_2 emissions than on-site activities.
- Off-site manufacture may be a greater factor in CO_2 emissions than on-site activities and transportation combined.
- Types of off-site manufacture that may be especially important in CO_2 emissions are:
  - -- production of electricity
  - -- reactivation of granulated carbon
  - -- treatment of wastewater





Conclusions

- **Yes, it's feasible to estimate the environmental footprint of a corrective action remedy.**
- **Yes, we selected the "greenest" remedy at Romic (pending final results from Level 3 manufacturing).**
- **Preliminary results suggest that it may be very important to include off-site manufacturing in estimations of the environmental footprint.**

NEXT STEPS: Specific to Romic

- Improve the life-cycle inventory inputs for Level 3 (manufacturing) calculations.

- Run calculations for the aspects of the three alternatives that are the same:

  - soil excavation
  - groundwater monitoring
  - capping contaminated areas

NEXT STEPS: Big Picture

- Complete five additional pilots
- Continue to refine the methodology
  - Consult EPA experts on life-cycle analysis topics
- Develop guidance document
- Promote Green Remediation in general and exchange information with others interested

Promoting Green Remediation

Bringing Sustainability to Our Site Clean-ups!

Travis AFB 2009 Plan

Groundwater Program Activities

RPM Meeting

January 28, 2009

INTRODUCTION

In 2008/2009, the schedule shows:

- 11 Basewide Documents
- 4 Basewide Field Actions
- 12 Site-specific Work Plans
- 11 Site-specific Field Actions
- 1 Site-specific Report

Basewide Documents

- 2007/2008 Annual GSAP Report (in progress)
- Monthly O&M Data Sheets (in progress)
- Annual 2008 RPO (O&M) Report (in progress)
- QAPP Update (in progress)
- Action Plan (in progress)
- Health & Safety Plan (complete)
- Field Sampling Plan
- Natural Attenuation Assessment Report (NAAR)
- MNA Implementation Plan
- Focused Feasibility Study (FFS)
- 2008/2009 Annual GSAP Report

Basewide Field Actions

- 2008 Semi-annual GSAP Sampling (complete)
- Ongoing O&M Activities & System Sampling (in progress)
- 2009 Annual GSAP Sampling
- 2009 Quarterly GSAP Sampling

Site-Specific Work Plans

- North Area
  - Site LF007C Site Characterization WP (in progress)

Site-Specific Work Plans

- South Area
  - Site SS030 Site Characterization WP (in progress)
  - Sites FT005/SS030 RPO Work Plan

Site-Specific Work Plans

- Central Area
  - Site ST027B VOC Plume Delineation WP (in progress)
  - Site SS016 IRA WP (in progress)

Site-Specific Work Plans

- West Area
  - Site LF008 RPO TM (complete)
  - Sites SD036 and SD037 RPO WP
  - Site DP039 RPO WP

Site-Specific Work Plans

- POCO Sites
  - Site ST032 POCO Tech Memo (in progress)
  - Site ST032 Tier 1 POCO Evaluation WP
  - Site ST018 RA WP
  - Site SS014 Tier 1 POCO Evaluation WP

Site-Specific Field Actions

- North Area
  - Site LF007C Field Investigation

Site-Specific Field Actions

- South Area
  - Site SS030 Site Characterization

Site-Specific Field Actions

- Central Area
  - Site SS016 In-situ Pilot Test
  - Site ST027B Site Characterization (in progress)

Site-Specific Field Actions

- West Area
  - Site LF008 Rebound Study (in progress)
  - Site SD036 In-situ Implementation
  - Site SD037 In-situ Implementation
  - Site DP039 In-situ Implementation

Site-Specific Field Actions

- POCO Sites
  - Site ST032 Site Characterization
  - Site SS014 Site Characterization
  - Site ST018 Remedy Implementation

Site-Specific Reports

- All Areas
  - Site ST027B Site Characterization Report

ST027 Site Investigation – Phase 1 Results and Proposal for Phase 2

Travis Air Force Base

California

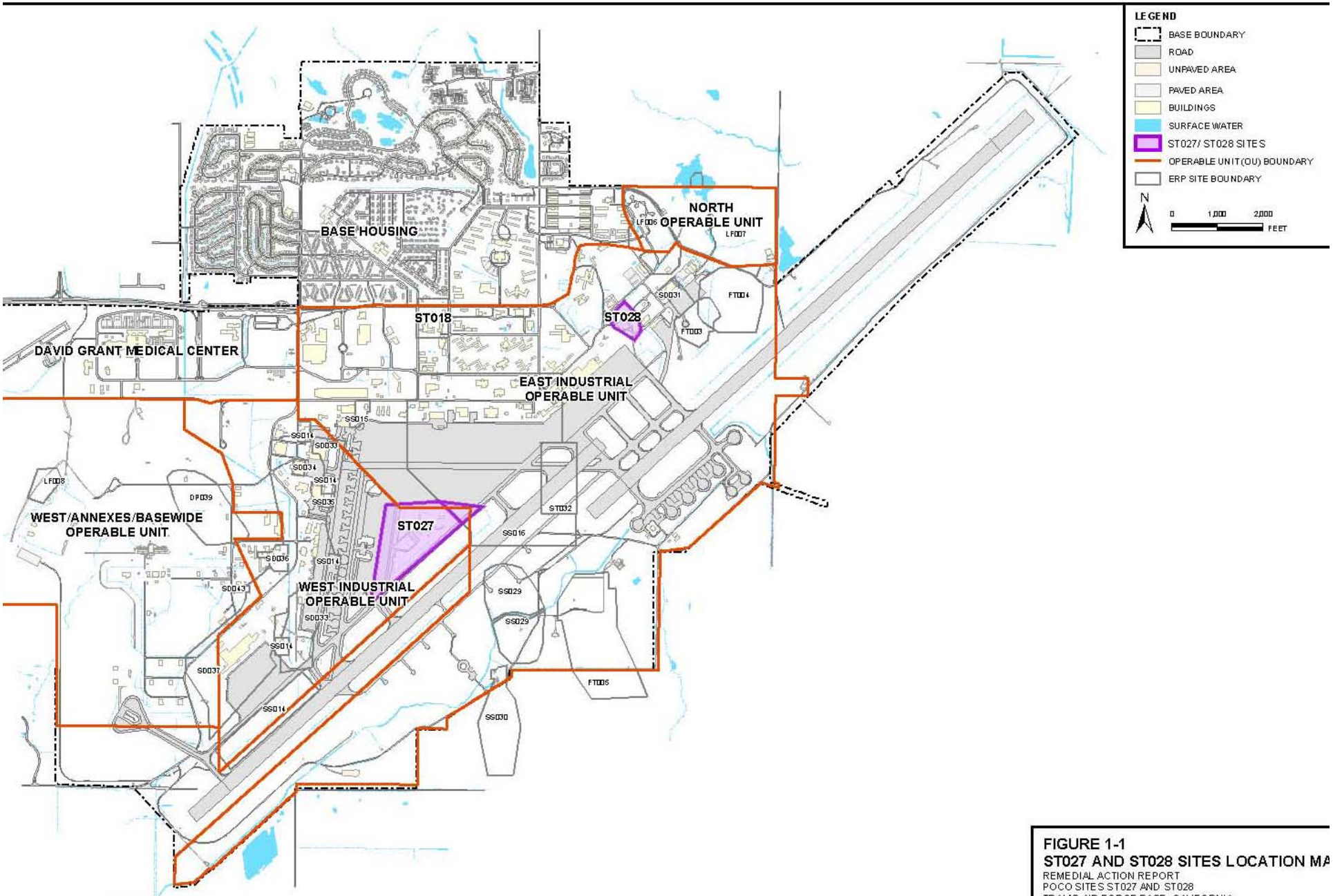


FIGURE 1-1
ST027 AND ST028 SITES LOCATION MA
REMEDIAL ACTION REPORT
POCO SITES ST027 AND ST028
TRAVIS AIR FORCE BASE, CALIFORNIA

CH2MHI

:TS\RDGIS\TRAVIS\MXD\REMEDIAL_DESIGN_REPORT\RA_REPORT\FIG1-1_SITELOCATIONST027_ST028.MXD 4/16/2008 13:45:51

ST027 Site Description

- Located in WIOU
  - Site uses: Aircraft/jet engine testing and fuel storage
  - Surface cover: Unpaved areas are low quality grass land
- Preliminary Conceptual Model from Phase 1
  - Potential release mechanisms – surface spills, dumping
  - Potential release locations – Aircraft test pad, Facility 1020 access road, drainage swale, and Taxiway N

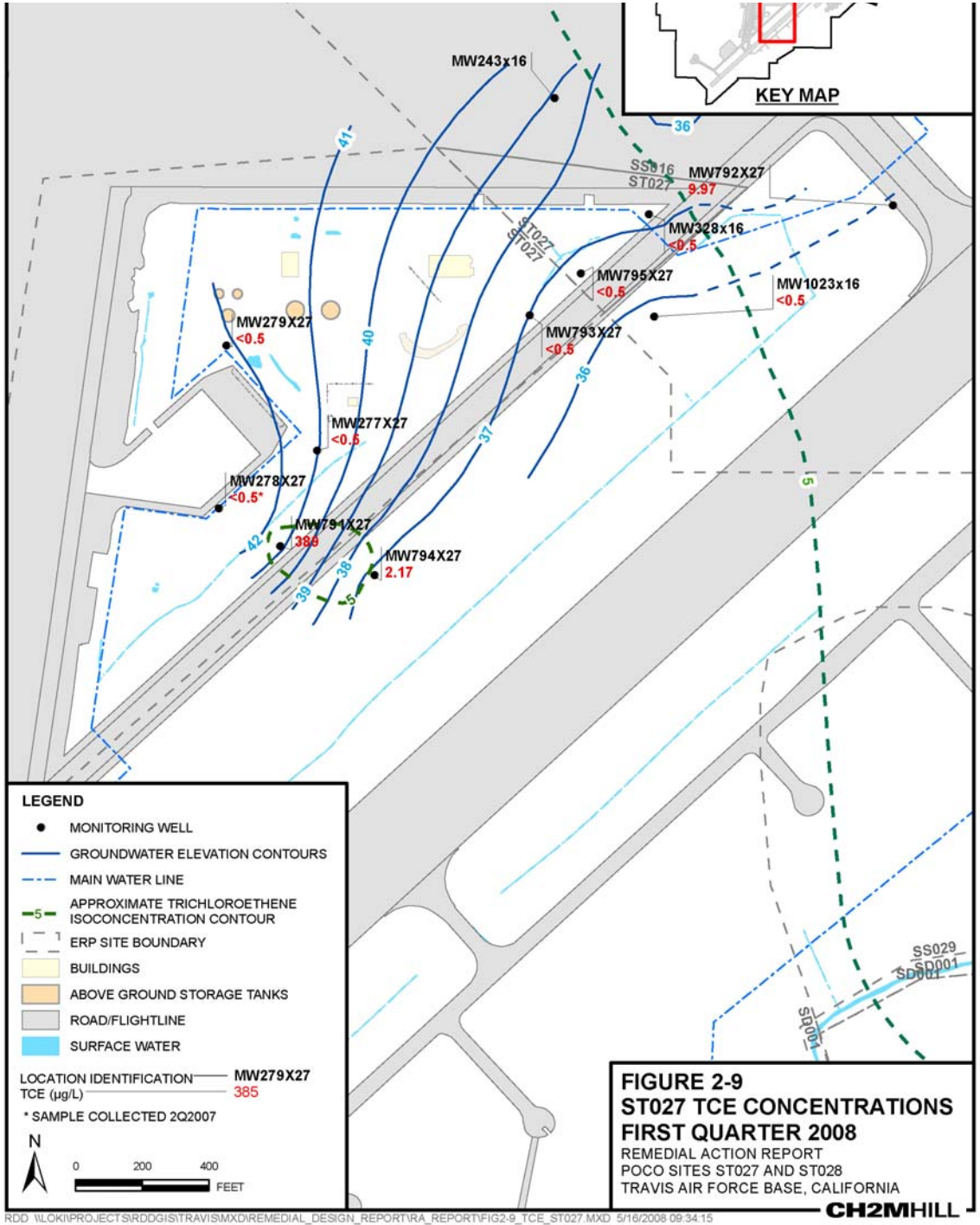


FIGURE 2-9
ST027 TCE CONCENTRATIONS
FIRST QUARTER 2008
REMEDIAL ACTION REPORT
POCO SITES ST027 AND ST028
TRAVIS AIR FORCE BASE, CALIFORNIA

CH2MHILL

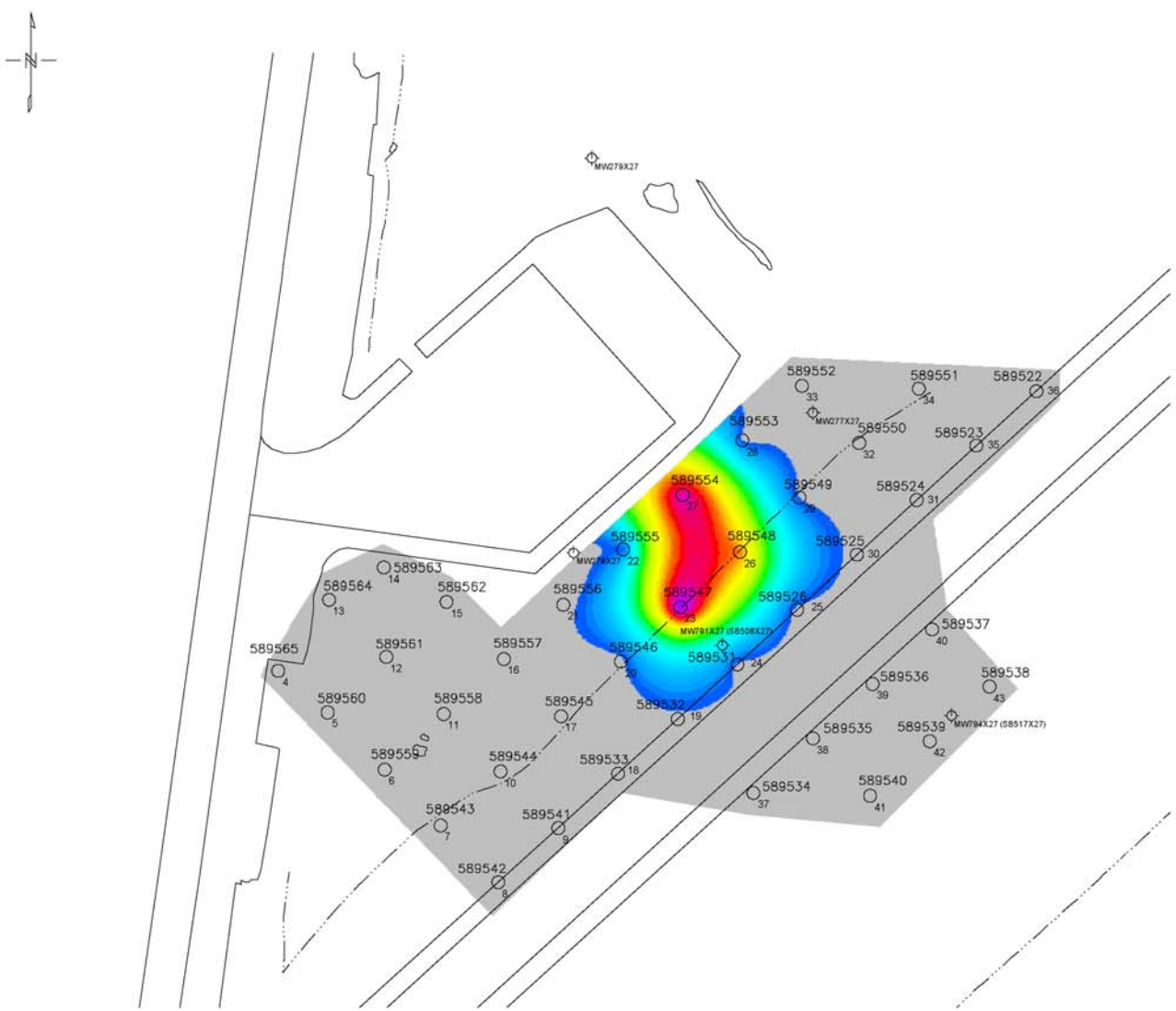
RDD \\LOKI\PROJECTS\RDDGIS\TRAVIS\MXD\REMEDIAL_DESIGN_REPORT\RA_REPORT\FIG2-9_TCE_ST027.MXD 5/16/2008 09:34:15

ST027 Site Investigation

- Phase 1 – GORE Site Assessment Survey
  - Completed in December, 2008
  - 40 passive soil gas sampling locations
  - Targeted potential release locations identified in Workplan
  - All locations analyzed for TCE, cis-1,2-DCE and Vinyl Chloride

ST027 Site Investigation

- Phase 1 Results
  - TCE concentrations highest between aircraft test pad and drainage swale
  - Cis-1,2-DCE concentrations highest near edge of Taxiway N
  - Vinyl chloride not detected in GORE samples



1.766
1.370
1.063
0.824
0.639
0.496
0.385
0.298
0.232
0.180
0.139
0.108
0.084
0.065
0.050
0.039
0.030
0.024
0.018
0.014
0.011

TCE
[µg]

GORE ™ Surveys for Environmental Site

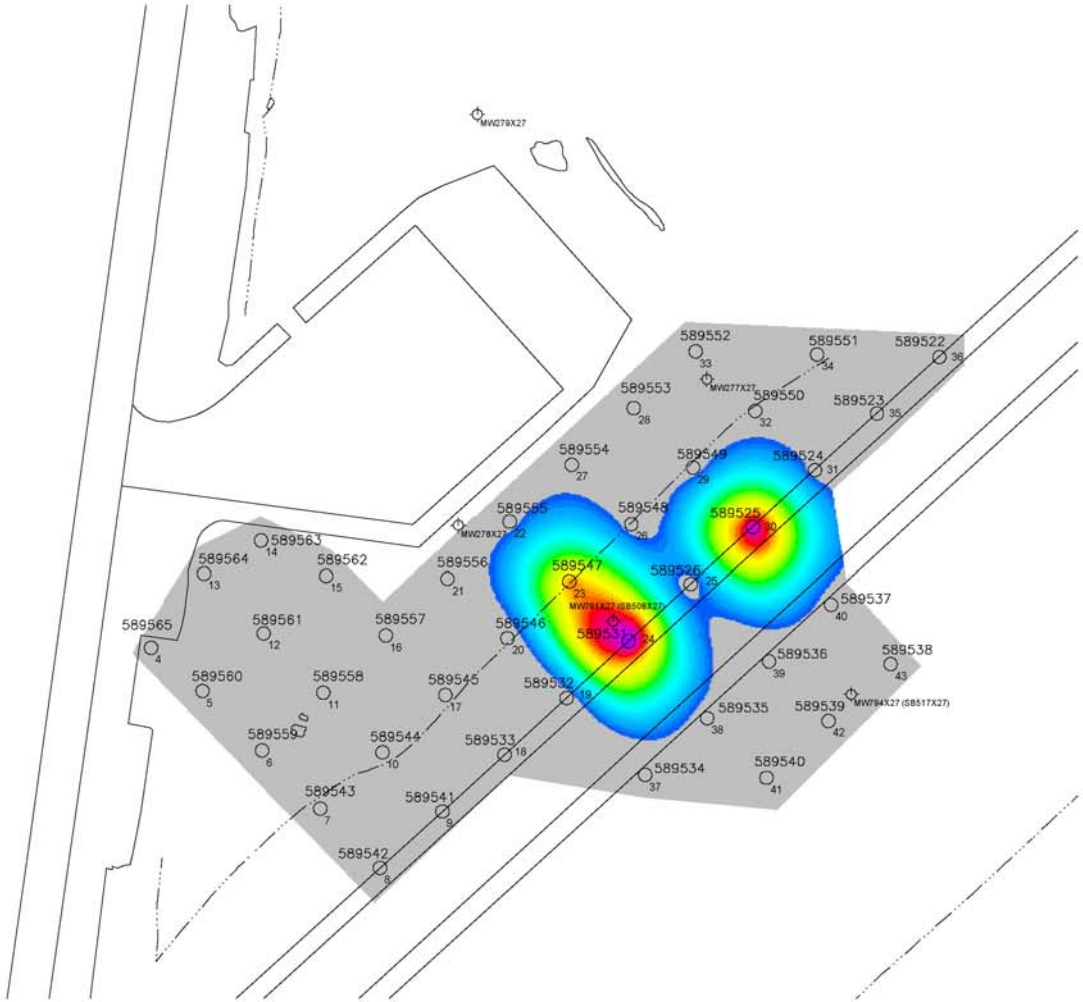
GORE
Creative Technologies Worldwide

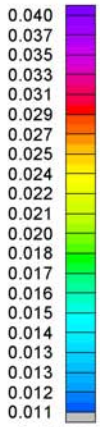
W.L. GORE & ASSOCIATES,
100 CHESAPEAKE BOULEVARD
ELKTON, MD, USA 21921
USA
(410) 392-7600

CH2M Hill, Sacramento, CA
ST027, Travis AFB
Trichloroethene

DATE DRAWN: 29 Dec 2008	DRAWN BY: JH	ORIG. CAD: shapefiles
REV. DATE:	REV. #:	PROJECT NUMBER: 13898154

W.L. GORE & ASSOCIATES





Scale 1:1800

100 0 100 200 300

(feet)

GORE ™ Surveys for Environmental Site Assessment

GORE
Creative Technologies Worldwide

W.L. GORE & ASSOCIATES, INC.
100 CHESAPEAKE BOULEVARD
ELKTON, MD, USA 21921
USA
(410) 392-7600

CH2M Hill, Sacramento, CA
ST027, Travis AFB
cis-1,2-Dichloroethene

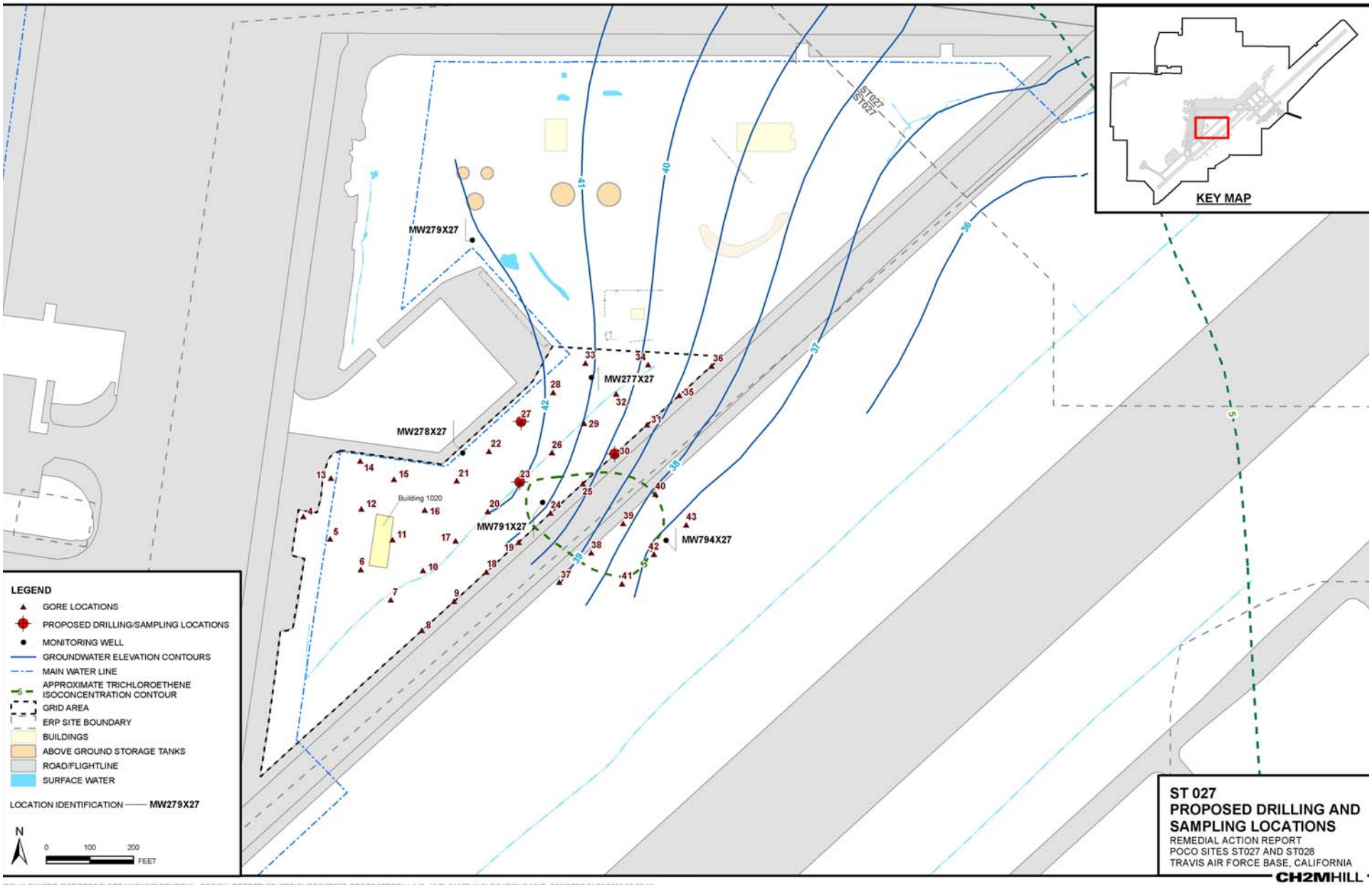
DATE DRAWN: 29 Dec 2008	DRAWN BY: JH	ORIG. CAD: shapefiles	SITE CODE: EQY
REV. DATE:	REV. #:	PROJECT NUMBER: 13898154	

ST027 Updated Conceptual Model

- Potential release mechanisms – surface spills, dumping
- Aircraft test pad and/or drainage swale appear the most likely release locations for TCE
- Cis-1,2-DCE downgradient of TCE – potential reductive dechlorination of TCE

ST027 Site Investigation

- Proposal for Phase 2: April-May, 2009
  - Drill/sample three soil borings
  - Target suspected source area for TCE (GORE locations 23 and 27) and eastern area of high cis-1,2-DCE (GORE location 30)
    - In situ groundwater samples to determine dissolved concentrations in source area
    - Soil and soil gas samples to determine concentrations in source and assess human health and ecological risk



DD \\LOK\PROJECTS\RDDGIS\TRAVIS\MXD\REMEDIAL_DESIGN_REPORT\OTHERFIGURES\ST027_PROPOSEDDRILLING_AND_SAMPLINGLOCATIONS.MXD SSCOPES 01/26/2009 09:52:15

ST027 Site Investigation

- Phase 3: May-June, 2009
  - Based on Phase 2 results – Install wells to monitor TCE in the source area
  - Drill soil borings/install wells to define the extent of the TCE plume (as needed)

Site ST032
ERP to POCO

Travis Air Force Base

California

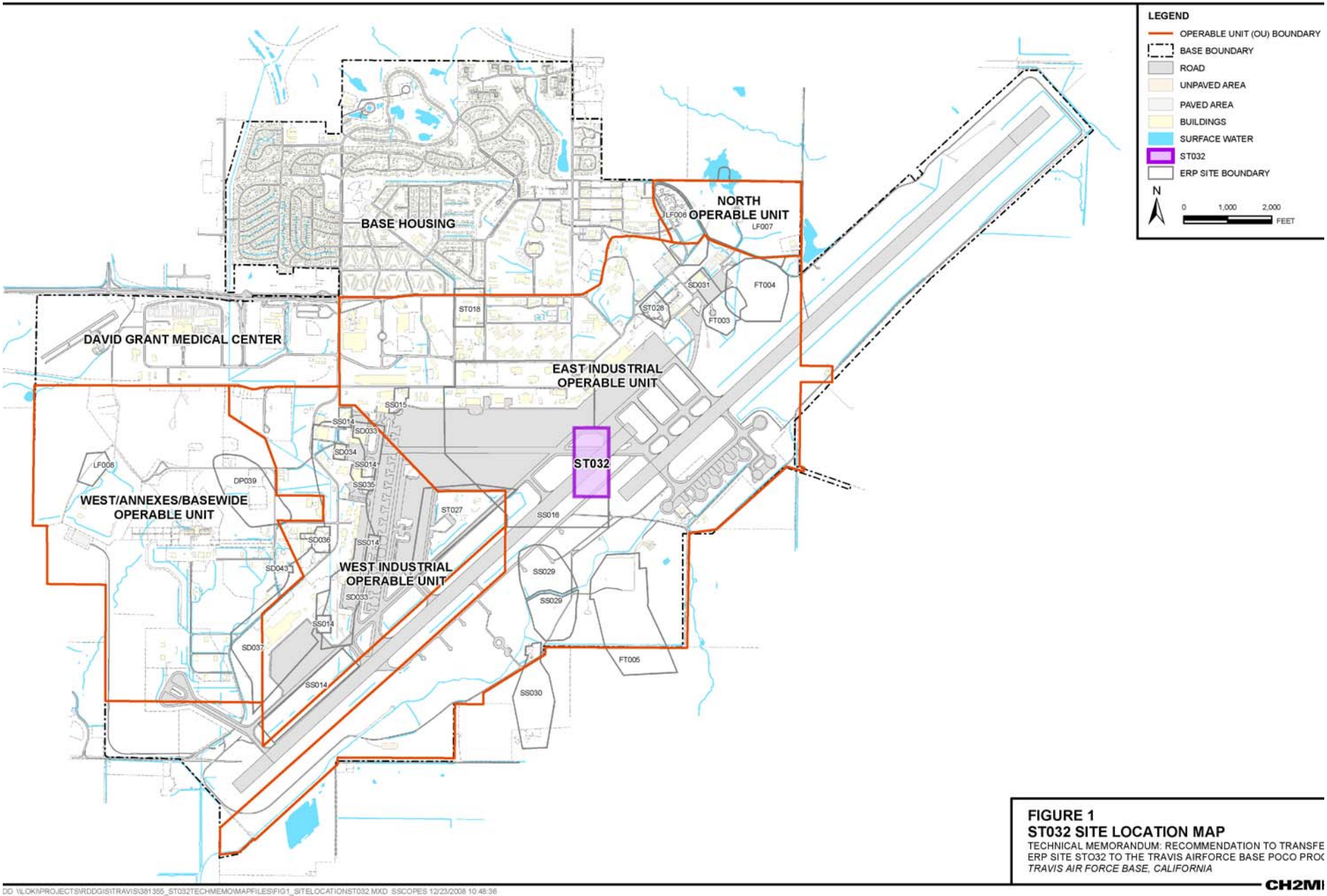


FIGURE 1
ST032 SITE LOCATION MAP
TECHNICAL MEMORANDUM: RECOMMENDATION TO TRANSFE
ERP SITE ST032 TO THE TRAVIS AIRFORCE BASE POCO PROC
TRAVIS AIR FORCE BASE, CALIFORNIA

CH2MI

DD \\LOKI\PROJECTS\RDDGIS\TRAVIS\381355_ST032TECHMEMO\MAPFILES\FIG1_SITELOCATIONST032.MXD SSCOPES 12/23/2008 10:48:36

ST032 Site Description

- Located in EIOU
  - Plume A (North) and Plume B (South) – fuel hydrocarbon plumes located in grassy areas, surrounded by the airfield
  - Site uses: Flightline and aircraft operations are only historical uses
  - Buried jet fuel line in Plume A area and buried storm sewer line in both Plume A and Plume B areas
  - No documented releases but historical fuel hydrocarbon impacts to groundwater in both areas
  - Also some TCE historically present in groundwater in Plume A area

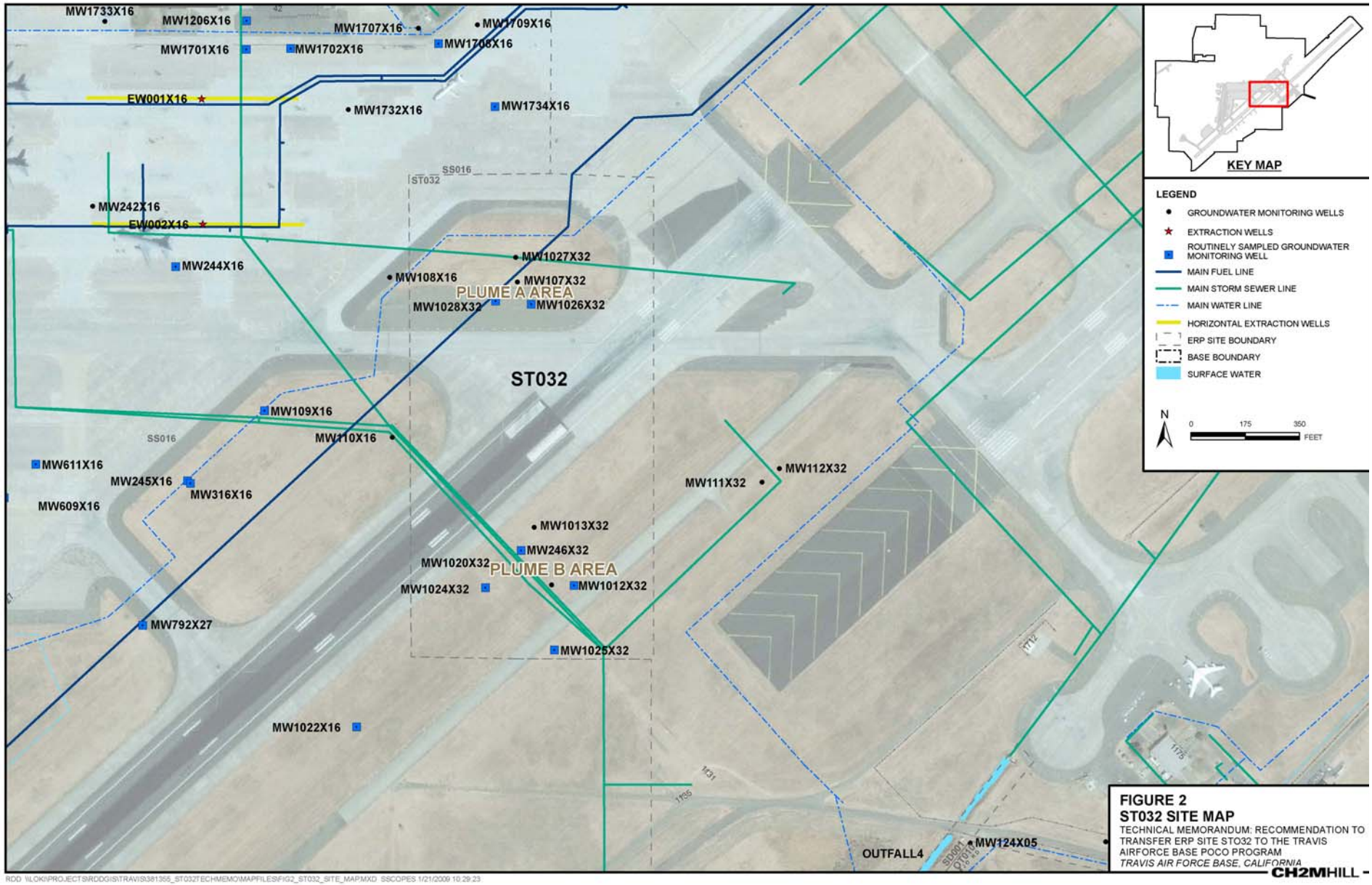


FIGURE 2
ST032 SITE MAP
TECHNICAL MEMORANDUM: RECOMMENDATION TO TRANSFER ERP SITE ST032 TO THE TRAVIS AIRFORCE BASE POCO PROGRAM
TRAVIS AIR FORCE BASE, CALIFORNIA
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ST032 Hydrogeology

- Thin aquifer in alluvium/weathered bedrock
  - Alluvium: clay and sand
  - Alluvium 20 – 30 feet thick
  - Bedrock: Nortonville Shale
- Saturated zone at 7 to 15 feet
- Groundwater flow to south toward extraction wells at SS029 and FT005

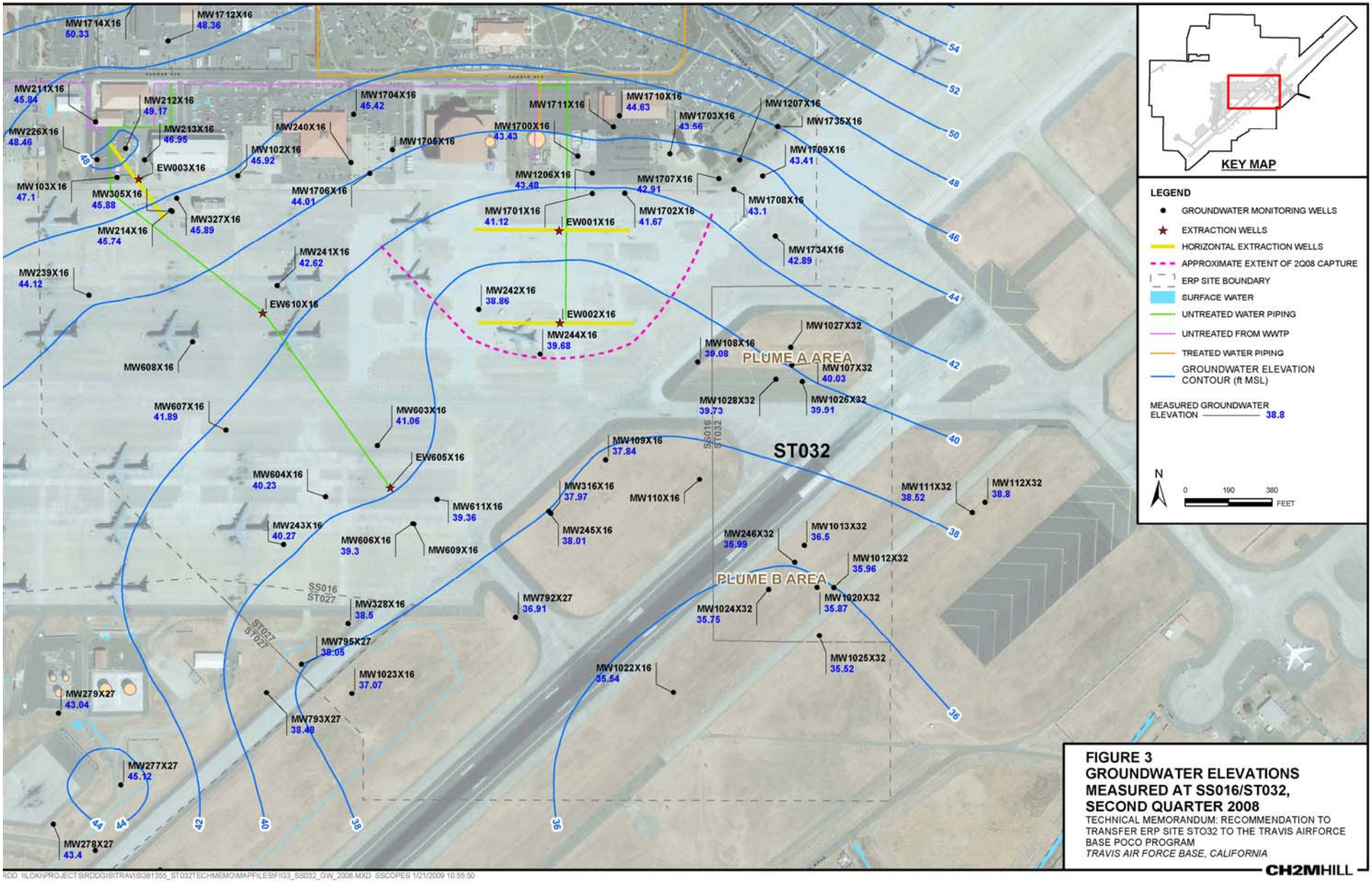

FIGURE 3
GROUNDWATER ELEVATIONS MEASURED AT SS016/ST032, SECOND QUARTER 2008
TECHNICAL MEMORANDUM: RECOMMENDATION TO TRANSFER ERP SITE ST032 TO THE TRAVIS AIRFORCE BASE POCO PROGRAM
TRAVIS AIR FORCE BASE, CALIFORNIA

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RDD \\LOKI\PROJECTS\RDDGIS\TRAVIS\381355_ST032TECHMEMO\MAPFILES\FIG3_SS032_GW_2008.MXD SSCOPES 1/21/2009 10:55:50

ST032 RI/FS (1995)

- Fuel hydrocarbon impacts to groundwater in Plume A and B areas
- Historical LNAPL in Plume B area
- Some historical chlorinated VOCs in groundwater in Plume A area
- Evaluated in EIOU FS because…
  - TCE and cis-1,2-DCE exceeded MCLs in Plume A area at that time

Conceptual Model

- No documented releases
- Potential release mechanisms
  - Plume A
    - Fuel Hydrocarbons: leaks from buried jet fuel line
    - Chlorinated VOCs: migration from SS016
  - Plume B
    - Surface spills
    - Migration from Plume A area along buried storm sewer

ST032 GSAP

- Plume A
  - Cis-1,2-DCE has not exceeded the MCL in ST032 wells since 1999. TCE has not exceeded MCL since the RI (1995)
  - TPH has not exceeded 100 µg/L since 2003
- Plume B
  - Measurable LNAPL not present since 2001
  - TPH has not exceeded 100 µg/L since RI, except in source area well MW246x32

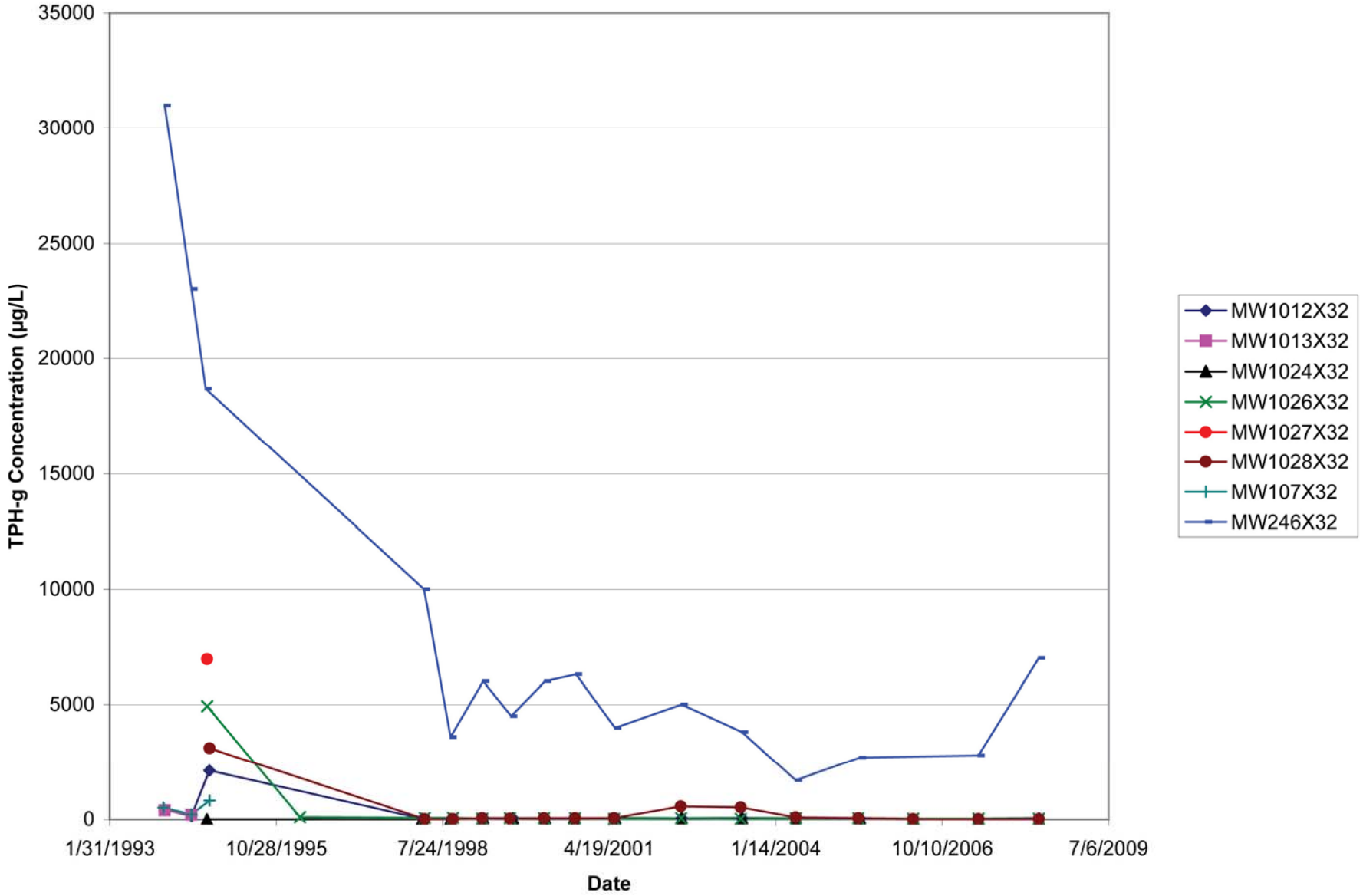

FIGURE 4
TPH-G CONCENTRATIONS VERSUS TIME
TECHNICAL MEMORANDUM: RECOMMENDATION TO TRANSFER ERP SITE ST032 TO THE TRAVIS AIR FORCE BASE POCO PROGRAM
TRAVIS AIR FORCE BASE, CALIFORNIA

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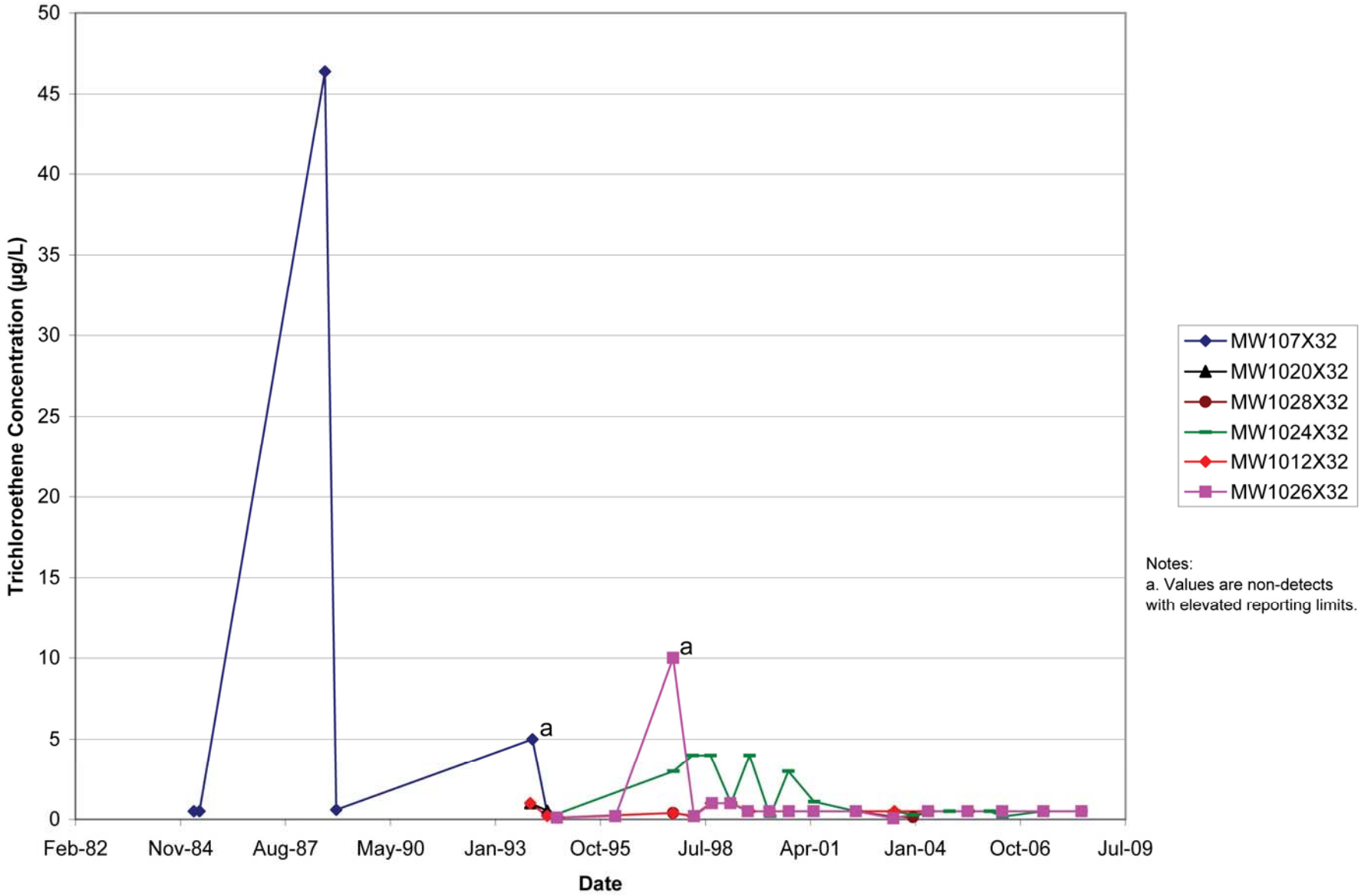

Notes:
a. Values are non-detects with elevated reporting limits.

FIGURE 7
TCE CONCENTRATIONS VERSUS TIME
TECHNICAL MEMORANDUM: RECOMMENDATION TO TRANSFER ERP SITE ST032 TO THE TRAVIS AIR FORCE BASE POCO PROGRAM
TRAVIS AIR FORCE BASE, CALIFORNIA

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ST032 Conclusions

- Remaining contamination consist of fuel hydrocarbons from undocumented fuel line leaks or surface spills
- Chlorinated VOCs, which migrated from SS016, are no longer present in ST032 wells
- Remaining fuel hydrocarbon plume is limited to MW246x32
- The distal part of SS016 TCE plume is located more than 500 feet west MW246x32 and does not commingle with the ST032 fuel hydrocarbon plume
- ST032 is a petroleum-only contaminated site and should be transferred to the POCO program

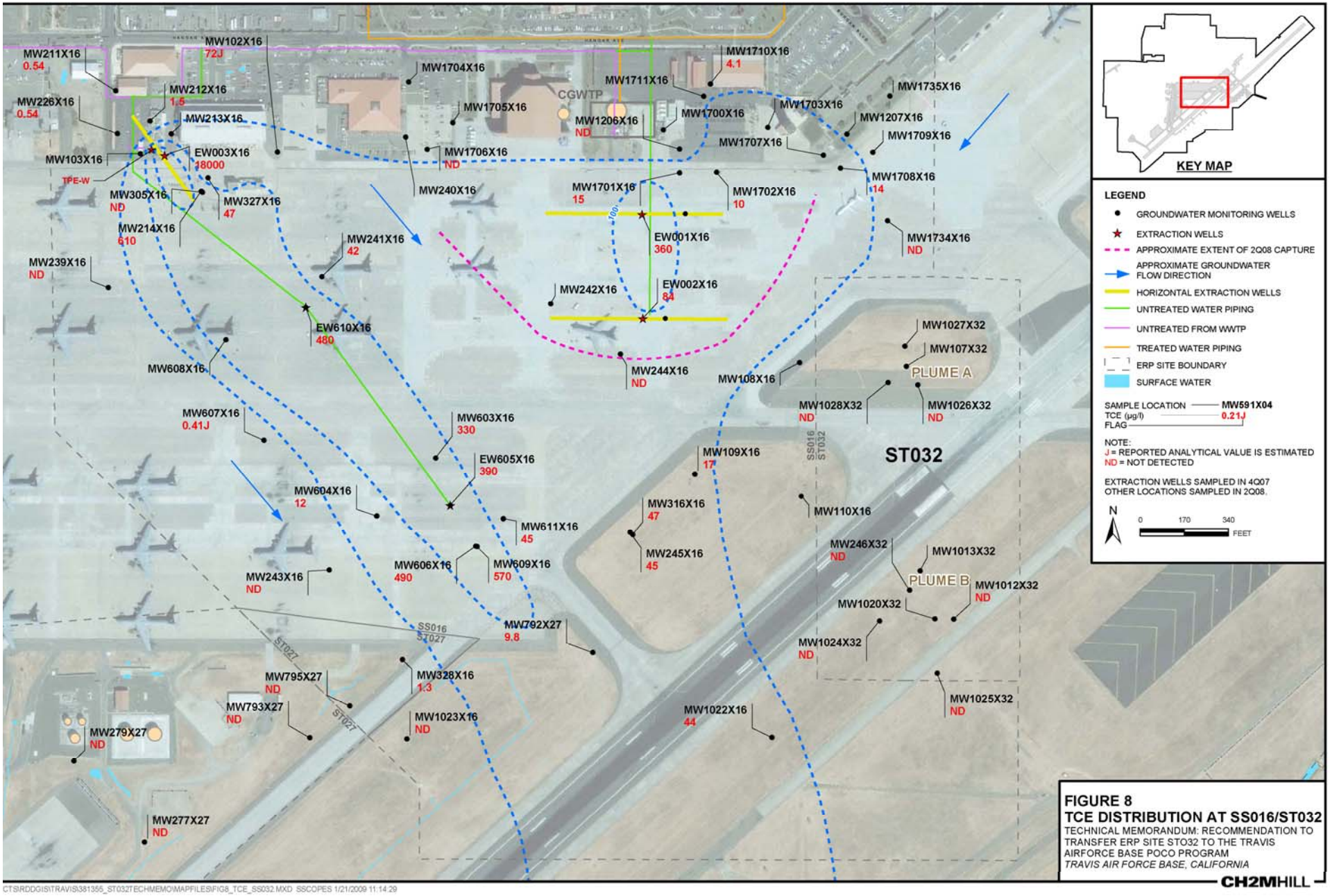

FIGURE 8
TCE DISTRIBUTION AT SS016/ST032
TECHNICAL MEMORANDUM: RECOMMENDATION TO TRANSFER ERP SITE STO32 TO THE TRAVIS AIRFORCE BASE POCO PROGRAM
TRAVIS AIR FORCE BASE, CALIFORNIA

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CT:\RDDGIS\TRAVIS\381355_ST032TECHMEMO\MAPFILES\FIG8_TCE_SS032.MXD SSCOPES 1/21/2009 11:14:29

Site SS030 RPO Work Plan

Site SS030 Background

- SS030 is 1 of 3 groundwater plumes that have migrated offbase
  - Located in southern area of Travis AFB
  - Groundwater TCE contamination likely associated with historical activities at Building 1125, a radar facility
  - TCE is the only contaminant detected above the IRG
  - The TCE plume currently extends ~1,100 feet offbase
- The Air Force currently has an existing easement encompassing the known extent of offbase plume.

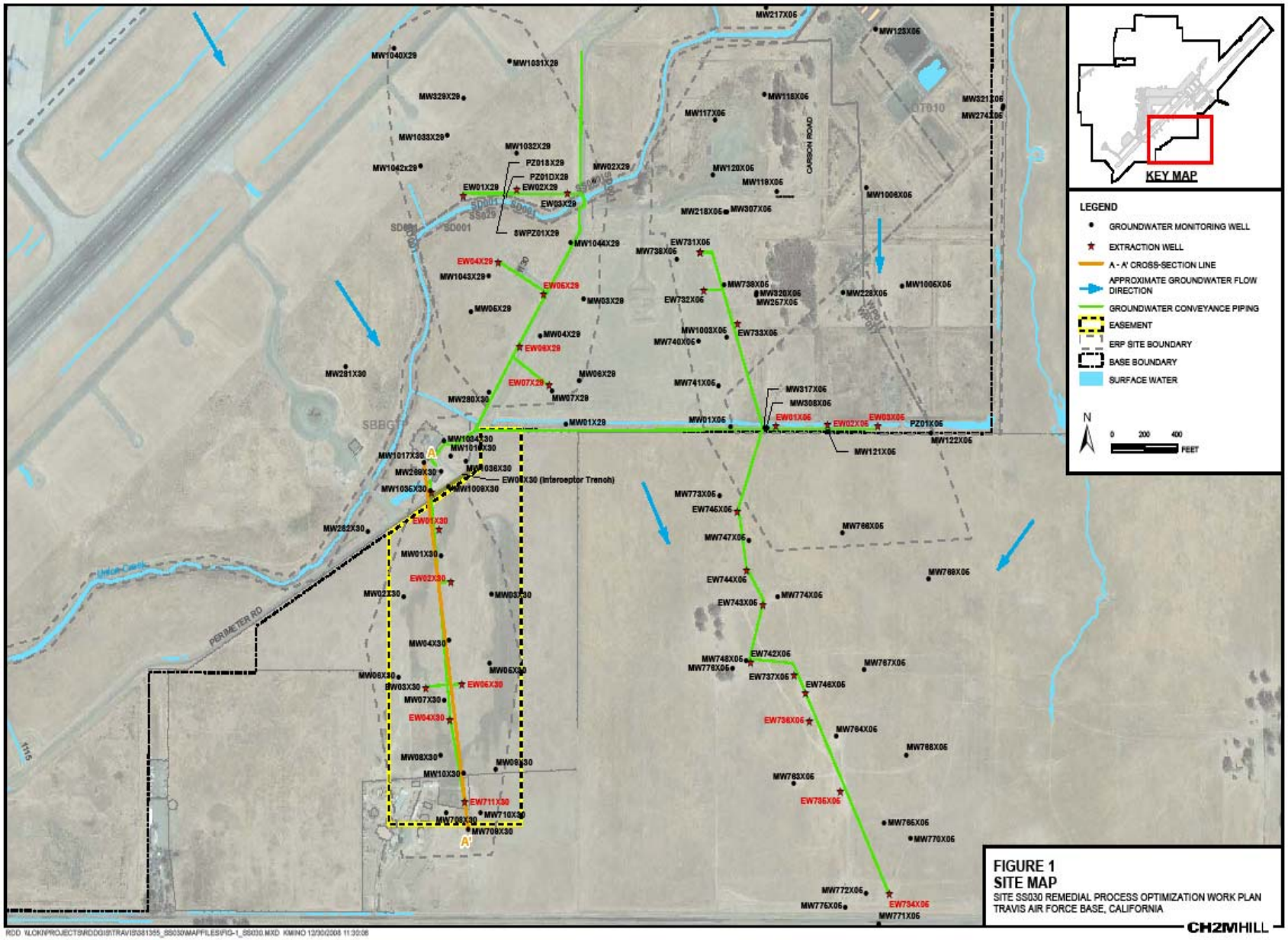

FIGURE 1
SITE MAP
SITE SS030 REMEDIAL PROCESS OPTIMIZATION WORK PLAN
TRAVIS AIR FORCE BASE, CALIFORNIA

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SS030 Background, cont'd

- A Groundwater Interim Remedial Action (IRA) has been in-place since 2003.
- Groundwater IRA objectives specified in the NEWIOU IROD:
  - Source Control – horizontal trench to contain and remove the source of contamination
  - Migration Control – horizontal trench and extraction wells to prevent further plume migration
  - Offbase Remediation – vertical extraction wells to remediate the offbase plume to below the TCE IRG of 5 µg/L

SS030 Background, cont'd

- Second Five-Year Review: increasing TCE concentrations on the east side of the plume indicate contamination may be escaping hydraulic capture.
- Insufficient monitoring wells to assess the extent of contamination and the local groundwater flow direction.

Hydrogeology

- Groundwater flows toward the south and southeast
- Fine-grained (clayey) alluvial matrix with thin sand zones
- Bedrock depth ranges 20 to >60 feet bgs
- Depth to groundwater about 10 to 20 feet bgs
- Yields from existing EWs typically <5 gpm

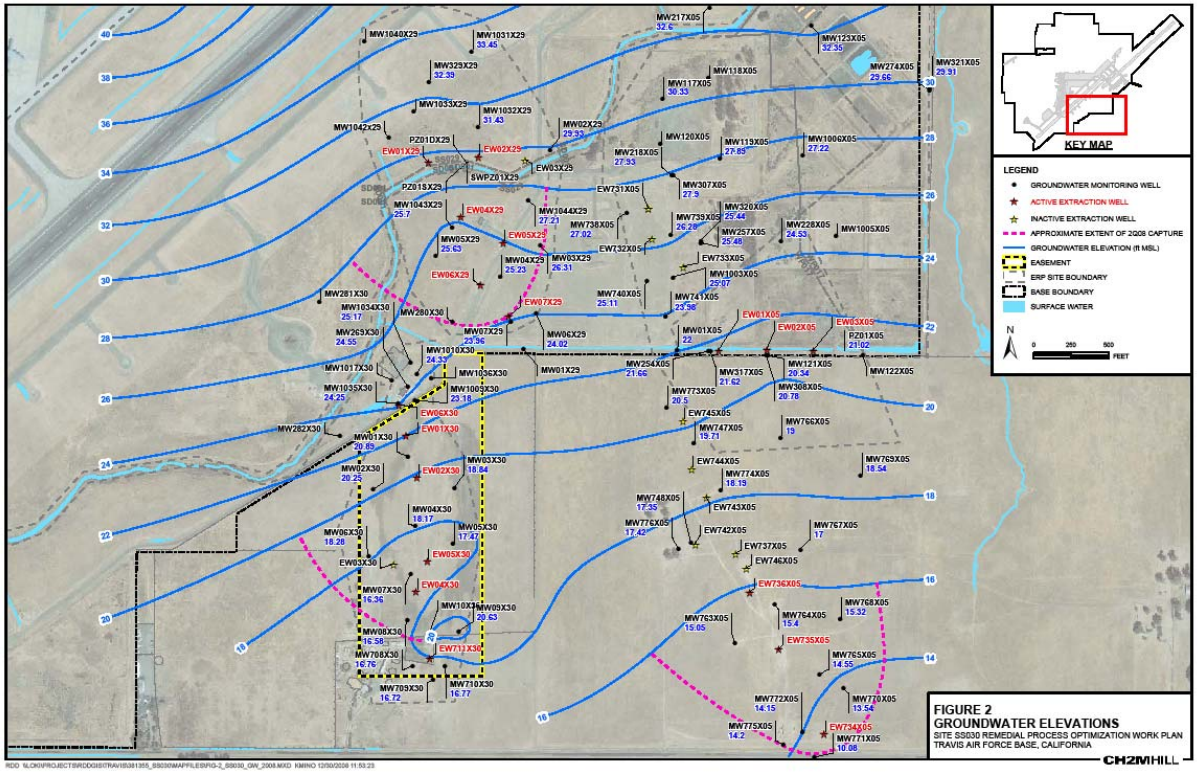

FIGURE 2
GROUNDWATER ELEVATIONS
SITE SS030 REMEDIAL PROCESS OPTIMIZATION WORK PLAN
TRAVIS AIR FORCE BASE, CALIFORNIA

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Groundwater Contamination

- TCE is only contaminant detected at concentration greater than NEWIOU IROD IRG of 5 ug/L.
- SS030 plume concentrations are generally decreasing under GET system operation.
- But, TCE concentrations appear to be increasing in MW03x30 and MW05x30, located on the eastern side of the offbase plume.

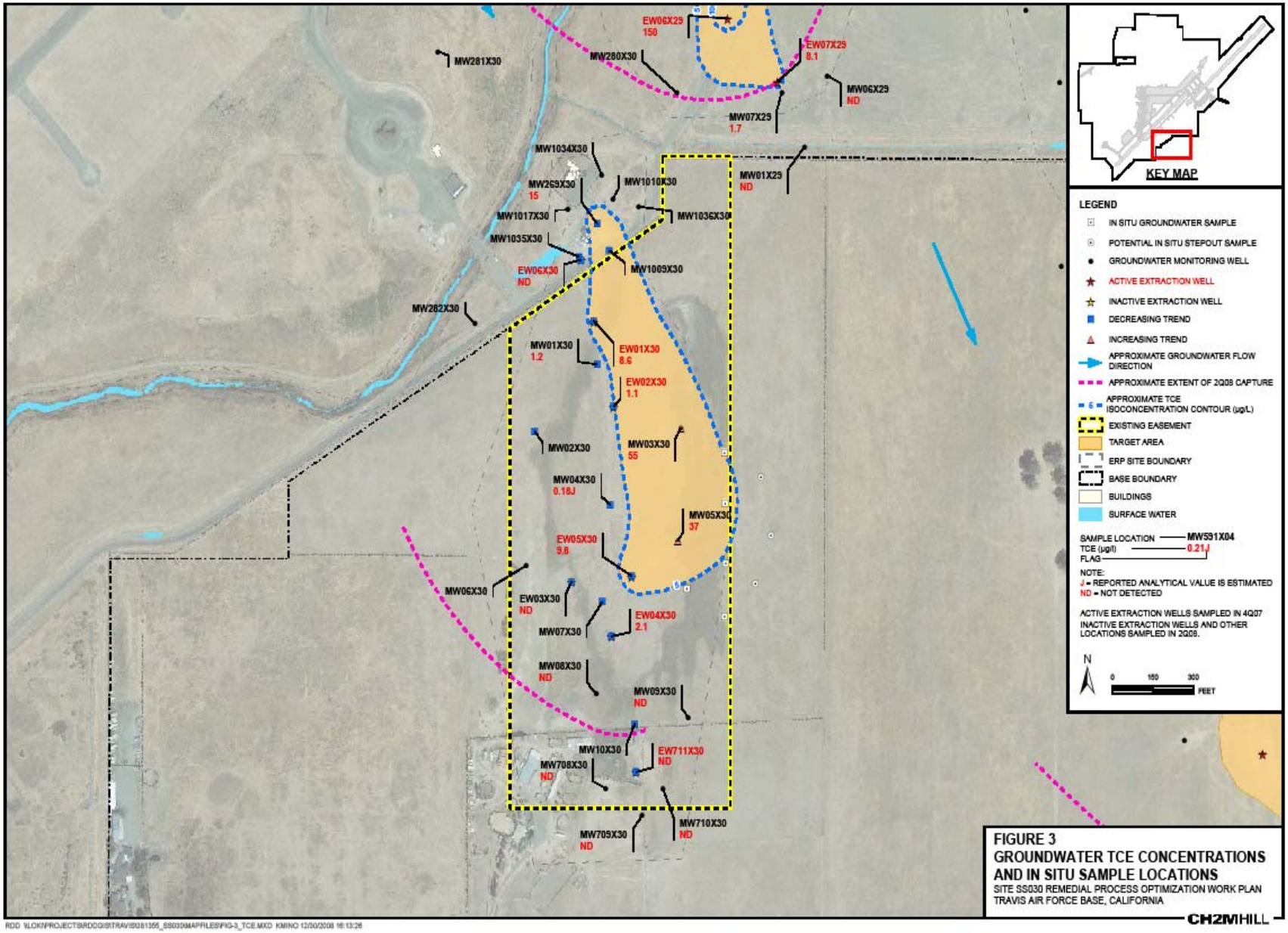

FIGURE 3
GROUNDWATER TCE CONCENTRATIONS AND IN SITU SAMPLE LOCATIONS
SITE SS030 REMEDIAL PROCESS OPTIMIZATION WORK PLAN
TRAVIS AIR FORCE BASE, CALIFORNIA

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RDD \\LOK\PROJECT\SRDOG\95TRAV\393611\355_SS030\MAPFILES\FIG-3_TCE.MXD KMINO 12/30/2008 16:13:26

RPO Activities

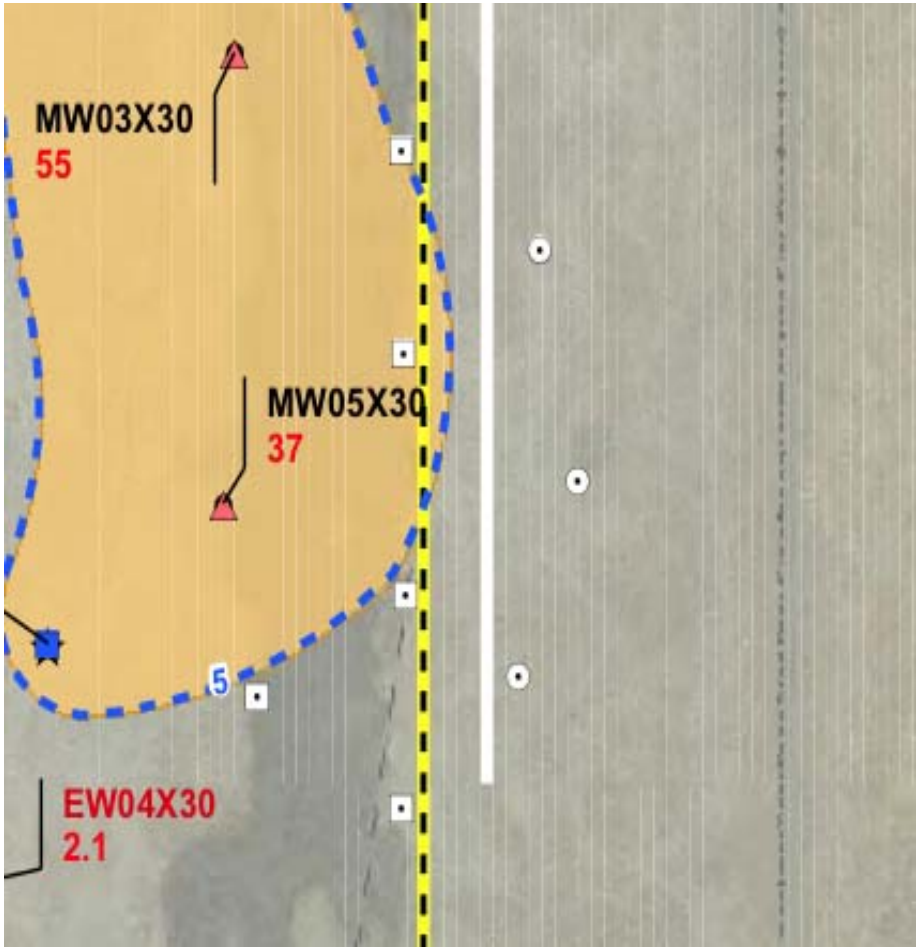
- Data Gaps Investigation
- Groundwater Modeling
- IRA Optimization
- Performance Monitoring

Data Gaps Investigation

- Following a phased approach using the Triad process
- Round 1: collection of in situ groundwater samples
  - five boring locations
  - advanced to bedrock
  - collect minimum of two groundwater samples per hole—one near the water table, another deeper, depending on geology

Round 1 In Situ Groundwater Sample Locations

- Conduct all work within existing easement (left of yellow dashed line)
- If needed, stepout locations (right of yellow dashed line) will require an expansion of the easement



Data Gaps Investigation, cont'd

- Construct temporary piezometers in the borings to refine groundwater flow directions
- Analyze samples and groundwater contours
- Consult with the team to evaluate needs for step out locations and an expanded easement
- Round 2: step out as needed until the plume is sufficiently characterized to support optimization

Groundwater Modeling—Capture Zone Analysis

- Evaluate groundwater flow conditions
- Determine extraction well location(s) and rates that will hydraulically contain and remediate the off-base plume
- Determine monitoring well locations/screen intervals that will provide performance monitoring capability
- Micro-Fem Version 3.0: 3-D, finite element, transient groundwater flow model that includes particle tracking capabilities

IRA Optimization

- Install extraction and monitoring wells
- Install well vaults
- Install conduits, control, and power wiring
- Plumb new extraction wells into existing pipeline to SBBGWTP
- Install new controls in SBBGWTP
- Complete construction in summer 2009

Performance Monitoring

- Startup sampling
- Collect four quarters of performance monitoring samples under the GSAP
- Prepare SS030 RPO Report
- Select GET for off-base plume in the FS/PP/ROD
- Continue ongoing monitoring under the GSAP

SS030

- Questions or comments?