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ADMINISTRATIVE RECORD  
COVER SHEET

AR File Number 3228

# Kelly Restoration Advisory Board (RAB) Technical Review Subcommittee (TRS)

## Meeting Agenda\*

March 14, 2006, 6:30 p.m.

Environmental Health & Wellness Center  
 911 Castroville Road

- |                    |   |  |
|--------------------|---|--|
| <b>6:30 - 6:40</b> | <b>Introduction</b><br>A. Agenda Review<br>B. Packet Review   | Dr. David Smith  |
| <b>6:40 - 7:00</b> | <b>Administrative</b><br>A. AFRPA Update<br>B. BRAC Cleanup Team (BCT) Update<br>C. Documents to TRS/RAB<br>D. RFI Responses<br>E. Action Items Report      | Ms. Sonja Coderre<br>Ms. Norma Landez<br><i>Please refer to your packets</i><br><i>Please refer to your packets</i><br><i>Please refer to your packets</i> |
| <b>7:00 - 7:40</b> | <b>TAPP Questions &amp; Answers</b>   | Mr. Rey Nieto  |
| <b>7:40 - 7:45</b> | <b>PCEH - Liver Study announcement</b>  | PCEH Representative  |
| <b>7:45 - 8:45</b> | <b>Jan 2006 Semiannual Compliance Plan Briefing</b>   | Mr. Don Buelter  |
| <b>8:45 - 9:00</b> | <b>Questions &amp; Answers</b>  |  |
| <b>9:00</b>        | <b>Meeting Wrap-up</b>  |  |
|                    | <b>Upcoming RAB Meetings:</b><br>April 11, 6:30 p.m., Kennedy High School, cafeteria, 1922 South General McMullen*<br><br>July 11, 6:30 p.m., Location TBD* |  |
| <b>9:00</b>        | <b>Adjournment</b>  |  |

*\*Meeting dates, locations and agenda item times are subject to change.*

**March 14, 2006**  
**Technical Review Subcommittee (TRS) Meeting**  
**of the Kelly Restoration Advisory Board (RAB)**  
**Environmental Health & Wellness Center**  
**911 Castroville Road**  
**San Antonio, Texas 78237**

**DRAFT Meeting Minutes**

**RAB Community Member Attendees:**

Robert Silvas, Community Cochair  
Rodrigo Garcia  
Henrietta LaGrange  
Nazirite Perez  
Armando Quintanilla

**RAB Government Member Attendees:**

Kyle Cunningham, San Antonio Metropolitan Health District (SAMHD) (Alternate for Melanie Ritsema)  
Mark Weegar, Texas Commission on Environmental Quality (TCEQ)

**Other Attendees:**

David Smith, Facilitator  
Don Buelter, AFRPA  
Amy Carbahal, HCRS, Inc.  
Sonja Coderre, Air Force Real Property Agency (AFRPA)  
Mark Hampton  
Linda Kaufman, Public Center for Environmental Health (PCEH)  
Norma Landez, AFRPA  
Eduardo Martinez, AFRPA Contractor  
Rey Nieto, AFRPA  
David Plylar, City of San Antonio, District 5 Office  
Abigail Power, TCEQ (Alternate for Mark Weegar)  
Heather Ramon-Ayala, AFRPA Contractor  
Melanie Rodriguez (PCEH)  
Martha Williams, HCRS, Inc.

The meeting began at 6:31 p.m.

**I. Introduction – Dr. David Smith**

Dr. Smith began the meeting by welcoming RAB members and other attendees. Dr. Smith then reviewed the agenda items for the evening.

**II. RAB Meeting Packet Review – Eduardo Martinez**

Mr. Martinez began reviewing the RAB meeting packets, which included:

- Final BRAC Cleanup Team (BCT) minutes – February 2006

- Documents to the TRS/RAB for the March TRS
- Documents to the TRS/RAB from the January RAB meeting signed acknowledgement of receipt of documents by both Cochairs
- AFRPA response letter to requests for information from RAB members
- January Action Item Report with attachments
- Presentation: TAPP Process
- Presentation: PCEH – Liver Study Announcement
- Presentation: January 2006 Semiannual Compliance Plan Summary
- AFRPA Response to Comments from Clearwater Revival Company Review of the Semiannual Compliance Plan Report – January 2006
- Media clippings regarding the former Kelly AFB

Mr. Rodrigo Garcia asked if there were any updates on the Leon Creek Fish Kill. There were no updates available, and information will be provided to the RAB when it is available.

Mr. Garcia, Ms. LaGrange and Mr. Perez requested copies of the January 2006 RAB transcript.

Mr. Silvas asked for a briefing on court case number: 1982CI02128 – State of Texas vs. Courtney Pennington, et al, and Ms. LaGrange also asked for the results of the court case.

### **III. Administrative**

A. Ms. Sonja Coderre provided an AFRPA update. No new issues have developed since the last meeting.

B. Ms. Norma Landez provided a BRAC Cleanup Team (BCT) Update. The final minutes from the February 2006 BCT meeting were included in meeting packets. No March BCT meeting was held.

### **IV. TAPP Answers and Questions– Mr. Rey Nieto**

Mr. Nieto briefed the audience on Technical Assistance for Public Participation (TAPP) funds, and outlined various projects that qualify, and do not qualify for TAPP funds. Handouts on the TAPP process, eligible and ineligible TAPP projects, nominating a potential provider, and a current balance of Kelly TAPP funds were also included in meeting packets.

Mr. Quintanilla requested training on parliamentarian procedure as a TAPP presentation. Mr. Quintanilla also referred to section 10.9.3.3. in the *Management Guidance for the Defense Environmental Restoration Program* (DERP), which outlined the waiver process for the \$100,000 total and \$25,000 annual TAPP funding limits. Mr. Quintanilla would like the committee to write two new TAPP requests: 1) \$2,100 for training on Robert's Rules of Order and 2) \$25,000 general fund request.

Mr. Garcia requested training on Zones 1-5 as a future TAPP project.

Mr. Silvas asked DD2749 forms be provided at the next meeting.

**V. PCEH Liver Studies – Ms. Kyle Cunningham/Melanie Rodriguez**

PCEH explained that past studies have shown higher than expected numbers of liver cancer cases in some ZIP codes surrounding the former base. Funding for a new study has been approved by AFRPA. Residents in the study area who have been diagnosed with primary liver cancer or those who have had a family member diagnosed with primary liver cancer are encouraged to participate in the study by calling HealthCare Resolution Services, Inc. at (210) 341-8200. The study area includes the following San Antonio ZIP codes: 78201, 78204, 78205, 78207, 78211, 78214, 78221, 78224, 78225, 78226, 78227, 78228, 78237 and 78242.

Ms. LaGrange requested copies of all outreach materials PCEH produced for the liver study announcement such as ads placed in LaPrensa and the Southside Reporter, including mailers sent to the community.

Mr. Garcia requested that Mr. Adam Antwine write a blank check to TCEQ and PCEH for air studies.

**VI. January 2006 Semiannual Compliance Plan Summary – Mr. Don Buelter**

Mr. Buelter provided a detailed summary on the information contained within the January 2006 Semiannual Compliance Plan Report. The full presentation was provided to all RAB members in meeting packets. Additionally, a copy of AFRPA's response to Clearwater Revival Company's review of the January 2005 Semiannual Compliance Plan Report was included in meeting packets.

Ms. Cunningham stated that funds from the City of San Antonio may be available for an additional review of reports such as the semiannual compliance plan report through Zephyr. Ms. Cunningham may be reached at (210) 532-5765.

**VII. Meeting Wrap-Up**

The next RAB meeting is scheduled to take place at 6:30 p.m., 11 April 2006 in the cafeteria of Kennedy High School, 1922 South General McMullen.

**VIII. Meeting Adjournment**

The meeting adjourned at 9:08 p.m.

## Attachments:

- Meeting agenda, 14 March 2006 TRS
  - Final BCT minutes, 16 February 2006
  - Documents placed in Cochair Library, March 2006 and January 2006/signed
  - AFRPA responses to Kelly RAB requests for information (RFIs)
  - January 2006 RAB action item report
  - TAPP waiver process handouts
  - Liver study announcement and news clippings
  - AFRPA briefing handouts, January 2006 Semiannual Compliance Plan Report
  - AFRPA Response to Comments, Re: Clearwater Revival Company review of the Semiannual Compliance Plan Report, Former Kelly AFB, January 2005
  - News clippings:
    - SA Current article, Bad news bearers, 1 February 2006
    - Mysa.com, Meeting set tonight in Kelly cleanup, 11 January 2006
    - Kens 5 website, Citizens voice concerns over former Kelly AFB, 11 January 2006
    - Mysa.com, Kelly's agency gets new name: Port Authority, 13 January 2006
    - Express-News, Study targets liver cancer deaths, 10 February 2006
- 

**Robert Silvas**  
Community Cochair

Date

**Adam Antwine**  
Installation Cochair

Date

**FINAL**  
**Former Kelly Air Force Base (AFB) BRAC Cleanup Team (BCT)**  
**16 February 2006 Meeting Minutes**

Item #	Lead	Support	Discussion Topic	Comments	Discussion Topic Concluded?	Disposition/Action Items
7.	Landez, N		Zone 2 Site Closure	Status of public comments for Dec 17 notice for 10 Zone 2 sites and subsequent closure approval letter.	Yes	The public comment period for the Proposed Corrective Measures for various sites in Zone 2 ended 14 February 2006. The TCEQ has not received any public comments to date, however will wait approximately one week to ensure all possible correspondence has been processed. TCEQ will notify AFRPA when they can proceed with deed recordation/notification for the ten sites.  The TCEQ requested the AFRPA address site specific concerns in the Final East Kelly SWMU and Data Gap Investigation – No Further Action Report dated April 2002. The TCEQ indicated the table provided to them is unclear as to which sites are closed and which sites are pending closure. The TCEQ requested AFRPA revise the table to more clearly indicate which sites remain open, which have closed and provide dates as necessary.
8.	Landez, N		Bldg 623 UST	Status of Bldg 623 UST closure report review/approval	Yes	AFRPA inquired about the review status of a tank closure report for Building 623 in the Site S-9 area submitted to the TCEQ in October or November. The TCEQ stated they will check the status of this report.
9.	Landez, N	Zone Managers	Pending Document Submittals	Review of documents to be submitted for regulatory review within the next 90 days; Status of documents already in review.	Yes	AFRPA inquired about the review status of the Zone 2 and Zone 3 CMS. The TCEQ stated the Zone 2 and Zone 3 CMS has not been reviewed to date.  The TCEQ indicated the Class 3 Modification for the Zone 4 and Zone 5 Corrective Measures Implementation Workplan is in review and either a Notice of Deficiency or Initial Draft Compliance Plan will be issued in April 2006.

**FINAL**  
**Former Kelly Air Force Base (AFB) BRAC Cleanup Team (BCT)**  
**16 February 2006 Meeting Minutes**

Item #	Lead	Support	Discussion Topic	Comments	Discussion Topic Concluded?	Disposition/Action Items
4. (cont.)	Landez, N	Braddy; Greg	Zone 1 Update	Review of project status for IRP Zone 1.	Yes	<p>tour.</p> <p>WESTON inquired whether it would be appropriate to provide portions of the CMS report to the TCEQ in electronic format to save paper, since much of the information has been submitted previously. The TCEQ responded unfortunately Central Records has no way of handling electronic records at this point and the entire CMS has to be submitted as a hard copy regardless of whether sections were previously submitted. The CMS must be a stand alone document.</p> <p>WESTON explained the two methods used for the risk evaluation. The first calculation was conducted using a typical Risk Reduction Standard evaluation on the maximum detected soil and groundwater concentrations, and secondly the risk was calculated using the 95% Upper Confidence Level (UCL).</p> <p>The TCEQ questioned the methodology of using soil data only at LF-12 because the buried drums still contain liquids and sludges and unless a drum leaked, and the underlying area was sampled, it would not be accurate to say the soil is protective of human health and the environment. WESTON noted they will discuss with the risk assessor and address in the assessment report..</p>
5.	Landez, N	Braddy; Greg	Zone 1 Tour	Tour of Zone 1 sites included in the Zone 1 CMS.	Tour Completed	
6.	Landez, N	Zone Managers	Additional Zone Updates	Review of major project status for IRP Zones 2, 3, 4 and 5.	Yes	<p>Zone 2:                      Response to TCEQ's letter regarding the Site S-4 institutional controls will be sent next week. The RCRA Facility Investigation (RFI) for the Environmental Process Control Facility (EPCF) will be submitted to the regulators at the end of April.</p> <p>Mr. Ruiz contacted AFRPA about the Site E-1 Area C removal action. AFRPA sent a letter indicating actions have been completed and the Easement has been terminated.</p> <p>Zone 4 and Zone 5: No updates to report.</p>



FINAL

Former Kelly Air Force Base (AFB) BRAC Cleanup Team (BCT)  
16 February 2006 Meeting Minutes

Item #	Lead	Support	Discussion Topic	Comments	Discussion Topic Concluded?	Disposition/Action Items
1. (cont.)	Patel, K.		Land Use Controls (LUCs)	Deed recordation/certification and alternate Land Use Controls (LUCs).	Yes	controls will be a factor in the closure of the landfills located on the realigned portion of Kelly AFB, and further discussions between the AF and the TCEQ will be required.
2.	Patel, K		Realigned Portions of Zone 5 - SWMU Closure Schedule	Current schedule for closure of the Compliance Plan (CP) SWMUs located on the realigned portion of Zone 5.	Yes	LAFB indicated Weston Solutions, Inc. (WESTON) San Antonio office will be conducting the SWMU closures on the realigned portion of Zone 5 and Mr. Bruce Wik is the WESTON Project Manager. LAFB indicated the TCEQ, specifically Mr. Gary Beyer, has agreed with a SWMU closure report submittal date of July 2006. WESTON will begin the field activities during the first week of March 2006. LAFB indicated WESTON was preparing a one page summary of soil screening criteria for the closure project and requested the TCEQ allow LAFB to screen soil samples utilizing TPH concentrations, before analyzing the samples for a whole suite of analytes. If analysis indicates TPH concentrations in soil are above laboratory detection limits, then the full suite of analytes would be run. LAFB indicated the screening criteria would be forwarded to the TCEQ and AFRPA for review and comments, by the end of the week and requested a conference call to discuss the criteria. KELLY The TCEQ inquired as to which Compliance Plan sites in Zone 5 are in the SWMU closure project and AFRPA responded they are the Building 894 CSA, the Bldg 966 Underground Storage Tanks (USTs), and the Bldg. 966 oil/water separator (OWS). # LAFB stated the other SWMUs being closed are the Building 920 OWS, Building 826 OWS, Building 814 OWS and the AAFES gas station OWS (Security Hill). AFRPA inquired whether the screening criteria included SPLP analysis if certain contaminant levels were reached, so as to avoid re-sampling costs. The TCEQ indicated when samples are collected for closure confirmation samples are typically analyzed using this method. LAFB indicated they would consider this approach. KELLY Regarding the sampling at Building 966, LAFB indicated the

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**Former Kelly Air Force Base (AFB) BRAC Cleanup Team (BCT)**  
**16 February 2006 Meeting Minutes**

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2. (cont.)	Patel, K.		Realigned Portions of Zone 5 - SWMU Closure Schedule	Current schedule for closure of the Compliance Plan (CP) SWMUs located on the realigned portion of Zone 5.	Yes	TCEQ had requested analyses of groundwater samples for BTEX as well as arsenic. LAFB informed the TCEQ WESTON was researching available analytical data on previous soil samples collected from Building 966 investigations to determine if BTEX was detected in the soil samples. LAFB proposed if BTEX had not been detected in the soil, then that analyses for BTEX in the groundwater samples for BTEX would not be needed. LAFB also indicated the arsenic at the site may be associated with JP-4 at the site.
3.	Landez, N		Realigned Portions of Zone 5 - Report Submittals	Requirements for submittals to the TCEQ/EPA concerning CP SWMUs located on the realigned portion of Zone 5.	Yes	AFRPA indicated it is their understanding the goal of the Compliance Plan SWMTU closures is either Risk Reduction Standard (RRS) 1 or RRS2. Sites closed to the RRS2 will require a 60 day public comment period when the closure report is approved. Then submittal of deed certification to the TCEQ will be required before final closure approval is granted. AFRPA noted LAFB's project schedule did not seem to include those steps. LAFB responded they believe the October 31, 2006 date allows sufficient time for those steps. LAFB asked the TCEQ if the closure reports for the Kelly Compliance Plan sites needed to come from AFRPA or LAFB. AFRPA indicated the closure reports for the sites noted in the Kelly Compliance Plan need to be submitted by AFRPA and cautioned LAFB that if the reports are submitted from LAFB directly to the TCEQ that the regulatory agency will reject them. The TCEQ reiterated the closure reports for the Compliance Plan sites are required to be submitted by AFRPA. The TCEQ also indicated the Zone 1 Corrective Measures Study (CMS) must be submitted by AFRPA because of Kelly Compliance Plan timelines.
4.	Landez, N	Braddy, Greg	Zone 1 Update	Review of project status for IRP Zone 1.	Yes	The Lackland AFB Remedial Action (RA) contractor (WESTON) provided a brief overview of the work currently being performed for the Corrective Measures Study (CMS) Investigation Report Environmental Zone 1 Sites; Lackland AFB, Texas. WESTON stated LAFB has mowed the landfill areas and a site tour of the landfills will give a good perspective of the area prior to regulatory review of the CMS. WESTON provided aerial maps and site maps of the landfills for the site

**FINAL**  
**Former Kelly Air Force Base (AFB) BRAC Cleanup Team (BCT)**  
**16 February 2006 Meeting Minutes**

Item #	Lead	Support	Discussion Topic	Comments	Discussion Topic Concluded?	Disposition/Action Items
1. (cont.)	Patel, K.		Land Use Controls (LUCs)	Deed recordation/certification and alternate Land Use Controls (LUCs).	Yes	<p>misinterpreting the General Services Administration (GSA) driver to restrictive covenants. The GSA owns the property, not the DOD. The DOD or any other military component is not the landowner for the federal property. The TCEQ indicated there is a GSA policy which allows deed notices and provided a copy of the policy to LAFB. The TCEQ stated the deed notice they require is not in conflict with the GSA policy, as it is not a restrictive covenant, it does not restrict property use.</p> <p>LAFB indicated not all DOD installations are following the correct procedures. LAFB again stated they cannot allow deed recordations on their property and requested to brief an alternate proposal to the BCT.</p> <p>After the presentation, the TCEQ indicated deed recordation is not an issue because the GSA policy talks of restrictive covenants. The TCEQ stated deed recordation is <u>not</u> a restrictive covenant. Deed recordation and restrictive covenants are two different things. Furthermore, if LAFB wants to close a site under RRS regulations, a deed notice or recordation must be filed and there are no variances to this requirement. Restrictive covenants are for the benefit of the State of Texas so the State can place a court injunction to stop what someone is illegally doing at a site. Restrictive covenants give the State the ability to file an injunction in court to stop an ongoing violation. Since sites closed using RRS regulations will be protective of human health and the environment, restrictive covenants are not needed. LAFB can perform deed notification but does not have authority to restrict property use while the installation is active.</p> <p>LAFB suggested a Memorandum of Agreement (MOA) between LAFB and the TCEQ regarding the use of alternate LUCs. An MOA can provide legal authority to the TCEQ in the event an LUC is not adhered to by the active installation. LAFB reiterated deed recordation is not allowed by the DOD policy at an active installation.</p> <p>The TCEQ noted the issue of land use controls and institutional</p>

**FINAL**  
**Former Kelly Air Force Base (AFB) BRAC Cleanup Team (BCT)**  
**16 February 2006 Meeting Minutes**

The meeting was conducted beginning at 10:00 a.m. on 16 February 2006 at the Air Force Real Property Agency Chief Operations Office – Kelly (AFRPA/COO-K) office in San Antonio, Texas, Conference Room No. 2. BCT members and support personnel attendance status are shown below.

Name	Organization	Present	Absent
<b>BCT Members</b>			
Norna Landez	AFRPA/COO-K	X	
Gary Miller	Environmental Protection Agency (EPA) / Region 6	X	
Mark Weegar	Texas Commission on Environmental Quality (TCEQ) (Austin)	X	
<b>Support Staff and Other Attendees</b>			
Don Buelter	AFRPA/COO-K		X
Leslie Brown	AFRPA/COO-K	X	
Luis Medina	AFRPA/COO-K	X	
Walter Peck	AFRPA/COO-K		X
Greg Lyssy	EPA/Region 6		X
Abbi Power	TCEQ/Region 13	X	
Ellie Wehner	TCEQ (Austin)	X	
Ravichandran Mahalingam	Lackland 37 CES/CEVR	X	
Kalpesh Patel	Lackland 37 CES/CEVR	X	
Ken Kebboll	US Army Corps of Engineers (USACE), Tulsa District	X	
Dan Davis	USACE, Tulsa District	X	
Amy Whitley	AFRPA/COO-K (TEAM Integrated Engineering, Inc. (TEAM))	X	
Kevin Tarleton	AFRPA/COO-K (TEAM Integrated Engineering, Inc. (TEAM))	X	
Greg Braddy	Weston Solutions, Inc. (WESTON)	X	

Item #	Lead	Support	Discussion Topic	Comments	Discussion Topic Concluded?	Disposition/Action Items
1.	Patel, K.		Land Use Controls (LUCs)	Deed recordation/certification and alternate Land Use Controls (LUCs).	Yes	Lackland Air Force Base (LAFB) provided a briefing regarding Deed Recordation and alternate Land Use Controls (LUCs) for their active installation. LAFB indicated Department of Defense (DOD) policy, dated 17 Jan 2001, states deed notification or land use restrictions cannot be used on an active DOD installation.  The TCEQ stated they have a state regulatory requirement which DOD cannot override. The TCEQ indicated LAFB was





DEPARTMENT OF THE AIR FORCE  
AIR FORCE REAL PROPERTY AGENCY

AFRPA/COO-Kelly  
143 Billy Mitchell Blvd. Ste 1  
San Antonio TX 78226-1816

JAN 30 2006

Mr. Armando Quintanilla  
70 Bristol Green  
San Antonio TX 78209

Dear Mr. Quintanilla

I received your request for information regarding the article published in the *Southside Reporter*, 12 January 2006, regarding the closure of ten Installation Restoration Program (IRP) sites located on the former Kelly AFB.

Indeed, the closure of these ten IRP sites is a great accomplishment in the Kelly environmental restoration program. We are excited to be able to announce this progress and know it is well received by community members such as yourself.

As we have discussed during the last few Kelly Restoration Advisory Board (RAB) meetings, AFRPA has made significant progress in the cleanup and property transfer programs. The final off-base construction project was completed at the end of 2005 and we are working with the regulators to complete on-base projects and finalize systems to meet cleanup standards and goals. Additionally, property transfer is scheduled to be completed within the next few years.

We will continue to publicize our activities and progress through the Kelly RAB and public notices. We look forward to providing such information as we reach milestones in the environmental and property transfer programs.

Thank you for your continued interest in the environmental restoration program at Kelly.

Sincerely

A handwritten signature in cursive script that reads "Adam G. Antwine".

ADAM G. ANTWINE  
Senior Representative



DEPARTMENT OF THE AIR FORCE  
AIR FORCE REAL PROPERTY AGENCY

AFRPA/DC-Kelly  
143 Billy Mitchell Blvd Ste 1  
San Antonio TX 78226-1816

JAN 23 2006

Mr. Robert Silvas  
22 Wayside  
San Antonio TX 78213

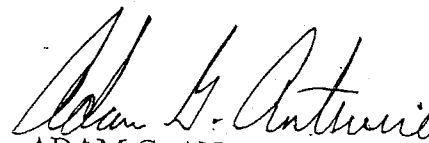
Dear Mr. Silvas

Thank you for attending the former Kelly Air Force Base (AFB) Restoration Advisory Board (RAB) Executive Committee Meeting held 5 January 2006. During the meeting, you submitted a request for information that is identical to a request for information you submitted dated 27 June 2005, which was responded to by AFRPA/ES on 13 July 2005. Your request identified a Texas Commission on Environmental Quality (TCEQ) letter dated 8 June 2005 referencing Incineration of Hazardous Materials at Kelly AFB - PIR #05.05.27.04 and several file numbers.

After further review, it was determined that the records you requested were not sufficiently described to enable the Air Force Real Property Agency (AFRPA) to locate the records with a reasonable search. If you would like to clarify (by providing either the type of record, title, index citation, subject area, date record was created, originator; the circumstances that resulted in the record being created; or the date and circumstances surrounding the event the record covers) the documents you wish AFRPA to provide and resubmit your request in writing, we will search our system of records to determine whether we have such documents.

Thank you for your continued interest in the Kelly Restoration Advisory Board.

Sincerely,

  
ADAM G. ANTWINE  
Senior Representative

Attachments:

1. Original RFI submitted by Robert Silvas, 27 June 2005.
2. Letter from Joyce Truett to Robert Silvas, 13 July 2005.

DEPARTMENT OF THE AIR FORCE  
AIR FORCE REAL PROPERTY AGENCY

JAN 31 2006

AFRPA/COO-Kelly  
143 Billy Mitchell Blvd Ste 1  
San Antonio TX 78226-1816Mr. Armando Quintanilla  
70 Bristol Green  
San Antonio TX 78209

Dear Mr. Quintanilla

Thank you for attending the former Kelly Air Force Base (AFB) Restoration Advisory Board (RAB) meeting held 10 January 2006. During the meeting, you requested documentation issued by the United States Environmental Protection Agency (EPA) outlining Superfund status scoring for the former Kelly AFB.

A response from EPA, dated 15 November 2005, was issued to all Kelly RAB members at the Kelly RAB Technical Review Subcommittee meeting held 13 December 2005. In addition to this response, EPA released confidential site file information for the former Kelly AFB to the public in November 2000. This information is available for public review at the Information Repository (IR), San Antonio Central Library, 600 North Soledad, 2<sup>nd</sup> Floor, San Antonio, TX 78205. The following information is available for your review at the IR, Index # 805A:

- Hazard Ranking System (HRS) Documentation Record for the former Kelly Air Force Base-Sludge Spreading Area dated 12 June 1984
- Final HRS Package for the former Kelly AFB dated 7 December 1987
- HRS Documentation Record for the former Kelly AFB dated 19 December 1995
- USAF Installation Program Hazard Assessment Rating Methodology dated 20 October 1982
- Installation Restoration Program-Phase I Records Search, the former Kelly AFB dated 12 August 1982

Thank you for your continued interest in the Kelly Restoration Advisory Board. If you have any questions, please call 925-0956.

Sincerely

A handwritten signature in cursive script that reads "Adam G. Antwine".

ADAM G. ANTWERNE  
Senior Representative



DEPARTMENT OF THE AIR FORCE  
AIR FORCE REAL PROPERTY AGENCY



FEB 03 2006

AFRPA/DC-Kelly  
143 Billy Mitchell Blvd Ste 1  
San Antonio TX 78226-1816

Dear Kelly Restoration Advisory Board Members

The Air Force Real Property Agency would like to remind all Kelly RAB members and alternates that a Technical Review Subcommittee (TRS) meeting will not take place in February 2006. As noted on the agenda at the 10 January 2006 RAB meeting, the next TRS meeting is scheduled on 14 March 2006, and the next RAB meeting will be scheduled on 11 April 2006.

At the 14 March 2006 TRS meeting, a briefing of the January 2006 Semiannual Compliance Plan Report will be conducted, for sampling events conducted April – December 2005. This meeting will also include a briefing conducted by the Public Center for Environmental Health (PCEH) on the subject of air monitoring during cleanup system construction. Additional updates will be provided in read ahead packets prior to the next meeting.

Thank you for your continued interest in the Kelly RAB. If you have any questions, please call 925-0956.

Sincerely

A handwritten signature in cursive script that reads "Adam G. Antwine".

ADAM G. ANTWINE  
Senior Representative

DEPARTMENT OF THE AIR FORCE  
AIR FORCE REAL PROPERTY AGENCY

AFRPA/DC-Kelly  
143 Billy Mitchell Blvd Ste 1  
San Antonio TX 78226-1816

FEB 22 2006

Mr. Robert Silvas  
22 Wayside  
San Antonio, TX 78213

Dear Mr. Silvas

You recently requested an electronic version of both the July 2005 Semiannual Compliance Plan Report and January 2006 Semiannual Compliance Plan Report.

Both reports, containing data collected from January 2005 through December 2005, are included in the attached CD. Copies of these documents are also available in the Information Repository located on the second floor of the San Antonio Central Public Library, 600 N. Soledad, in the Government Documents section.

Additionally, the January 2006 Semiannual Compliance Plan Report is scheduled to be reviewed at the Technical Review Subcommittee (TRS) meeting, 14 March 2006, at the Environmental Health and Wellness Center (EHWC).

Thank you for your continued interest in the environmental restoration program at the former Kelly AFB. If you have any questions, please contact Public Affairs Officer Sonja Coderre at (210) 925-0956.

Sincerely,

A handwritten signature in cursive script that reads "Adam G. Antwine".

ADAM G. ANTWINE  
Senior Representative

Attachments:  
Semiannual Compliance Plan CD:  
-July 2005 (January-June 2005)  
-January 2006 (July-December 2005)

DEPARTMENT OF THE AIR FORCE  
AIR FORCE REAL PROPERTY AGENCY



FEB 09 2006

AFRPA/COO-Kelly  
143 Billy Mitchell Blvd Ste 1  
San Antonio TX 78226-1816

Dear Kelly Restoration Advisory Board Members

The following is an action items report for the 10 January 2006 Kelly Restoration Advisory Board (RAB) meeting.

1. *Mr. Quintanilla asked that public transportation information be provided for future public meetings such as the recent Class 3 Modification public meeting.*

For the most current and accurate public transportation information, please contact VIA Metropolitan Transit at (210) 362-2020, or their website [www.viainfo.net](http://www.viainfo.net). Bus route information for current stops near AFRPA meeting locations are provided at Attachment 1. Bus schedules and routes are subject to change. Route 62 currently services KellyUSA and downtown, and makes frequent stops at Tinker and Duncan. Multiple routes service the Las Palmas Shopping Center, the location of the Environmental Health & Wellness Center, including Routes 68, 70 and 524. Route 62, which also stops at KellyUSA, makes frequent stops near Kennedy High School.

2. *Mr. Quintanilla recommended Ms. Subra be asked to provide the briefing given at the January 2006 RAB meeting at a future orientation training. He added that new members need explanations of what things such as Class 2 and 3 Modifications and Risk Reduction Standards (RRSs) are.*

At the present time, there are no new members on the Kelly RAB. The intent of new member workshops is to provide new RAB members information such as: RAB history, guidance and purpose, resources for the Kelly RAB, member roles and responsibilities, AFRPA overview, and an overall picture of the environmental restoration program at the former Kelly AFB.

Technical Review Subcommittee (TRS) meetings offer an ideal setting for learning about topics such as Class 2 and 3 modifications. For example, Class 3 Modification briefings were given by AFRPA personnel at both the October 2005 RAB and November 2005 TRS. Additionally, the Kelly RAB was informed about the Class 3 Modification public meeting for the Corrective Measures Implementation Work Plan for Zone 4 and Zone 5 at the former Kelly AFB. This public meeting took place 11 January 2006 at the Greater Kelly Development Authority (GKDA), where questions regarding this topic were addressed.

AFRPA meets in Executive Committee with the community cochair prior to every RAB and TRS meeting to discuss upcoming agenda topics. Suggestions for agenda topics should be provided to the community cochair for discussion during Executive Committee.

3. *Mr. Rodrigo Garcia stated that AFRPA needs to hire a contractor that will do a better, more professional job of writing reports such as the semiannual compliance plan, and create the reports using layman's terminology.*

As discussed at previous RAB and TRS meetings, the semiannual compliance plan report, by design, is a technical document. This type of report is designed to effectively convey technical information from the Air Force to the regulatory agencies such as the Texas Commission on Environmental Quality (TCEQ) and meet state regulatory requirements.

The Kelly RAB was provided \$100,000 in Technical Assistance for Public Participation (TAPP) funds to hire TAPP contractors to describe these types of reports in layman's terms. To date, the Kelly RAB has expended \$97,825 of this funding.

4. *Mr. Quintanilla asked that on the next Community Involvement Plan (CIP) update, AFRPA include information on Environmental Justice (EJ).*

AFRPA will consider this recommendation in updating the Kelly Community Involvement Plan.

5. *Ms. Hannapel asked for a report outlining responses AFRPA has received from community feedback forms.*

AFRPA currently inputs all responses from community feedback forms in an Access database. This survey tracking system was implemented in 2003 and includes all responses received from annual mailers, base tours, neighborhood association meetings, speakers' bureau events, etc. A current overall report calculating all feedback form responses received since 2003 is included as Attachment 2.

6. *Requests were made to receive copies of the transcript from the 13 December 2005 Technical Review Subcommittee (TRS) meeting by: Ms. Hannapel, Ms. Galvan, Mr. Perez, Mr. Garcia, Mr. Martinez, Ms. LaGrange.*

A copy of the transcript from the 13 December 2005 TRS meeting was mailed to each of the parties listed above on 17 January 2006.

7. *Mr. Quintanilla stated the Information Repository (IR) needs to be relocated near Kelly because the current location was too far from Kelly.*

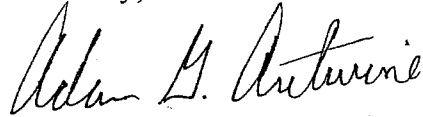
The Kelly IR, located at the San Antonio Central Library downtown, is a convenient location for the entire San Antonio community and is only 6.6 miles from the former Kelly AFB. Public transportation makes frequent stops downtown from all areas throughout the city, and the San Antonio Central Library has its own parking garage which provides one free hour of parking for patrons of the library.

8. Ms. Galvan asked for a review of the health studies conducted by Public Center for Environmental Health (PCEH).

Please refer to Attachment 3 for information regarding health studies conducted by PCEH.

Thank you for your continued interest in the Kelly Restoration Advisory Board.

Sincerely,



ADAM G. ANTWINE  
Senior Representative

Attachments:

1. VIA bus route information
2. Community feedback report
3. PCEH information sheet

INBOUND: TRAVELS FROM A → E

	A Tinker & Duncan	B Roselawn & Gen. McMullen	C Kirk & Frio City Rd.	D Brazos & Laredo	E Navarro & Villita
<b>AM</b>					
FG 5:24	5:29	5:37	5:42	5:50	
6:24	6:29	6:37	6:42	6:50	
7:24	7:29	7:37	7:42	7:50	
8:24	8:29	8:37	8:42	8:50	
FG 9:07	9:13	9:21	9:26	9:35	
9:37	9:43	9:51	9:56	10:05	
10:07	10:13	10:21	10:26	10:35	
10:37	10:43	10:51	10:56	11:05	
11:07	11:13	11:21	11:26	11:35	
11:37	11:43	11:51	11:56	12:05	
<b>PM</b>					
12:07	12:13	12:21	12:26	12:35	
12:37	12:43	12:51	12:56	1:05	
1:07	1:13	1:21	1:26	1:35	
1:37	1:43	1:51	1:56	2:05	
2:07	2:13	2:21	2:26	2:35	
2:37	2:43	2:51	2:56	3:05	
3:07	3:13	3:21	3:26	3:35	
3:37	3:43	3:51	3:56	4:05	
4:07	4:13	4:21	4:26	4:35	
4:37	4:43	4:51	4:56	5:05	
5:07	5:13	5:21	5:26	5:35	
5:37	5:43	5:51	5:56	6:05	
6:22	6:28	6:36	6:41	6:50	
7:25	7:30	7:37	7:42	7:50	
8:25	8:30	8:37	8:42	8:50	
9:25	9:30	9:37	9:42	9:50	
L10:54	10:59	11:06	11:10	11:18	

OUTBOUND: TRAVELS FROM F → A

	F St. Mary's & Martin	D Brazos & Laredo	C Kirk & Frio City Rd.	B Roselawn & Gen. McMullen	A Tinker & Duncan
<b>AM</b>					
5:53	6:05	6:09	6:16	6:21	
6:53	7:05	7:09	7:16	7:21	
7:53	8:05	8:09	8:16	8:21	
8:53	9:05	9:10	9:17	9:22	
9:26	9:39	9:44	9:51	9:56	
9:57	10:10	10:15	10:22	10:27	
10:27	10:40	10:45	10:52	10:57	
10:57	11:10	11:15	11:22	11:27	
11:27	11:40	11:45	11:52	11:57	
11:57	12:10	12:15	12:22	12:27	
<b>PM</b>					
12:27	12:40	12:45	12:52	12:57	
12:57	1:10	1:15	1:22	1:27	
1:27	1:40	1:45	1:52	1:57	
1:57	2:10	2:15	2:22	2:27	
2:27	2:40	2:45	2:52	2:57	
2:57	3:10	3:15	3:22	3:27	
3:27	3:40	3:45	3:52	3:57	
3:57	4:10	4:15	4:22	4:27	
4:27	4:40	4:45	4:52	4:57	
4:57	5:10	5:15	5:22	5:27	
5:27	5:40	5:45	5:52	5:57	
5:57	6:10	6:14	6:21	TG 6:26	
6:53	7:06	7:10	7:17	7:22	
7:53	8:06	8:10	8:17	8:22	
8:51	9:03	9:07	9:13	9:18	
9:51	10:03	10:07	10:13	TG 10:18	
L10:39	10:43	10:49	10:49	10:54	
L11:39	11:43	11:49	11:49	TG 11:54	

▶ SUNDAY

INBOUND: TRAVELS FROM A → E

	A Tinker & Duncan	B Roselawn & Gen. McMullen	C Kirk & Frio City Rd.	D Brazos & Laredo	E Navarro & Villita
<b>AM</b>					
FG 5:26	5:31	5:38	5:42	5:50	
FG 6:26	6:31	6:38	6:42	6:50	
7:26	7:31	7:38	7:42	7:50	
8:26	8:31	8:38	8:42	8:50	
9:26	9:31	9:38	9:42	9:50	
10:26	10:31	10:38	10:42	10:50	
11:26	11:31	11:38	11:42	11:50	
<b>PM</b>					
12:26	12:31	12:38	12:42	12:50	
1:26	1:31	1:38	1:42	1:50	
2:26	2:31	2:38	2:42	2:50	
3:26	3:31	3:38	3:42	3:50	
4:26	4:31	4:38	4:42	4:50	
5:26	5:31	5:38	5:42	5:50	
6:26	6:31	6:38	6:42	6:50	
7:26	7:31	7:38	7:42	7:50	
8:26	8:31	8:38	8:42	8:50	
9:26	9:31	9:38	9:42	9:50	
L10:54	10:59	11:06	11:10	11:18	

OUTBOUND: TRAVELS FROM F → A


	F St. Mary's & Martin	D Brazos & Laredo	C Kirk & Frio City Rd.	B Roselawn & Gen. McMullen	A Tinker & Duncan
<b>AM</b>					
6:53	7:05	7:09	7:16	7:21	
7:53	8:05	8:09	8:16	8:21	
8:53	9:05	9:09	9:16	9:21	
9:55	10:07	10:11	10:18	10:23	
10:55	11:07	11:11	11:18	11:23	
11:55	12:07	12:11	12:18	12:23	
<b>PM</b>					
12:55	1:07	1:11	1:18	1:23	
1:55	2:07	2:11	2:18	2:23	
2:55	3:07	3:11	3:18	3:23	
3:55	4:07	4:11	4:18	4:23	
4:55	5:07	5:11	5:18	5:23	
5:55	6:07	6:11	6:18	6:23	
6:53	7:05	7:09	7:16	7:21	
7:53	8:05	8:09	8:16	8:21	
8:51	9:03	9:07	9:13	9:18	
9:51	10:03	10:07	10:13	TG 10:18	
L10:39	10:43	10:49	10:49	10:54	
L11:39	11:43	11:49	11:49	TG 11:54	

L - Indicates routes that are modified for "lineup". Every night at 10:30 p.m. and 11:30 p.m., buses from many routes line up together downtown to give riders a last chance to transfer before they make final runs and return to the garage.

Route 62 lines up on St. Mary's at Commerce. Refer to VIA's lineup brochure for details.

FG & TG - From or to VIA garage at 1021 San Pedro.

Customer Service/Information:  
**362-2020** (1-866-362-2020)  
 TTY 362-2019  
 www.viainfo.net



**FARES:**

	ADULT	DISCOUNT*
• Metro, Frequent, Stop or Flex Service	\$ .80	\$ .40
• Bus Transfer Slip	1.45	.70
• Monthly Big Pass	20.00	10.00

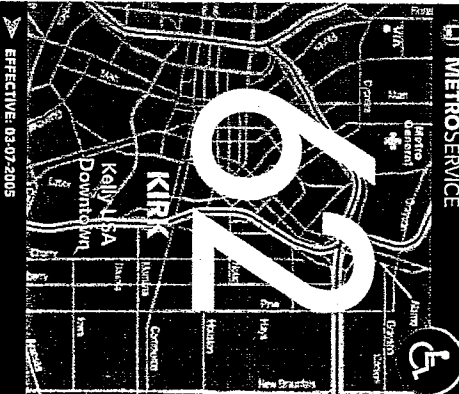
**VALETS PATRONS:** their personal care attendants and a companion (with VIA ID) ..... FREE  
 \* DISCOUNTS: Disabled fare and senior fare available to all eligible patrons (62 and older), students, persons with certain disabilities, Medicare recipients and children 5-11 (no ID required for children, 4 and under fare free).  
 \* REDUCED FARE: A VIA Reduced Fare ID is required and must be presented when boarding in order to pay reduced fares or use discounted passes. Call Customer Service to obtain the proper ID.

**TRAVELERS:** Transfer slips, which allow you to connect from one bus to another, must be used for transfers. Transfer slips are available at all VIA Information Centers or by mail order. In addition, there are many convenient retail pass outlets throughout the city.

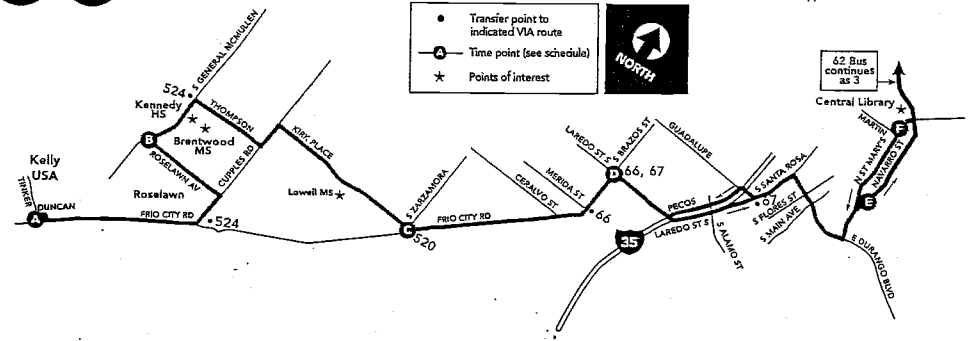
**PASSES:** Passes and ticket booklets are available at all VIA Information Centers.

**TIPS TO RIDE BY:**

- Be at your stop five minutes early
- Have correct change ready
- Please do not stand in aisle
- Exit through the rear door
- No smoking, eating or drinking on bus
- Please do not stand in aisle
- Exit through the rear door



**EFFECTIVE: 03-07-2005**



MONDAY - FRIDAY					MONDAY - FRIDAY				
INBOUND: TRAVELS FROM A → E					OUTBOUND: TRAVELS FROM F → A				
A	B	C	D	E	F	D	C	B	A
Tinker & Duncan	Roselawn & Gen. McMullen	Kirk & Frio City Rd.	Brazos & Laredo	Navarro & Villita	St. Mary's & Martin	Brazos & Laredo	Kirk & Frio City Rd.	Roselawn & Gen. McMullen	Tinker & Duncan
<b>AM</b>									
FG 4:53	4:59	5:06	5:11	5:20	5:25	5:38	5:42	5:49	5:55
FG 5:48	5:54	6:01	6:06	6:15	5:55	6:08	6:12	6:19	6:25
6:11	6:18	6:25	6:30	6:40	6:25	6:39	6:44	6:52	6:59
6:41	6:48	6:55	7:00	7:10	7:00	7:14	7:19	7:27	7:34
7:11	7:18	7:25	7:30	7:40	7:30	7:44	7:49	7:57	8:04
7:41	7:48	7:55	8:00	8:10	8:00	8:14	8:19	8:27	8:34
8:11	8:18	8:25	8:30	8:40	8:30	8:44	8:49	8:57	9:04
8:41	8:48	8:55	9:00	9:10	9:00	9:14	9:19	9:26	9:33
9:10	9:17	9:25	9:30	9:40	9:27	9:41	9:46	9:53	10:00
9:35	9:42	9:50	9:55	10:05	9:57	10:11	10:16	10:23	10:30
10:05	10:12	10:20	10:25	10:35	10:27	10:41	10:46	10:53	11:00
10:35	10:42	10:50	10:55	11:05	10:57	11:11	11:16	11:23	11:30
11:05	11:12	11:20	11:25	11:35	11:27	11:41	11:46	11:53	12:00
11:35	11:42	11:50	11:55	12:05	11:57	12:11	12:16	12:23	12:30
<b>PM</b>									
12:05	12:12	12:20	12:25	12:35	12:27	12:41	12:46	12:53	13:00
12:35	12:42	12:50	12:55	1:05	12:57	1:11	1:16	1:23	1:30
1:05	1:12	1:20	1:25	1:35	1:27	1:41	1:46	1:53	2:00
1:35	1:42	1:50	1:55	2:05	1:57	2:11	2:16	2:23	2:30
2:05	2:12	2:20	2:25	2:35	2:27	2:41	2:46	2:53	3:00
2:35	2:42	2:50	2:55	3:05	2:57	3:11	3:16	3:23	3:30
3:05	3:12	3:20	3:25	3:35	3:30	3:45	3:50	3:58	4:05
3:36	3:43	3:51	3:56	4:06	4:00	4:15	4:20	4:28	4:35
4:08	4:15	4:23	4:28	4:38	4:30	4:45	4:50	4:58	5:05
4:38	4:45	4:53	4:58	5:08	5:00	5:15	5:20	5:28	5:35
5:10	5:17	5:25	5:30	5:40	5:30	5:45	5:50	5:58	6:05
5:46	5:53	6:01	6:05	6:15	6:00	6:14	6:18	6:25	TG 6:31
6:22	6:28	6:36	6:40	6:50	6:27	6:41	6:45	6:52	TG 6:57
7:25	7:30	7:37	7:41	7:50	6:55	7:08	7:12	7:18	7:23
8:25	8:30	8:37	8:41	8:50	7:52	8:05	8:09	8:15	8:20
9:25	9:30	9:37	9:41	9:50	8:52	9:05	9:09	9:15	9:20
L10:54	10:59	11:06	11:10	11:18	9:52	10:05	10:09	10:15	TG10:20
						L10:39	10:43	10:49	10:54
						L11:39	11:43	11:49	TG11:54

L - Indicates routes that are modified for "lineup". Every night at 10:30 p.m. and 11:30 p.m., buses from many routes line up together downtown to give riders a last chance to transfer before they make final runs and return to the garage.

Route 62 lines up on St. Mary's at Commerce. Refer to VIA's lineup brochure for details.

FG & TG - From or to VIA garage at 1021 San Pedro.

**HOLIDAY SCHEDULES**  
 Bus service on VIA observed holidays will be provided as follows:

**Saturday Schedule** - Martin Luther King Day, Memorial Day & Friday after Thanksgiving

**Sunday Schedule** - New Year's Day, Labor Day, Thanksgiving and Christmas

Please look for notices on the bus, at [www.viainfo.net](http://www.viainfo.net) or call Customer Service at 362-2020 (select option 5) for holiday service for Independence Day, Veteran's Day, Christmas Eve, and New Year's Eve.

**SERVICES FOR RIDERS WITH DISABILITIES:** All VIA buses and many stops are now accessible to riders with disabilities. You can get bus schedule and other information in accessible formats. Please call 362-2020 or TTY 362-2019.

**BIKE & RIDE:** Take your bike on the bus! Every VIA bus has a bike rack, and it takes only seconds to mount your bike and be on your way. Or if you prefer, rent a bike locker--available at many Park & Ride locations. Call VIA Customer Service at 362-2020 for more information.

**PERSONAL TRIP PLANNER:** Plan your own bus trip online 24 hours a day. Log on to [www.viainfo.net](http://www.viainfo.net), and select Personal Trip Planner. Just enter where and when you want to go on the bus and the Trip Planner does the rest--providing you with step-by-step instructions and a map of your trip.

Table with columns A-E and rows for various bus routes (FG 503, 505, 605, 635, 705, 735, 805, 835, 903, 931, 1061, 1063, 1101, 1131, 1201, 1231, 1501, 1511, 201, 231, 301, 331, 401, 431, 501, 531, 605, 635, 650, 720, 750, 820, 850, 920, 950, 1020, L1101, L1201) and their corresponding departure times.

Table with columns F-A and rows for various bus routes (530(1), 542, 545, 532, 613, 643, 713, 813, 941, 1041, 1111, 1141, 1241, 1311, 1341, 211, 241, 311, 341, 411, 441, 541, 611, 645, 715, 745, 815, 845, 915, 945) and their corresponding departure times.

Table with columns A-E and rows for various bus routes (FG 542, 550, 620, 650, 720, 750, 805, 841, 847, 916, 946, 1016, 1046, 1116, 1146, 1216, 1246, 1316, 144, 216, 246, 316, 346, 416, 446, 516, 549, 620, 650, 720, 750, 820, 850, 920, 950, 1020, 1101, 1120) and their corresponding departure times.

Table with columns F-A and rows for various bus routes (612, 615, 622, 643, 713, 813, 941, 1041, 1111, 1141, 1241, 1311, 1341, 211, 241, 311, 341, 411, 441, 541, 611, 645, 715, 745, 815, 845, 915, 945) and their corresponding departure times.

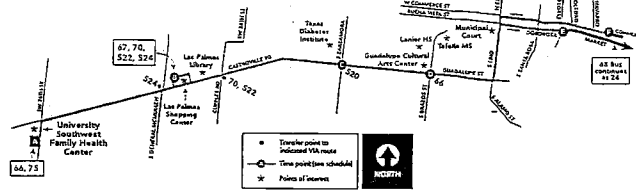
1-Coast to Law Palms only. FG & TG - From or to VIA garage at 1021 San Pedro

L - Indicates routes that are modified for "loop". Every night at 10:30 p.m. and 11:00 p.m., buses from many routes line up together downtown to give riders a last chance to transfer before they make final west and return to the garage.

Advertisement for California Community Foundation, including contact information (362-2020) and website (www.ccfinfo.net).

Advertisement for 100th Anniversary of the University of California, featuring a map of the campus and the text 'FREQUENT SERVICE'.





MONDAY-FRIDAY

EASTBOUND: TRAVELS FROM 4 → 3					WESTBOUND: TRAVELS FROM 3 → 4				
A	B	C	D	E	F	D	C	B	A
University Southwest Family Health Center	Las Palmas Shopping Center	Comalapa & Zaranova	Comalapa & Brazos	Comalapa & Flores	Comalapa & Astmo	Comalapa & Brazos	Comalapa & Zaranova	Las Palmas Shopping Center	University Southwest Family Health Center
<b>AM</b>					<b>AM</b>				
PG 5:05	PG 4:56	5:03	5:06	5:15	5:10	5:22	5:25	5:32	5:38
	5:18	5:21	5:20	5:29	5:23(1)	5:37	5:40	5:47	6:08
PG 5:35	5:41	5:48	5:51	6:00	5:55(1)	6:07	6:10	6:17	
6:04	6:08	6:11	6:17	6:20	6:10	6:22	6:25	6:32	6:39
6:31	6:33	6:31	6:35	6:45	6:25(1)	6:37	6:41	6:48	7:12
7:01	6:58	6:59	7:05	7:15	6:45(1)	7:09	7:13	7:20	7:42
7:31	7:08	7:16	7:20	7:30	7:25(1)	7:39	7:43	7:50	8:12
8:01	7:23	7:21	7:25	7:35	7:40	7:54	7:58	8:05	8:42
8:31	7:53	8:01	8:05	8:15	7:55(1)	8:09	8:13	8:20	8:42
	8:18	8:20	8:20	8:30	8:25(1)	8:39	8:43	8:50	9:13
	8:23	8:31	8:35	8:45	8:40	8:54	8:58	9:05	9:42
	8:31	8:36	8:50	9:00	8:55(1)	9:09	9:13	9:20	9:42
9:01	8:54	9:02	9:06	9:15	9:10	9:23	9:27	9:34	10:12
9:31	9:09	9:17	9:21	9:30	9:25(1)	9:38	9:42	9:49	10:12
	9:24	9:32	9:34	9:45	9:40	9:53	9:57	10:04	10:42
	9:39	9:47	9:51	10:00	9:55(1)	10:08	10:12	10:19	10:42
10:01	9:54	10:02	10:06	10:15	10:10	10:23	10:27	10:34	10:42
	10:09	10:17	10:21	10:30	10:25(1)	10:38	10:42	10:49	11:12
	10:24	10:32	10:36	10:45	10:40	10:53	10:57	11:04	11:12
10:31	10:39	10:47	10:51	11:00	10:55(1)	11:08	11:12	11:19	11:42
	10:54	11:02	11:06	11:15	11:10	11:23	11:27	11:34	11:42
11:01	11:09	11:17	11:21	11:30	11:25(1)	11:38	11:42	11:49	12:12
	11:24	11:32	11:36	11:45	11:40	11:53	11:57	12:04	12:12
11:31	11:39	11:47	11:51	12:00	11:55(1)	12:08	12:12	12:19	
	11:54	12:02	12:06	12:15					
<b>PM</b>					<b>PM</b>				
12:01	12:09	12:17	12:21	12:30	12:25(1)	12:38	12:42	12:49	12:42
	12:24	12:32	12:36	12:45	12:40	12:53	12:57	1:04	1:12
12:31	12:39	12:47	12:51	1:00	12:55(1)	1:08	1:12	1:19	1:12
	12:54	1:02	1:06	1:15	1:10	1:23	1:27	1:34	1:42
1:01	1:09	1:17	1:21	1:30	1:25(1)	1:38	1:42	1:49	1:42
	1:24	1:32	1:36	1:45	1:40	1:53	1:57	2:04	2:12
1:31	1:39	1:47	1:51	2:00	1:55(1)	2:08	2:12	2:19	2:12
	1:54	2:02	2:06	2:15	2:10	2:23	2:27	2:34	2:42
2:01	2:09	2:17	2:21	2:30	2:25(1)	2:38	2:42	2:49	3:12
	2:24	2:32	2:36	2:45	2:40	2:53	2:57	3:04	3:12
2:31	2:39	2:47	2:51	3:00	2:55(1)	3:08	3:12	3:19	3:12
	2:53	3:01	3:05	3:15	3:10	3:23	3:27	3:34	3:42
3:00	3:08	3:16	3:20	3:30	3:25(1)	3:38	3:42	3:49	4:12
	3:23	3:31	3:35	3:45	3:40	3:53	3:57	4:04	4:12
3:30	3:38	3:46	3:50	4:00	3:55(1)	4:08	4:12	4:19	4:12
	3:53	4:01	4:05	4:15	4:10	4:23	4:27	4:34	4:42
4:00	4:08	4:16	4:20	4:30	4:25(1)	4:38	4:42	4:49	5:12
	4:23	4:31	4:35	4:45	4:40	4:53	4:57	5:04	5:12
4:30	4:38	4:46	4:50	5:00	4:55(1)	5:08	5:12	5:19	5:12
	4:53	5:01	5:05	5:15	5:10	5:23	5:27	5:34	5:42
5:00	5:08	5:16	5:20	5:30	5:25(1)	5:38	5:42	5:49	6:12
	5:23	5:31	5:35	5:45	5:40	5:53	5:57	6:04	6:12
5:30	5:38	5:46	5:50	6:00	5:55(1)	6:08	6:12	6:19	6:12
	5:53	6:01	6:05	6:15	6:10	6:23	6:27	6:34	6:42
6:04	6:11	6:19	6:23	6:30	6:25(1)	6:38	6:42	6:49	6:42
	6:26	6:34	6:38	6:45	6:40	6:53	6:57	7:04	7:12
6:34	6:41	6:48	6:51	7:00	6:45	6:58	7:02	7:09	7:12
6:49	6:56	7:03	7:06	7:15	6:55	7:08	7:12	7:19	7:12
	7:19	7:26	7:30	7:35	7:15	7:28	7:32	7:39	7:42
7:19	7:26	7:33	7:36	7:45	7:25	7:38	7:42	7:49	7:42
8:00	8:07	8:14	8:17	8:25	8:15	8:28	8:32	8:39	8:42
	8:21	8:27	8:30	8:35	8:25	8:38	8:42	8:49	8:42
8:51	8:57	9:04	9:07	9:15	9:15	9:27	9:30	9:37	9:42
	9:21	9:27	9:30	9:35	9:15	9:27	9:30	9:37	9:42
9:31	9:37	9:44	9:47	9:55	9:45	9:57	10:00	10:07	10:12
	10:21	10:27	10:30	10:37					
	11:01	11:06	11:09	11:14					
	11:21	11:26	11:29	11:34					

1-Goes to Las Palmas only.

L - Indicates routes that are modified for "lineup". Every night at 10:30 p.m. and 11:30 p.m., buses from many routes line up together downtown to give riders a last chance to transfer before they make final runs and return to the garage.

Combined route 68-69 lines up on Comalapa west side of St. Mary's, leaves downtown on route 68, returns downtown on route 69. Refer to VIA lineup brochure for details.

FG & TG - From or to VIA garage at 1021 San Pedro.

**HOLIDAY SCHEDULES**  
Bus service on VIA observed holidays will be provided as follows:  
Saturday Schedule - Martin Luther King Day, Memorial Day & Friday after Thanksgiving  
Sunday Schedule - New Year's Day, Labor Day, Thanksgiving and Christmas  
Please look for notices on the bus, at [www.viainfo.net](http://www.viainfo.net) or call Customer Service at 362-2020 (select option 3) for holiday service for Independence Day, Veteran's Day, Christmas Eve, and New Year's Eve.

**BIKE & RIDE:** Take your bike on the bus! Every VIA bus has a bike rack, and it takes only seconds to mount your bike and be on your way. Or if you prefer, rent a bike locker—available at many Park & Ride locations. Call VIA Customer Service at 362-2020 for more information.

**SERVICES FOR RIDERS WITH DISABILITIES:** All VIA buses and many stops are now accessible to riders with disabilities. You can get bus schedule and other information in accessible formats. Please call 362-2020 or TTY 362-2019.

**PERSONAL TRIP PLANNER:** Plan your own bus trip online 24 hours a day. Log on to [www.viainfo.net](http://www.viainfo.net), and select Personal Trip Planner. Just enter where and when you want to go on the bus and the Trip Planner does the rest—providing you with step-by-step instructions and a map of your trip.

**SATURDAY**

**EASTBOUND: TRAVELS FROM A → D**

	<b>A</b> Las Palmas Shopping Center	<b>B</b> Durango & Zarzamora	<b>C</b> Buena Vista & Colbrado	<b>D</b> Dolorosa & S. Flores
<b>AM</b>				
FG 6:27	6:36	6:40	6:45	
7:27	7:36	7:40	7:45	
8:25	8:35	8:40	8:45	
9:25	9:35	9:40	9:45	
10:25	10:35	10:40	10:45	
11:22	11:33	11:38	11:45	
<b>PM</b>				
12:22	12:33	12:38	12:45	
1:22	1:33	1:38	1:45	
2:22	2:33	2:38	2:45	
3:22	3:33	3:38	3:45	
4:22	4:33	4:38	4:45	
5:24	5:34	5:39	5:45	
6:24	6:34	6:39	6:45	
7:24	7:34	7:39	TG 7:45	

**WESTBOUND: TRAVELS FROM E → A**

	<b>E</b> Alamo & Durango	<b>C</b> Buena Vista & Colbrado	<b>B</b> Durango & Zarzamora	<b>A</b> Las Palmas Shopping Center
<b>AM</b>				
6:45	6:57	7:02	7:10	
7:45	7:57	8:02	8:11	
8:45	8:58	9:02	9:11	
9:45	9:58	10:02	10:11	
10:45	10:58	11:02	11:11	
11:45	11:59	12:04	12:13	
<b>PM</b>				
12:45	12:59	1:04	1:13	
1:45	1:59	2:04	2:13	
2:45	2:59	3:04	3:13	
3:45	3:59	4:04	4:13	
4:45	4:59	5:04	5:13	
5:45	5:58	6:02	6:11	
6:45	6:58	7:02	7:11	

FG & TG - From or to VIA garage at 1021 San Pedro

**PERSONAL TRIP PLANNER:** Plan your own bus trip online 24 hours a day. Log on to [www.viainfo.net](http://www.viainfo.net), and select Personal Trip Planner. Just enter where and when you want to go on the bus and the Trip Planner does the rest—providing you with step-by-step instructions and a map of your trip.

**HOLIDAY SCHEDULES**

Bus service on VIA observed holidays will be provided as follows:

**Saturday Schedule** - Martin Luther King Day, Memorial Day & Friday after Thanksgiving

**Sunday Schedule** - New Year's Day, Labor Day, Thanksgiving and Christmas

Please look for notices on the bus, at [www.viainfo.net](http://www.viainfo.net) or call Customer Service at 362-2020 (select option 5) for holiday service for Independence Day, Veteran's Day, Christmas Eve, and New Year's Eve.

Customer Service/Information:  
**362-2020** (1-866-362-2020)  
 TTY 362-2019  
[www.viainfo.net](http://www.viainfo.net)

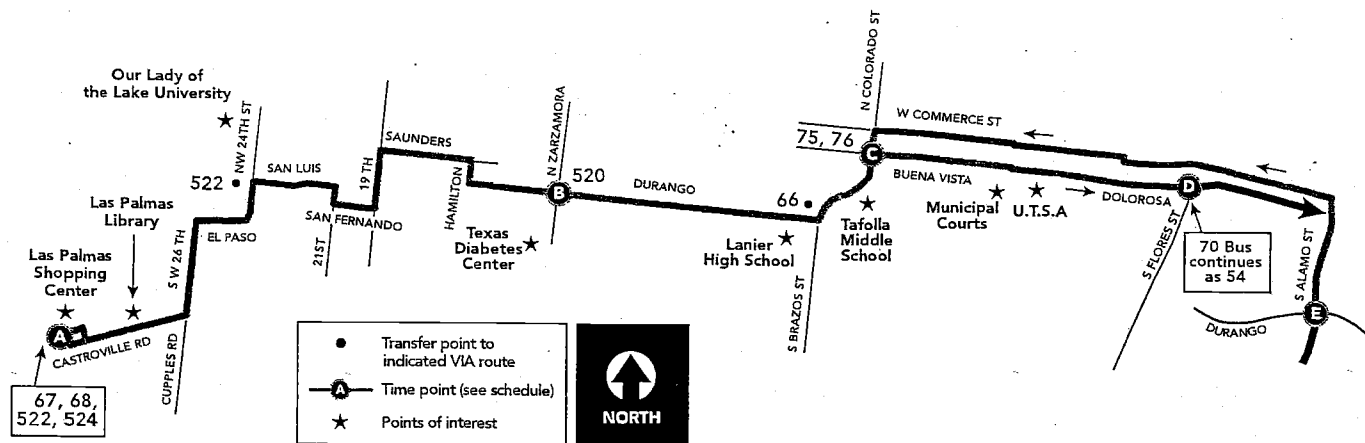
- TIPS TO RIDE BY:**
- Be at your stop five minutes early.
  - Have correct change ready (operators do not carry change).
  - No smoking, eating or drinking on bus.
  - Please do not stand in aisle.
  - Exit through the rear door.
- VIATrans PATRONS:** their personal care attendants and a companion (with VIA ID)..... **FREE**
- OFF PEAK SPECIAL:** Seniors and persons with limited mobility (with VIA ID - 9 a.m. to 3 p.m. weekdays and all day weekends)..... **20¢**
- \* DISCOUNTS:** Discounted fares and passes are available to the following: seniors (62 and older), students, persons with certain disabilities, Medicare recipients and children 5-11 (no ID required for children, 4 and under ride free).
- \* REDUCED FARE ID:** A VIA Reduced Fare ID is required and must be presented when boarding in order to pay reduced fares or use discounted passes. Call Customer Service to obtain the proper ID.
- TRANSFERS:** Transfer Slips, which allow you to connect from one bus to another, must be purchased when boarding and are valid on date issued within 2 hours from time indicated. If transferring from a regular service to Express Service, additional fare is required.
- PASSES:** Passes and ticket booklets are available at all VIA Information Centers or by mail order. In addition, there are many convenient retail pass outlets throughout the city.
- | FARES:                             | ADULT  | DISCOUNT* |
|------------------------------------|--------|-----------|
| • Metro, Frequent, or Skip Service | \$ .80 | \$ .40    |
| • Express Service                  | 1.60   | .80       |
| • Bus Transfer Slip                | .15    | .07       |
| • Monthly Big Pass                 | 20.00  | 10.00     |

**WEST DURANGO**  
 Las Palmas Shopping Center  
 Downtown  
 New Brango

**METROSERVICE**

**EFFECTIVE: 05-30-2005**

**70**  **70 Bus continues as 54**



**MONDAY - FRIDAY**

**EASTBOUND: TRAVELS FROM A → D**

	<b>A</b> Las Palmas Shopping Center	<b>B</b> Durango & Zarzamora	<b>C</b> Buena Vista & Colorado	<b>D</b> Dolorosa & S. Flores
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AM	FG 5:26	5:35	5:40	5:45
	6:25	6:35	6:40	6:45
	7:25	7:35	7:40	7:45
	8:24	8:34	8:39	8:45
	9:24	9:34	9:39	9:45
	10:24	10:34	10:39	10:45
	11:24	11:35	11:39	11:45
PM	12:24	12:35	12:39	12:45
	1:24	1:35	1:39	1:45
	2:24	2:35	2:39	2:45
	3:24	3:33	3:39	3:45
	4:24	4:35	4:40	4:45
	5:25	5:35	5:40	5:45
	6:25	6:35	6:40	6:45
	7:27	7:37	7:41	TG 7:45

**WESTBOUND: TRAVELS FROM E → A**

	<b>E</b> Alamo & Durelgo	<b>C</b> Buena Vista & Colorado	<b>B</b> Durango & Zarzamora	<b>A</b> Las Palmas Shopping Center
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AM	5:45	5:56	6:00	6:07
	6:45	6:58	7:03	7:11
	7:45	7:58	8:03	8:11
	8:45	8:59	9:03	9:11
	9:45	9:59	10:03	10:11
	10:45	10:59	11:03	11:12
	11:45	11:59	12:03	12:12
PM	12:45	1:01	1:05	1:14
	1:45	2:01	2:05	2:14
	2:45	3:01	3:06	3:16
	3:45	4:02	4:07	4:16
	4:45	4:59	5:04	5:13
	5:45	5:59	6:04	6:13
	6:45	6:59	7:04	7:12

FG & TG - From or to VIA garage at 1021 San Pedro

**SERVICES FOR RIDERS WITH DISABILITIES:** All VIA buses and many stops are now accessible to riders with disabilities. You can get bus schedule and other information in accessible formats. Please call 362-2020 or TTY 362-2019.

**BIKE & RIDE:** Take your bike on the bus! Every VIA bus has a bike rack, and it takes only seconds to mount your bike and be on your way. Or if you prefer, rent a bike locker—available at many Park & Ride locations. Call VIA Customer Service at 362-2020 for more information.

**▶ SATURDAY**

**NORTHBOUND: TRAVELS FROM A → G**

A	B	C	D	E	F	G
SW General Hosp.	Military Dr. & Bynum	McMullen & Thompson	McMullen & Castroville	McMullen & Culebra	Babcock & St. Cloud	Crossroads Park & Ride
<b>AM</b>						
FG 6:05	6:08	6:17	6:25	6:33	6:40	6:47
7:05	7:08	7:17	7:25	7:33	7:40	7:47
8:05	8:08	8:17	8:25	8:33	8:40	8:47
FG 8:35	8:38	8:47	8:55	9:03	9:11	9:18
9:05	9:09	9:18	9:23	9:31	9:39	9:46
9:35	9:39	9:48	9:53	10:01	10:09	10:16
10:05	10:09	10:18	10:23	10:31	10:39	10:46
10:35	10:39	10:48	10:53	11:01	11:09	11:16
11:05	11:09	11:18	11:23	11:31	11:39	11:46
11:35	11:39	11:48	11:53	12:01	12:09	12:16
<b>PM</b>						
12:05	12:09	12:18	12:23	12:31	12:39	12:46
12:35	12:39	12:48	12:53	1:01	1:09	1:16
1:05	1:09	1:18	1:23	1:31	1:39	1:46
1:35	1:39	1:48	1:53	2:01	2:09	2:16
2:05	2:09	2:18	2:23	2:31	2:39	2:46
2:35	2:39	2:48	2:53	3:01	3:09	3:16
3:05	3:09	3:18	3:23	3:31	3:39	3:46
3:35	3:39	3:48	3:53	4:01	4:09	4:16
4:05	4:09	4:18	4:23	4:31	4:39	4:46
4:35	4:39	4:48	4:53	5:01	5:09	5:16
5:05	5:09	5:18	5:23	5:31	5:39	TG 5:46
5:35	5:39	5:48	5:53	6:01	6:09	6:16
6:20	6:23	6:32	6:37	6:45	6:53	TG 7:00

**SOUTHBOUND: TRAVELS FROM G → A**

G	F	E	D	C	B	A
Crossroads Park & Ride	Babcock & St. Cloud	McMullen & Culebra	McMullen & Castroville	McMullen & Thompson	Military Dr. & Bynum	SW General Hosp.
<b>AM</b>						
FG 6:10	6:17	6:24	6:31	6:35	6:44	6:51
7:10	7:17	7:24	7:31	7:35	7:44	7:51
8:10	8:17	8:24	8:31	8:35	8:44	8:51
FG 8:40	8:47	8:54	9:01	9:06	9:16	9:24
9:10	9:17	9:24	9:32	9:37	9:47	9:55
9:40	9:47	9:54	10:02	10:07	10:17	10:25
10:10	10:17	10:24	10:32	10:37	10:47	10:55
10:40	10:47	10:54	11:02	11:07	11:17	11:25
11:10	11:17	11:24	11:32	11:37	11:47	11:55
11:40	11:47	11:54	12:02	12:07	12:17	12:25
<b>PM</b>						
12:10	12:17	12:24	12:32	12:37	12:47	12:55
12:40	12:47	12:54	1:02	1:07	1:17	1:25
1:10	1:17	1:24	1:32	1:37	1:47	1:55
1:40	1:47	1:54	2:02	2:07	2:17	2:25
2:10	2:17	2:24	2:32	2:37	2:47	2:55
2:40	2:47	2:54	3:02	3:07	3:17	3:25
3:10	3:17	3:24	3:32	3:37	3:47	3:55
3:40	3:47	3:54	4:02	4:07	4:17	4:25
4:10	4:17	4:24	4:32	4:37	4:47	4:55
4:40	4:47	4:54	5:02	5:07	5:17	5:25
5:10	5:17	5:24	5:32	5:37	5:47	5:55
5:40	5:47	5:54	6:02	6:07	6:16	TG 6:23
6:25	6:32	6:39	6:47	6:52	7:01	TG 7:08

**▶ SUNDAY**

**NORTHBOUND: TRAVELS FROM A → G**

A	B	C	D	E	F	G
SW General Hosp.	Military Dr. & Bynum	McMullen & Thompson	McMullen & Castroville	McMullen & Culebra	Babcock & St. Cloud	Crossroads Park & Ride
<b>AM</b>						
FG 7:05	7:08	7:17	7:25	7:33	7:40	7:47
8:05	8:08	8:17	8:25	8:33	8:40	8:47
9:05	9:09	9:18	9:23	9:31	9:39	9:46
10:05	10:09	10:18	10:23	10:31	10:39	10:46
11:05	11:09	11:18	11:23	11:31	11:39	11:46
<b>PM</b>						
12:05	12:09	12:18	12:23	12:31	12:39	12:46
1:05	1:09	1:18	1:23	1:31	1:39	1:46
2:05	2:09	2:18	2:23	2:31	2:39	2:46
3:05	3:09	3:18	3:23	3:31	3:39	3:46
4:05	4:09	4:18	4:23	4:31	4:39	4:46
5:05	5:09	5:18	5:23	5:31	5:39	5:46
6:05	6:08	6:17	6:22	6:30	6:38	TG 6:45

**SOUTHBOUND: TRAVELS FROM G → A**

G	F	E	D	C	B	A
Crossroads Park & Ride	Babcock & St. Cloud	McMullen & Culebra	McMullen & Castroville	McMullen & Thompson	Military Dr. & Bynum	SW General Hosp.
<b>AM</b>						
FG 7:10	7:17	7:24	7:31	7:35	7:44	7:51
8:10	8:17	8:24	8:31	8:35	8:44	8:51
9:10	9:17	9:24	9:32	9:37	9:47	9:55
10:10	10:17	10:24	10:32	10:37	10:47	10:55
11:10	11:17	11:24	11:32	11:37	11:47	11:55
<b>PM</b>						
12:10	12:17	12:24	12:32	12:37	12:47	12:55
1:10	1:17	1:24	1:32	1:37	1:47	1:55
2:10	2:17	2:24	2:32	2:37	2:47	2:55
3:10	3:17	3:24	3:32	3:37	3:47	3:55
4:10	4:17	4:24	4:32	4:37	4:47	4:55
5:10	5:17	5:24	5:32	5:37	5:47	5:55
6:10	6:17	6:24	6:32	6:37	6:46	TG 6:53

FG & TG - From or to VIA garage at 1021 San Pedro.

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**Sunday Schedule -** New Year's Day, Labor Day, Thanksgiving and Christmas

Please look for notices on the bus, at [www.viainfo.net](http://www.viainfo.net) or call Customer Service at 362-2020 (select option 5) for holiday service for Independence Day, Veteran's Day, Christmas Eve, and New Year's Eve.

Customer Service/Information:  
**362-2020 (1-866-362-2020)**  
 TTY 362-2019  
[www.viainfo.net](http://www.viainfo.net)

**FARES:**

	ADULT	DISCOUNT*
• Metro, Region, Slip or Fax Service	\$ .80	\$ .40
• Express Service	1.40	.80
• Bus Transfer Slip	.15	.07
• Monthly Big Pass	20.00	10.00

**VIA FARE PATRONS:** their personal care attendants and a companion (with VA ID).....FREE

**OFF PEAK SPECIAL:** Seniors and youth with fixed disability (with VA ID - 9 am to 3 pm, weekdays and all day weekends).....20¢

**DISCOUNTS:** Discounted fares and passes are available to the following:

- Seniors (62 and older), students, persons with certain disabilities, Medicare recipients and children 5-11 (no ID required for children, 4 and under ride free).
- \* **REDUCED FARE:** A VIA Reduced Fare ID is required and must be presented when boarding in order to pay reduced fares or use discounted passes. Call Customer Service to obtain the proper ID.

**TRANSFERS:** Transfer Slips, which allow you to connect from one bus to another must be purchased when boarding and are valid for two hours of date issued. If transferring from a regular service to Express Service, additional fare is required.

**PASSENGERS:** Passes and ticket booklets are available at all VIA Information Centers or retail order. In addition, there are many convenient retail pass outlets throughout the city.

**TIPS TO RIDE BY:**

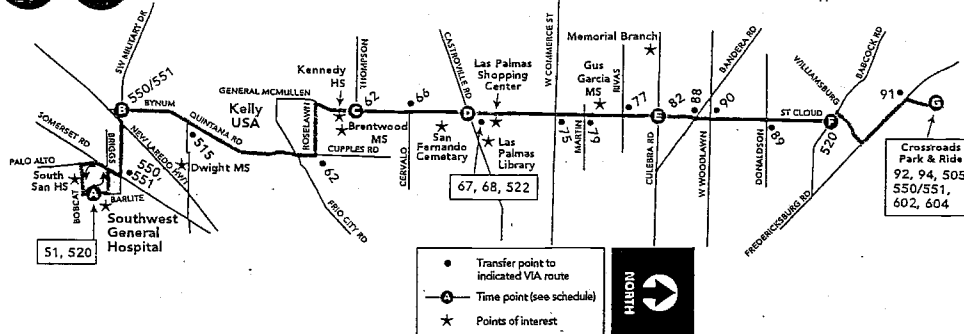
- Be at your stop five minutes early.
- No smoking, eating or drinking on bus.
- Have your fare ready.
- Please do not stand in aisle.
- Operators do not carry change.
- Exit through the rear door.

**GENERAL McMULLEN FREQUENT SERVICE**

Crossroads Park & Ride, Las Palmas Shopping Ctr., Southwest State Hospital

**362-2020**

EFFECTIVE: 11-01-2004



• Transfer point to indicated VIA route  
 ○ Time point (see schedule)  
 ★ Points of interest



**MONDAY - FRIDAY**

**NORTHBOUND: TRAVELS FROM A → G**

A	B	C	D	E	F	G
SW General Hosp.	Military Dr. & Bynum	McMullen & Thompson	McMullen & Castroville	McMullen & Culebra	Babcock & St. Cloud	Crossroads Park & Ride
<b>AM</b>						
FG 6:05	6:08	6:17	6:23	6:32	6:40	6:47
FG 6:20	6:23	6:32	6:38	6:47	6:55	7:02
6:35	6:39	6:49	6:55	7:04	7:12	7:19
FG 6:50	6:54	7:04	7:10	7:19	7:27	7:34
7:05	7:09	7:19	7:25	7:34	7:42	7:49
7:20	7:24	7:34	7:40	7:49	7:57	8:04
7:35	7:39	7:49	7:55	8:04	8:12	8:19
7:50	7:54	8:04	8:10	8:19	8:27	8:34
8:05	8:09	8:19	8:25	8:34	8:42	8:49
8:20	8:24	8:32	8:38	8:47	8:55	9:02
8:35	8:39	8:47	8:53	9:02	9:10	9:17
8:50	8:54	9:02	9:08	9:17	9:25	9:32
9:05	9:09	9:17	9:23	9:32	9:40	9:47
9:20	9:24	9:32	9:38	9:47	9:55	10:02
9:35	9:39	9:47	9:53	10:02	10:10	10:17
9:50	9:54	10:02	10:08	10:17	10:25	10:32
10:05	10:09	10:17	10:23	10:32	10:40	10:47
10:20	10:24	10:32	10:38	10:47	10:55	11:02
10:35	10:39	10:47	10:53	11:02	11:10	11:17
10:50	10:54	11:02	11:08	11:17	11:25	11:32
11:05	11:09	11:19	11:25	11:34	11:42	11:49
11:20	11:24	11:34	11:40	11:49	11:57	12:04
11:35	11:39	11:49	11:55	12:04	12:12	12:19
11:50	11:54	12:04	12:10	12:19	12:27	12:34
<b>PM</b>						
12:05	12:09	12:19	12:25	12:34	12:42	12:49
12:20	12:24	12:34	12:40	12:49	12:57	1:04
12:35	12:39	12:49	12:55	1:04	1:12	1:19
12:50	12:54	1:04	1:10	1:19	1:27	1:34
1:05	1:09	1:19	1:25	1:34	1:42	1:49
1:20	1:24	1:34	1:40	1:49	1:57	2:04
1:35	1:39	1:49	1:55	2:04	2:12	2:19
1:50	1:54	2:04	2:11	2:20	2:28	2:35
2:05	2:09	2:19	2:26	2:35	2:43	2:50
2:20	2:24	2:34	2:41	2:50	2:58	3:05
2:35	2:39	2:49	2:56	3:05	3:13	3:20
2:50	2:54	3:04	3:11	3:20	3:28	3:35
3:05	3:09	3:19	3:26	3:35	3:43	3:50
3:20	3:24	3:34	3:41	3:50	3:58	4:05
3:35	3:39	3:49	3:56	4:05	4:13	4:20
		FG4:00(1)	4:07	4:16	4:24	TG 4:31
3:50	3:54	4:04	4:10	4:19	4:27	4:34
4:05	4:09	4:18	4:24	4:33	4:41	4:48
4:20	4:24	4:33	4:39	4:48	4:56	5:03
4:35	4:39	4:48	4:54	5:03	5:11	5:18
4:50	4:54	5:03	5:09	5:18	5:26	5:33
5:05	5:09	5:18	5:24	5:33	5:41	5:48
5:20	5:24	5:33	5:39	5:48	5:56	TG 6:03
5:35	5:39	5:48	5:53	6:02	6:10	6:17
5:50	5:54	6:03	6:08	6:17	6:25	TG 6:32
6:20	6:24	6:33	6:38	6:47	6:55	7:02

**SOUTHBOUND: TRAVELS FROM G → A**

G	F	E	D	C	B	A
Crossroads Park & Ride	Babcock & St. Cloud	McMullen & Culebra	McMullen & Castroville	McMullen & Thompson	Military Dr. & Bynum	SW General Hosp.
<b>AM</b>						
FG 6:10	6:17	6:26	6:35	6:40	6:50	6:58
FG 6:25	6:32	6:41	6:50	6:55	7:05	7:13
FG 6:40	6:48	6:57	7:06	7:11	7:21	7:29
6:55	7:03	7:12	7:21	7:26	7:36	7:44
7:10	7:18	7:27	7:36	7:41	7:51	7:59
7:25	7:33	7:42	7:51	7:56	8:06	8:14
7:40	7:48	7:57	8:06	8:11	8:21	8:28
7:55	8:03	8:12	8:21	8:26	8:35	8:42
8:10	8:18	8:26	8:34	8:39	8:48	8:55
8:25	8:32	8:40	8:48	8:53	9:02	9:09
8:40	8:47	8:55	9:03	9:08	9:17	9:24
8:55	9:02	9:10	9:18	9:23	9:32	9:39
9:10	9:17	9:25	9:33	9:38	9:47	9:54
9:25	9:32	9:40	9:48	9:53	10:02	10:09
9:40	9:47	9:55	10:03	10:08	10:17	10:24
9:55	10:02	10:10	10:18	10:23	10:32	10:39
10:10	10:17	10:25	10:33	10:38	10:47	10:54
10:25	10:32	10:40	10:48	10:53	11:02	11:10
10:40	10:47	10:55	11:03	11:08	11:17	11:25
10:55	11:02	11:10	11:18	11:23	11:32	11:40
11:10	11:17	11:25	11:33	11:38	11:47	11:55
11:25	11:32	11:40	11:48	11:53	12:02	12:10
11:40	11:47	11:55	12:03	12:08	12:17	12:25
11:55	12:02	12:10	12:18	12:23	12:32	12:40
<b>PM</b>						
12:10	12:17	12:25	12:33	12:38	12:47	12:55
12:25	12:32	12:40	12:48	12:53	1:02	1:10
12:40	12:47	12:55	1:03	1:08	1:17	1:25
12:55	1:02	1:10	1:18	1:23	1:32	1:40
1:10	1:17	1:25	1:33	1:38	1:47	1:55
1:25	1:32	1:40	1:48	1:53	2:02	2:10
1:40	1:47	1:55	2:03	2:08	2:18	2:26
1:55	2:02	2:11	2:20	2:25	2:35	2:43
2:10	2:17	2:26	2:35	2:40	2:50	2:58
2:25	2:32	2:41	2:50	2:55	3:05	3:13
2:40	2:47	2:56	3:05	3:10	3:20	3:28
2:55	3:02	3:11	3:20	3:25	3:35	3:43
3:10	3:17	3:26	3:35	3:40	3:50	3:58
3:25	3:32	3:41	3:50	3:55	4:05	4:12
3:40	3:47	3:56	4:05	4:09	4:18	4:25
3:55	4:02	4:11	4:20	4:24	4:33	4:40
4:10	4:17	4:26	4:35	4:39	4:48	4:55
4:25	4:32	4:41	4:50	4:54	5:03	5:10
4:40	4:47	4:56	5:05	5:09	5:18	5:25
4:55	5:02	5:11	5:20	5:24	5:33	5:40
5:10	5:17	5:26	5:35	5:39	5:48	TG 5:55
5:25	5:32	5:41	5:50	5:54	6:03	6:10
5:40	5:47	5:55	6:03	6:07	6:16	TG 6:23
5:55	6:02	6:10	6:18	6:22	6:31	TG 6:38
6:25	6:32	6:40	6:48	6:52	7:01	TG 7:08
7:05	7:12	7:20	7:28	7:32	7:41	TG 7:48

1 - This trip runs on school days only. Subject to change.  
 FG & TG - From or to VIA garage at 1021 San Pedro.

**HOLIDAY SCHEDULES**  
 Bus service on VIA observed holidays will be provided as follows:  
 Saturday Schedule - Martin Luther King Day, Memorial Day & Friday after Thanksgiving  
 Sunday Schedule - New Year's Day, Labor Day, Thanksgiving and Christmas  
 Please look for notices on the bus, at [www.viainfo.net](http://www.viainfo.net) or call Customer Service at 362-2020 (select option 5) for holiday service for Independence Day, Veteran's Day, Christmas Eve, and New Year's Eve.

**SERVICES FOR RIDERS WITH DISABILITIES:** All VIA buses and many stops are now accessible to riders with disabilities. You can get bus schedule and other information in accessible formats. Please call 362-2020 or TTY 362-2019.

**BIKE & RIDE:** Take your bike on the bus! Every VIA bus has a bike rack, and it takes only seconds to mount your bike and be on your way. Or if you prefer, rent a bike locker—available at many Park & Ride locations. Call VIA Customer Service at 362-2020 for more information.

# Overall Kelly Community Feedback Report

Total Surveys Submitted: 394

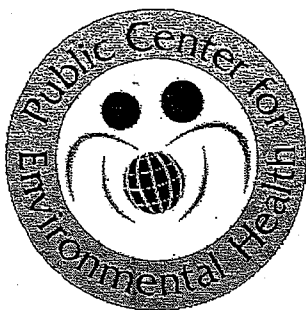
	English	Spanish
Feedback Forms completed in	98.0%	2.0%

During the past 12 months, have you . . .	Yes	No	Don't Know	No Response
Receieved by mail any information about the cleanup?	29.7%	62.9%	5.3%	2.0%
Heard anything about the cleanup in the news?	50.5%	43.9%	3.8%	1.8%
Talked to a friend or neighbor about the cleanup?	28.4%	67.5%	1.3%	2.8%
Spoken or interacted with an Air Force representative?	15.2%	81.5%	1.0%	2.3%

How familiar or unfamiliar are you with the environmental cleanup at Kelly?									
Very Familiar	6.3%	Somewhat Familiar	39.1%	Somewhat Unfamiliar	20.8%	Very Unfamiliar	22.6%	No Response	11.2%

Please tell us how much you agree or disagree with the following statements:	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Don't know	No Response
The Air Force is being very open in its communications.	17.8%	42.1%	20.1%	5.8%	1.8%	9.9%	2.5%
The Air Force is very responsive to community concerns.	19.3%	44.2%	17.0%	6.1%	2.0%	9.1%	2.3%
The Air Force is providing useful information to me.	18.8%	47.2%	18.0%	6.6%	2.3%	4.8%	2.3%
I can easily understand information from the Air Force.	18.3%	50.5%	15.0%	5.8%	2.0%	5.3%	3.0%
The environmental cleanup is being done safely.	19.5%	42.1%	18.5%	2.0%	1.0%	14.2%	2.5%
The environmental cleanup is being done as quickly as possible.	18.0%	35.8%	21.1%	4.8%	3.6%	2.3%	2.3%
In general, the environmental cleanup is going well.	15.0%	42.1%	18.0%	3.8%	1.8%	16.5%	2.8%

During the next 12 months, how likely is it that you will do the following?	Very Likely	Likely	Somewhat Likely	Not very Likely	Not Sure	No Response
Read information about the cleanup.	31.2%	31.0%	22.1%	11.7%	1.3%	2.5%
Talk to my neighbor(s) about the cleanup..	18.3%	23.4%	23.6%	28.7%	2.5%	3.6%
Attend community meetings about the cleanup.	8.4%	18.3%	24.4%	39.6%	5.8%	3.6%
Call the Air Force with questions about the cleanup.	4.3%	11.2%	19.8%	55.6%	5.8%	3.3%
Meet with an Air Force representative about the cleanup.	4.6%	10.2%	17.8%	55.3%	4.6%	7.6%
Write a letter to a news editor about the cleanup.	4.3%	9.6%	13.5%	63.2%	6.1%	3.3%
Play an active role in representing my community's interests	7.9%	11.7%	28.2%	40.6%	8.6%	3.0%



## Public Center for Environmental Health

### Contact Information

Program Manager: Kyle Cunningham

Telephone: 210-532-5765

Fax: 210-532-3747

<http://www.sanantonio.gov/health/PCEH/>

### Purpose

Linking health and environment

### Mission

To protect and enhance community health through the development of scientifically sound recommendations for environmental improvement.

### Projects

Fruit & Nut Sampling

Public Water Supply Testing

Air Monitoring During PRB Construction

Well Plugging

Sub-Slab Gas Sampling

Liver Cancer Case Series and Feasibility Study

Continuous Water Monitoring at Leon Creek

*In partnership with TCEQ:* PM 2.5 Air Monitoring

*In partnership with AFIOH/RSRH:* Case Series Investigation of ALS Among Former Kelly AFB Workers

*In Partnership with Texas Department of State Health Services:* Occurrence of Birth Defects Near Kelly Air Force Base

Summary of Investigation Into the Occurrence of Cancer

Summary of Investigation Into Rates of Low Birth Weight and Very Low Birth Weight

**Project descriptions and reports can be viewed at PCEH's website, [www.sanantonio.gov/health/PCEH/](http://www.sanantonio.gov/health/PCEH/). Free Internet access and assistance can be obtained at any public library.**

## TAPP WAIVER RESPONSIBILITY AND PROCESS

**Background:** The Technical Assistance for Public Participation (TAPP) contract supporting the AFRPA/COO-Kelly is approaching its lifetime maximum funding level of \$100,000. The TAPP blanket purchase agreement established to provide environmental restoration consulting to the Restoration Advisory Board (RAB) and the Technical Review Sub-Committee (TRS) at the former Kelly AFB has been in existence since September 1998. The RAB community members, cognizant of remaining funds totaling \$2,175, have an expressed concern that additional requirements will soon exceed the \$100,000 funding limit. The Department of Defense (DoD) regulations which are clearly defined in 32 Code of Federal Regulations (CFR) 203 state that the combined sum of purchase orders cannot exceed \$100,000 or, during any one year, the lesser of \$25,000 or one (1) percent of the installation's total projected environmental restoration cost-to-complete. These limitations refer to the maximum allowable technical assistance funding per RAB/TRS, as established by 32 CFR 203.4, unless a *waiver* is granted by the DoD Component Secretary or equivalent for the installation in question.

The \$100,000 total and the \$25,000 annual limitations may be *waived*, as appropriate, to reflect the complexity of response action, the nature and extent of contamination at the installation, the level of activity at the installation, projected total needs as identified by the TAPP recipient, the size and diversity of the affected population, and the ability of the TAPP recipient to identify and raise funds from other sources. In this regard, the RAB Community Cochair has verbally requested that the Air Force Real Property (AFRPA) advise on the process to be followed to prepare and submit the necessary waiver package to the appropriate approval authority.

**The Waiver Process:** Although the waiver process is not definitively outlined in 32 CFR 203, the stated objective of a request for waiver of the \$100,000 lifetime maximum funding limit, should be to document the specific requirements that collectively represent a compelling argument to approve such a request. Although not specified in 32 CFR 203, a cost estimate of required funding over the \$100,000 limit should be included in the request for waiver for appropriate consideration. Services requested must meet TAPP guidelines for eligible activities in 32 CFR Section 203.10 and application guidelines in section 203.9.

- Community members of the RAB/TRS develop TAPP Project Description and submit a TAPP Application (DD Form 2749) for required services consistent with Section 203.9 and, if desired, the names of one or more proposed technical assistance providers to the DoD RAB Co Chair, i.e., the AFRPA/COO-Kelly Senior Representative.
  - The AFRPA Senior Representative will ensure the application is submitted to SAF/IE.
- SAF/IE or designated authority reviews and renders a decision on requested waiver for additional funding to support the remaining TAPP requirements.

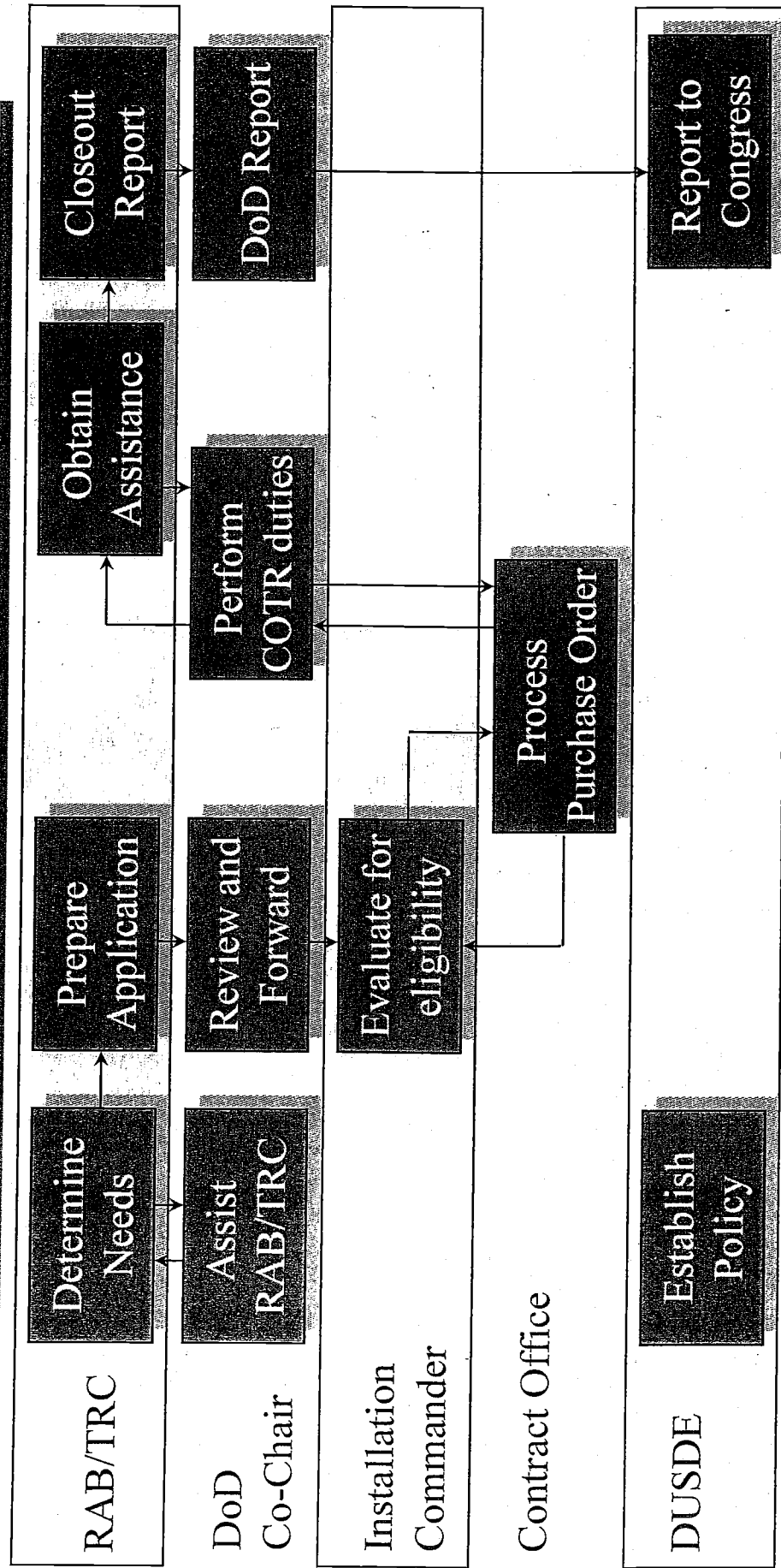


- After SAF/IE approval, the respective Senior Representative and RAB/TRS are notified and the procurement package is submitted to the appropriate Contracting Officer for final processing.

**Conclusion:** Ultimately, only the component Department Assistant Secretary (DAS) can grant waivers.



# The TAPP Process





# Eligible Projects

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- Interpretation of technical documents
- Review of proposed restoration technologies
- Participate in relative risk site evaluations
- Understand health and environmental implications of sites and cleanup strategies
- Training, as appropriate



# Ineligible Projects

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- Political activities and lobbying
- Litigation or underwriting legal actions
- The generation of new primary data
- Reopening final DoD decisions or conducting disputes with DoD
- Epidemiological or health studies
- Community outreach



# Nominating a potential provider

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- Minimum qualifications are specified in rule
  - demonstrated knowledge of issues
  - training in relevant discipline
  - ability to interpret technical issues to the community
- RAB/TRC can determine additional qualifications
  - experience in local geology
  - experience in working with community group
  - specialized technical expertise

# TAPP FUNDING SUMMARY

Year of Award	Date of Award	Project/Document Name	Contractor	Total Award	Date of RAB Presentation
FY98	09/24/98	ATSDR Report (Water)	University of Maryland	\$ 9,706.00	04/11/00
FY98	09/24/98	1997 Basewide Remediation Assessment	Clearwater Revival	\$ 6,975.00	07/20/99
FY98	09/24/98	OU-2 Work Plan	Neathery Environmental	\$ 5,145.00	10/05/99
FY99	09/23/99	Zone 5 Corrective Measures Study	Geomatrix	\$ 3,617.50	10/15/02
FY99	09/23/99	Zone 3 Corrective Measures Study Addendum	Clearwater Revival	\$ 6,375.00	04/11/00
FY99	09/23/99	Zone 4 OU-2 Remedial Investigation	Neathery Environmental	\$ 6,195.00	04/16/02
FY00	08/29/00	Shallow Groundwater Report	Geomatrix	\$ 5,572.50	01/16/01
FY00	08/29/00	B-258 SWMU RCRA Facility Investigation	Clearwater Revival	\$ 5,925.00	11/19/02
FY00	08/29/00	Site S-8 Draft Final Corrective Measures Investigation	Neathery Environmental	\$ 5,660.00	01/16/01
FY01	08/23/01	ATSDR Health Assessment	University of Maryland	\$ 7,428.00	04/16/02
FY01	08/23/01	Zone 4 Corrective Measures Study	Geomatrix	\$ 8,390.00	10/15/02
FY01	08/23/01	Zone 3 RCRA Facility Investigation	Clearwater Revival	\$ 5,775.00	10/21/03
FY03	06/10/03	ATSDR Air Emission Study	University of Maryland	\$ 8,366.00	04/19/05
FY03	06/10/03	Zone 2/3 Corrective Measures Study	Neathery Environmental	\$ 5,570.00	01/18/05
FY03	09/23/03	Additional Travel for Zone 3 RFI Presentation	Clearwater Revival	\$ 500.00	
FY06	11/04/05	2005 Semiannual Compliance Plan	Clearwater Revival	\$ 6,625.00	01/10/06
<b>TOTAL</b>				<b>\$ 97,825.00</b>	

CEILING	\$ 100,000.00
AWARDED	\$ 97,825.00
REMAINING BALANCE	\$ 2,175.00

## San Antonio Liver Cancer Study

As part of its ongoing monitoring of the health status of residents living in the vicinity of the former Kelly Air Force Base, the San Antonio Metropolitan Health District (SAMHD) is announcing a new study on liver cancer risk. The study will primarily focus on 14 ZIP code areas in Southwest San Antonio: 78201, 78204, 78205, 78207, 78211, 78214, 78221, 78224, 78225, 78226, 78227, 78228, 78237, and 78242.

Past investigations of liver cancer conducted by the Texas Department of State Health Services (DSHS) beginning in 1999 have consistently shown higher than expected numbers of liver cancer cases in some ZIP code areas surrounding the former base.

With the release of the results of the latest investigation in March 2005, SAMHD, with the support of the Agency for Toxic Substances and Disease Registry (ATSDR) and DSHS, decided a more detailed investigation of liver cancer was warranted.

The Air Force Real Property Agency (AFRPA) approved a funding request for the study in August 2005 and a Request for Qualifications (RFQ) to solicit proposals was advertised in October. In late December, HealthCare Resolution Services, Inc. was chosen to conduct the study.

Residents in the study area who have been diagnosed with primary liver cancer or those who have had a family member diagnosed with primary liver cancer are encouraged to participate in the study by calling 1-866-599-HCRS (4277).

### Contact information:

*HealthCare Resolution Services, Inc*  
 14504 Greenview Drive, Suite 102  
 Laurel, MD 20708-4215  
 Toll Free: 1-866-599-HCRS  
 Fax: 1-866-899-4277  
 Email: [info@hcrs-inc.com](mailto:info@hcrs-inc.com)



*Public Center for Environmental Health*  
 San Antonio Metropolitan Health District  
 Phone: 210-532-5765  
 Website: [www.sanantonio.gov/health/PCEH](http://www.sanantonio.gov/health/PCEH)

**METRO HEALTH**  
 SAN ANTONIO'S PUBLIC HEALTH TEAM

## Estudio Del Cáncer Del Hígado Del San Antonio

Como parte de su supervisión en curso del estado de salud de los residentes que viven en la vecindad de la base de fuerza aérea anterior del Kelly, el distrito metropolitana de la salud de San Antonio (SAMHD) está anunciando un nuevo estudio en riesgo del cáncer del hígado. El estudio se centrará sobre todo en 14 áreas del código postal en el sudoeste San Antonio: 78201, 78204, 78205, 78207, 78211, 78214, 78221, 78224, 78225, 78226, 78227, 78228, 78237, and 78242.

Más allá de las investigaciones del cáncer del hígado conducidas por el departamento de Tejas de los servicios médicos del estado (DSHS) que comenzaban en 1999 han demostrado constantemente números más arriba que previstos de las cajas del cáncer del hígado en algunas áreas del código postal que rodeaban la base anterior.

Con el lanzamiento de los resultados de la investigación más última de marzo de 2005, SAMHD, con la ayuda de la agencia para las sustancias tóxicas y el registro de la enfermedad (ATSDR) y DSHS, decidió que una investigación más detallada del cáncer del hígado fuera autorizada.

La fuerza aérea que la agencia de la característica verdadera (AFRPA) aprobó un pedido de financiamiento el estudio en agosto de 2005 y un pedido las calificaciones (RFQ) de solicitar ofertas fue anunciada en octubre. En diciembre, HealthCare Resolution Services, Inc. fue elegido para conducir el estudio.

Se anima a los residentes en el área del estudio que se han diagnosticado con el cáncer primario del hígado o los que han tenido un miembro de la familia diagnosticado con el cáncer primario del hígado que participen en el estudio llamando 1-866-599-HCRS (4277).

### Información del contacto:

*HealthCare Resolution Services, Inc*  
 14504 Greenview Drive, Suite 102  
 Laurel, MD 20708-4215  
 Peaje libremente: 1-866-599-HCRS  
 Fax: 1-866-899-4277  
 info@hcrs-inc.com



*Public Center for Environmental Health*  
 San Antonio Metropolitan Health District  
 210-532-5765

[www.sanantonio.gov/health/PCEH](http://www.sanantonio.gov/health/PCEH)

**METRO HEALTH**  
 SAN ANTONIO'S PUBLIC HEALTH TEAM



Thursday, February 9, 2006

6:00 to 8:00 p.m.

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Welcome and Introduction	Dr. Fernando A. Guerra, Director of Health San Antonio Metropolitan Health District
Background on Liver Cancer Study	Kyle Cunningham, Program Manager Public Center for Environmental Health
Plan for the Study	Ms. Brenda Doles, President HealthCare Resolution Services, Inc.  Dr. Tim Aldrich, Epidemiologist Project Consultant
Public Comment and Questions	Please give your name. Speak clearly and loudly enough to be heard by others.
Closing Remarks	Dr. Fernando A. Guerra

Contact information:

*HealthCare Resolution Services, Inc*

*14504 Greenview Drive, Suite 102*

*Laurel, MD 20708-4215*

*Toll Free: 1-866-599-HCRS*

*Fax: 1-866-899-4277*

*Email: info@hcrs-inc.com*

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SPECIAL PUBLIC MEETING

LIVER CANCER STUDY

As part of its ongoing monitoring of the health status of residents living in the vicinity of the former Kelly AFB, the Metropolitan Health District is announcing a new study on liver cancer risk. Community input and involvement is essential for an accurate and meaningful assessment.

Metro Health staff will discuss the purpose, scope and conduct of the study and answer questions from community residents. The study will be conducted by Health Care Resolution Services (HCRS) whose staff will also be available for questions and comments.

WHEN: Thursday, February 9, 2006 at 6:00PM

WHERE: Brentwood Middle School  
1626 W. Thompson

CONTACT: Public Center for Environmental Health  
532-5765

KellyUSA, site of the former Kelly Air Force Base, is the likely source for contaminants that have leaked into adjacent Leon Creek.

## State, fed agencies seem unfazed by troubling Kelly reports

BY LISA SORG  
lsorg@sacurrent.com

When you sift through the hundreds of pages of numbers and the long chemical names, the situation at Kelly Air Force Base boils down to this: The water, dirt, and fish in Leon Creek are contaminated with toxic chemicals. The Air Force's incomplete data is hampering an independent consultant's ability to evaluate how military contractors are cleaning up the former base and the residential neighborhood that abuts it. And, at this rate, a complete cleanup is decades away.

In January, biochemist Wilma Subra and civil engineer Patrick Lynch delivered sobering presentations about the ongoing cleanup of contamination at Kelly. [See related story, "Report bears little good news for Kelly cleanup," January 4-10, 2006.] The presentations were part of a meeting of the Kelly Air Force Restoration Advisory Board, which hired consultants Subra and Lynch to review the military's data. Members of the RAB, as it's known, include residents from the affected community, scientists, and an Air Force representative. Staff from the

Texas Commission on Environmental Quality and the Environmental Protection Agency also attend the meetings.

Among the many issues the RAB faces are the chemicals found in Leon Creek, which are the same as were used at Kelly when it was a military base. While TCEQ's Mark Weeger said the fish could have been contaminated elsewhere and migrated to the creek, Subra noted that, "Kelly is the biggest elephant around."

Subra unveiled 2004 data showing that surface water in Leon Creek exceeded Environmental Protection Agency thresholds for four chemicals, including mercury. Creek sediment had excessive levels of 22 chemicals, including arsenic, cadmium, and DDT — an insecticide banned in 1972. Fish tissue sampled in 2004 also contained higher than permissible levels of four chemicals, including hexachlorobutadiene, which can cause kidney tumors. Eighteen of 30 fish-tissue samples exceeded screening levels for various toxic chemicals.

The news didn't improve with Lynch, who reviewed the Air Force's 2004 groundwater assessment, which documented a persistent plume of arsenic in the groundwater southeast of the base. Citing a lack of monitoring wells and lab reports and inaccurate figures, Lynch

said, "There is no way to replicate the statistics. There is no way to independently evaluate the analysis."

Despite the dim news, Weeger of the TCEQ and Gary Miller of the EPA's Region 6 office stood in the back of the room and chatted while Lynch discussed his recommendation for Kelly: "If you want the groundwater cleaned up, you have to remove the contamination from the ground."

Only after RAB member Robert Silvas commented on their private conversation did they return to the table. Weeger and Miller downplayed Lynch's and Subra's findings, saying they are aware of contamination in the area.

"The cleanup is well underway," said Miller, referring to the groundwater pumps, barriers, and other measures the Air Force is undertaking. "It will take a number of years for the remedies in place."

"How do you account for the problems in the report?" asked RAB member Armando Quintanilla.

"We would have found these inconsistencies," said Weeger, adding that, "the cleanup is going along very well."

"Discrepancies in a few wells doesn't change the long-term remediation. You can get wrapped up in the minutiae, but that doesn't change that groundwater contamination is still high."

FRI

SAN ANTONIO EXPRESS-NEWS

2/10/06

# Study targets liver cancer deaths

Health district will look at possible impact from Kelly AFB pollutants.

BY JERRY NEEDHAM  
EXPRESS-NEWS STAFF WRITER

The San Antonio Metropolitan Health District launched a study Thursday aimed at determining if environmental contamination from the former Kelly AFB has played a role in excessive liver cancer deaths in ZIP codes around the facility.

Health Care Resolution Services Inc., a Maryland firm selected after a request for proposals was issued last October, will conduct the six-month study, said Fernando Guerra, district health director.

About 40 people showed up for a public meeting at Brentwood Middle School on Thursday night in response to 23,000 letters the health department sent out

to get public input into the study. Tim Aldrich, an epidemiologist who is a professor at East Tennessee State University, will lead the \$20,000 study. The Air Force Real Property Agency, which is overseeing the cleanup of pollution at and around the former base, which closed in 2001, is paying for the study.

A plume of contaminated groundwater drifted up to five miles off the base and underneath 20,000 homes south and east of the base. Residents are worried that fumes from that plume or other pollutants released into the neighborhood over the decades the base operated have caused illness.

"Diabetes and lifestyle — we're tired of hearing that," said Robert Silvas, a member of the Kelly AFB Restoration Advisory Board, alluding to previous studies that showed no link to residents' health problems and base pollution, instead suggesting that various ailments could have been brought on by living condi-

tions or choices made by residents.

Aldrich said his team will take the 330 liver cancer deaths that occurred in 14 ZIP codes around Kelly from 1995 through 2002 and interview friends, neighbors and family members of many of them to try to zero in on the risk factors that may have led to their illness.

In response to suggestions from the public Thursday, Aldrich said he would include in the study analysis of data on other types of cancer in the selected ZIP codes.

Aldrich said that hepatitis B and alcoholism are known risk factors for liver cancer and that a certain number of such cancers would be expected in any population.

He said it's possible the study will find no explanation for the high rates of liver cancer, but he hopes to find clear-cut links to environmental factors.

[jneedham@express-news.net](mailto:jneedham@express-news.net)

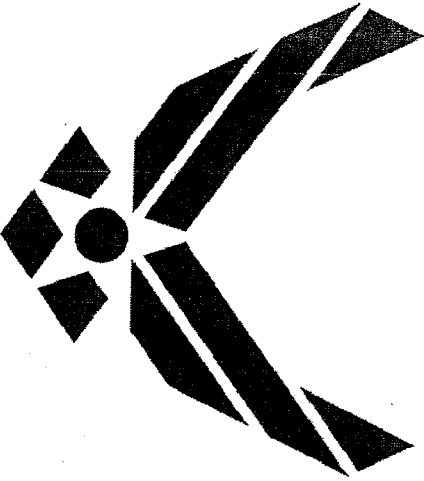
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# ***Air Force Real Property Agency***

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## **January 2006 Semiannual Compliance Plan Summary**



***March 14, 2006***

***Former Kelly Air Force Base***

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# *History*

- The Air Force maintains a permit and a compliance plan issued by the Texas Commission on Environmental Quality (TCEQ) in 1998 for the former Kelly Air Force Base.
- The compliance plan requires the Air Force to submit updates on environmental conditions every six months to allow TCEQ, the Air Force and the public to check progress on environmental cleanup.
- The January 2006 Semiannual Compliance Plan Report (SCPR) is the update for the period of July-December 2005, including annual sampling completed April through June 2005.

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3/13/2006

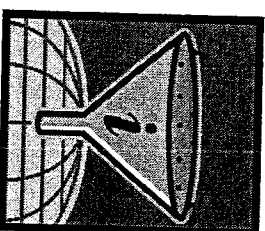
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# ***Project Scope***

- Fulfill the monitoring and reporting requirements of the Compliance Plan issued by the TCEQ
  - The January 2006 SCPDR documents groundwater, soil, surface water, sediment and biological samples collected from more than 1,400 sample sites on or around the former Kelly AFB
- Provide an annual "snapshot" of groundwater plumes and Leon Creek
  - Verifies progress in reaching environment goals and tracks trend analysis
- Used for remedial system evaluation
- Number of data points is about 110,000



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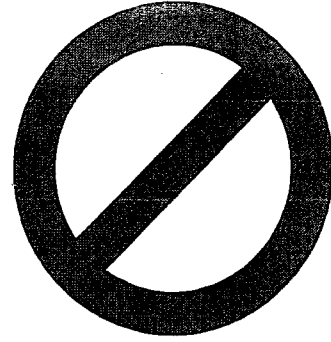


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# ***What this Report Does Not Cover***

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- Selection of remediation methods
- Design of remediation methods
- Scheduling of remediation
- Recommendations for site closure
- Source determination







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# Sampling/Monitoring Events

January<sup>1</sup>

March<sup>1</sup>

Apr - June<sup>2</sup>

July<sup>2</sup>

- Semi-annual sampling of RCRA wells and Leon Creek, with elevations and flow measurements
- Annual GW level measurements
- Annual GW sampling of Waste Management Areas (basewide)
- Semi-annual GW sampling of four RCRA-regulated units
- Semi-annual surface water/sediment sampling of Leon Creek
- Annual biological sampling of Leon Creek

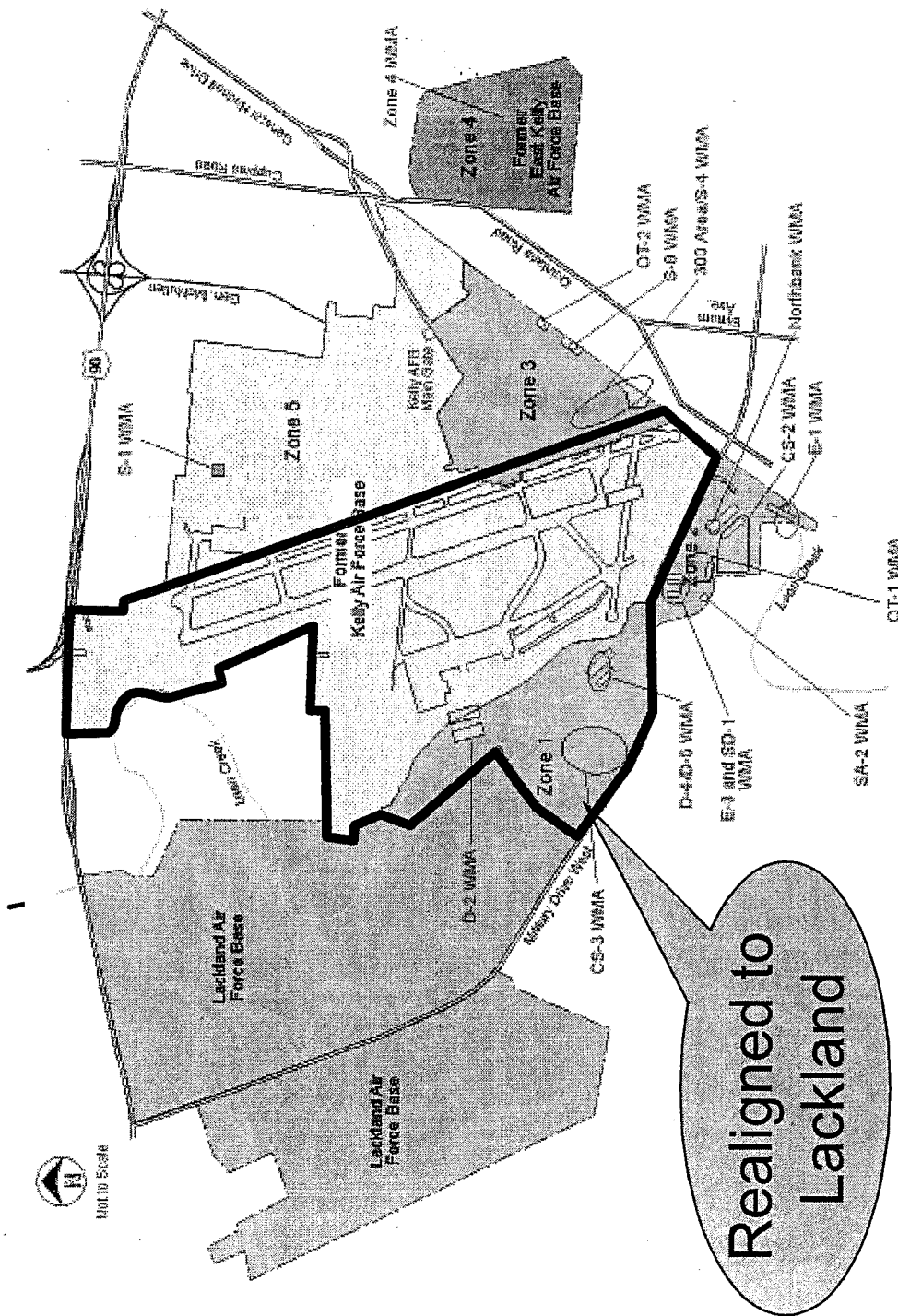
Reported in July Semiannual Report

<sup>2</sup> Reported in January Semiannual Report



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# Waste Management Areas



Realigned to Lackland

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# **Overview**

The SCPPR is divided into four parts:

- Introduction
- Leon Creek semiannual assessment
- Semiannual groundwater assessment for Resource Conservation and Recovery Act regulated units
- Annual Solid Waste Management Unit Assessment



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# Part 1: Introduction

The introduction section of the SCPBR contains:

- History of the SCPBR
- Organization of the SCPBR
- Executive summaries of sections 2, 3, and 4
- Historical background and description of the former Kelly AFB
- Tables (1.1 and 1.2) identifying compliance plan requirements and where to find these requirements in the SCPBR, and compliance plan modifications



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# Part 1: Introduction

Table 1.1 in the SCPR identifies:

- The paragraph in the plan specifying the requirement
- The requirement itself
- Location in the January 2006 SCPR

TABLE 1.1  
Compliance Plan Checklist of Semiannual and Annual Reporting Requirements  
Former Kelly AFB, Texas

Compliance Plan Paragraph No.	Requirement	Location in January 2006 Semiannual Compliance Plan Report (July - December 2005)
V.B.1	If a groundwater recovery well system is used in the overall corrective action system, the flow rate for each recovery system shall be recorded or calculated and documented once a week. The weekly flow rate data shall be used to calculate a semiannual total flow that shall be reported in accordance with Section VII.B.2.I.	Part IV, Sections 6.1 - 6.15; Appendix F
VII.B.1	Water table maps shall be prepared from the groundwater data collected pursuant to Section VI (semiannual for registered units and annual for solid waste management units) and shall be evaluated by the permittee with regard to the following parameters: <ul style="list-style-type: none"> <li>a. Development and maintenance of a cone of depression during system operation</li> <li>b. Directions of groundwater flow</li> <li>c. Effectiveness of hydrodynamic control of the contaminated zone during operation</li> <li>d. Estimate of the rate and direction of groundwater contamination migration</li> </ul>	Part III, Sections 4.2, 4.3, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, A.1
VII.B.2.a	A narrative summary of the evaluations made in accordance with Sections V, VI, and VII for the preceding 6-month period. These periods shall be 1 January through 30 June and 1 July through 31 December.	Part II, Executive Summary Part III, Executive Summary
VII.B.2.b	The chemical analysis results, submitted in a tabulated format, shall be evaluated by the permittee. The permittee shall clearly indicate, separate to the Executive Director that Groundwater Protection Status (GWS) has been exceeded. The GWS shall also contain a summary of quality assurance/quality control results to assure the validity of the analytical data. Copies of the original laboratory report for chemical analysis showing detection limits and quality control and quality assurance data shall be provided if requested by the Executive Director.	Part III, Tables 5.1, 5.3, 5.4, Appendixes B, E, F Part IV, Appendix D, Table 5.1
VII.B.2.c	Tabulation of all water level elevations required in Section VI.C.4, depth to water measurements, and total depth of well measurements collected since the data that was submitted in the previous semiannual report.	Part III, Tables 2.1, 2.2
VII.B.2.d	Potentiometric surface maps showing the elevation of the water table at the time of sampling, definition of the area of influence of the corrective action system, and the direction of groundwater flow gradients outside any radius of influence. If a recovery system is used as the corrective action system, the minimum and maximum gradient within the hydrologically influenced area should be specified.	Part III, Table 4.1, Figures 4.1, 4.2, A.1 Part IV, Table 4.1, Figure 4.1



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# Part 2: Leon Creek Semiannual Assessment

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## Background on Leon Creek:

- Leon Creek is 45 miles long and receives water from more than 200 square miles of Bexar county.
- 3.5 miles flow adjacent to or through the former Kelly AFB.
- Flow near the former Kelly AFB is typically low, less than 74.8 gallons per second, or 10 cubic feet per second, during dry conditions.
- Flow measured more than 74,800 gallons per second (10,000 CFS) during heavy rains.

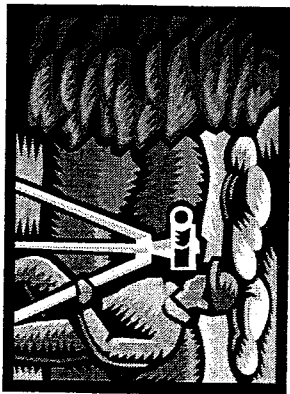


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# Part 2: Leon Creek Semiannual Assessment (cont)

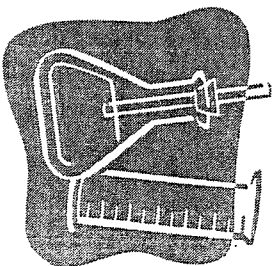
**1. Physical Assessment**

- elevation and flow measurements



**2. Chemical Assessment**

- Water and sediment



**3. Biological Assessment**

- Toxicity, habitat and fish tissue

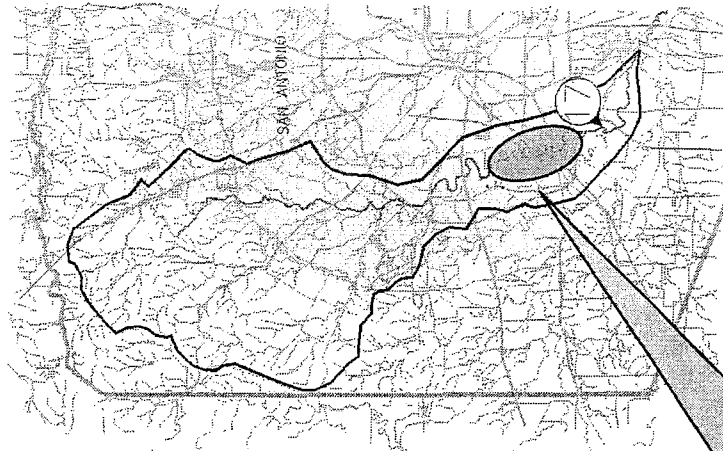




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# Part 2: Leon Creek Semiannual Assessment (cont)

- Small, shallow, slow moving urban stream flowing through western San Antonio
- Lack of tree cover causes high water temperatures, which reduces the amount of oxygen in the water
- Highly susceptible to flash flooding
- Receptacle for urban runoff



Adjacent to KAFB





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## **Part 2: Leon Creek Semiannual Assessment (cont)**

- Samples collected from the creeks consist of: surface water, sediment, effluent from seeps and outfalls and a biological assessment of plant and animal communities in the creek.
- Sampling is also completed at three 'reference' creeks not impacted by the former Kelly AFB for comparison (Salado Creek, Medio Creek and Medina River)





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## **Part 2: Leon Creek Semiannual Assessment (cont)**

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- Results of the samples are compared to:
  - Historic trends of contamination and biological assessments to assess changes in Leon Creek
  - Texas Soil and Water Quality Standards to determine if levels are below those of concern to regulatory agencies



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## **Part 2: Leon Creek Semiannual Assessment (cont)**

**Texas Water Quality Standard (TWQS) guidelines come from the Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data, 2004**

*The criteria from this document are screening criteria and do not necessarily mean that exceeding one or more indicates a risk to human health and the environment, but that possible risk exists.*



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## **Part 2: Leon Creek Semiannual Assessment (cont)**


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- Samples of surface water identified 8 organic and 12 inorganic constituents.
- Samples of sediment identified 43 organic constituents and 12 inorganic constituents.
- The results from samples taken from Leon Creek showed 2 constituents in the surface water and 25 constituents in the sediment were found to be above TWQS guidelines.



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# Part 2: Leon Creek Semiannual Assessment (cont)

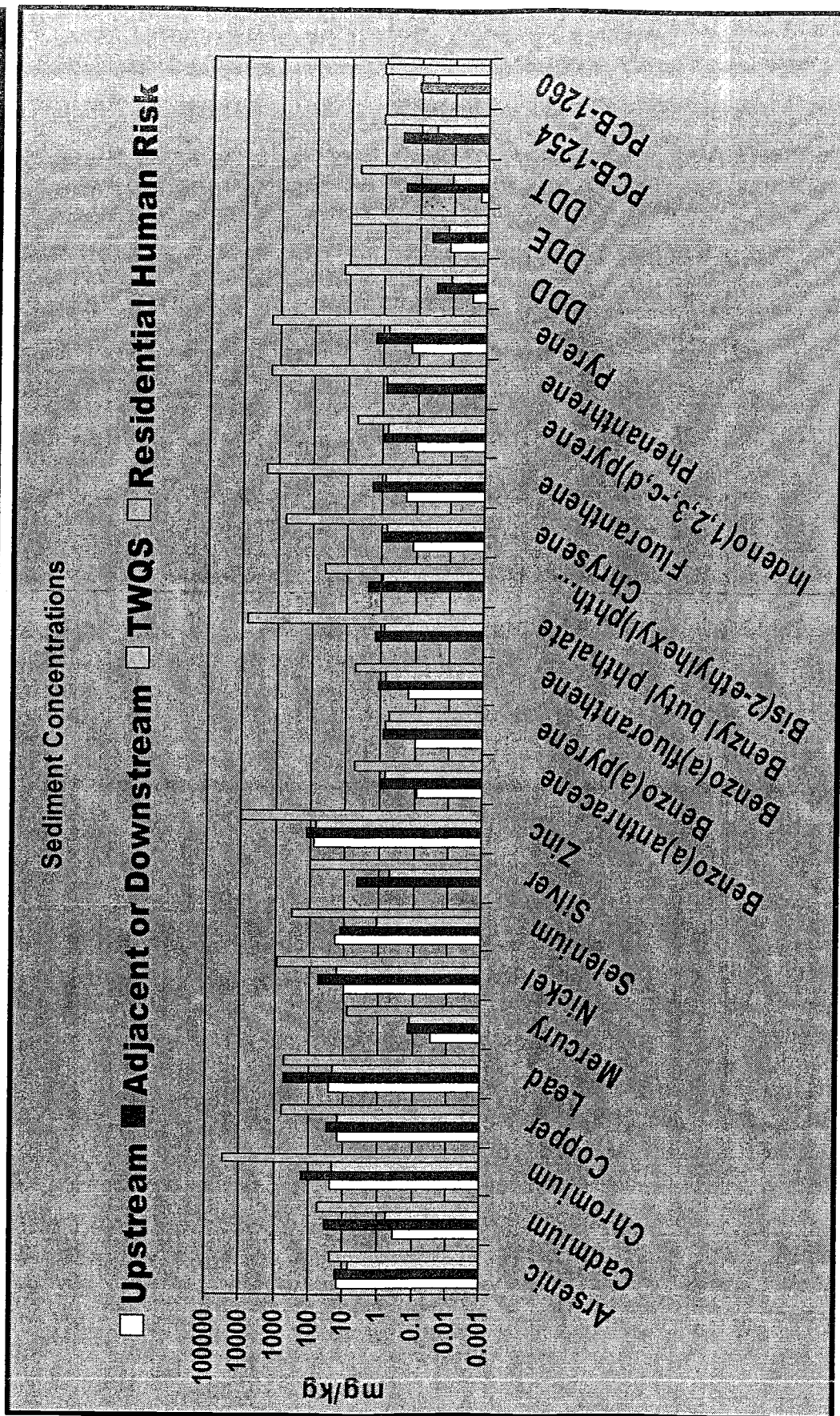
- Chemicals in sediment above TWQS are listed to the right: 
- Chemicals in surface water above TWQS were silver (total) and silver (dissolved) and in seeps were PCE and chromium (dissolved).

Inorganics	Organics
Arsenic	benzo(a)anthracene
Cadmium	benzo(a)pyrene
Chromium	benzo(b)fluoranthene
Copper	Benzyl butyl phthalate
Lead	bis (2-ethyl-hexyl) phthalate
Mercury	Chrysene
Nickel	Fluoranthene
Selenium	Indeno(1,2,3-c,d)pyrene
Silver	Phenanthrene
Zinc	Pyrene
	DDD
	DDE
	DDT
	PCB-1254
	PCB-1260



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# Leon Creek Sediment Results



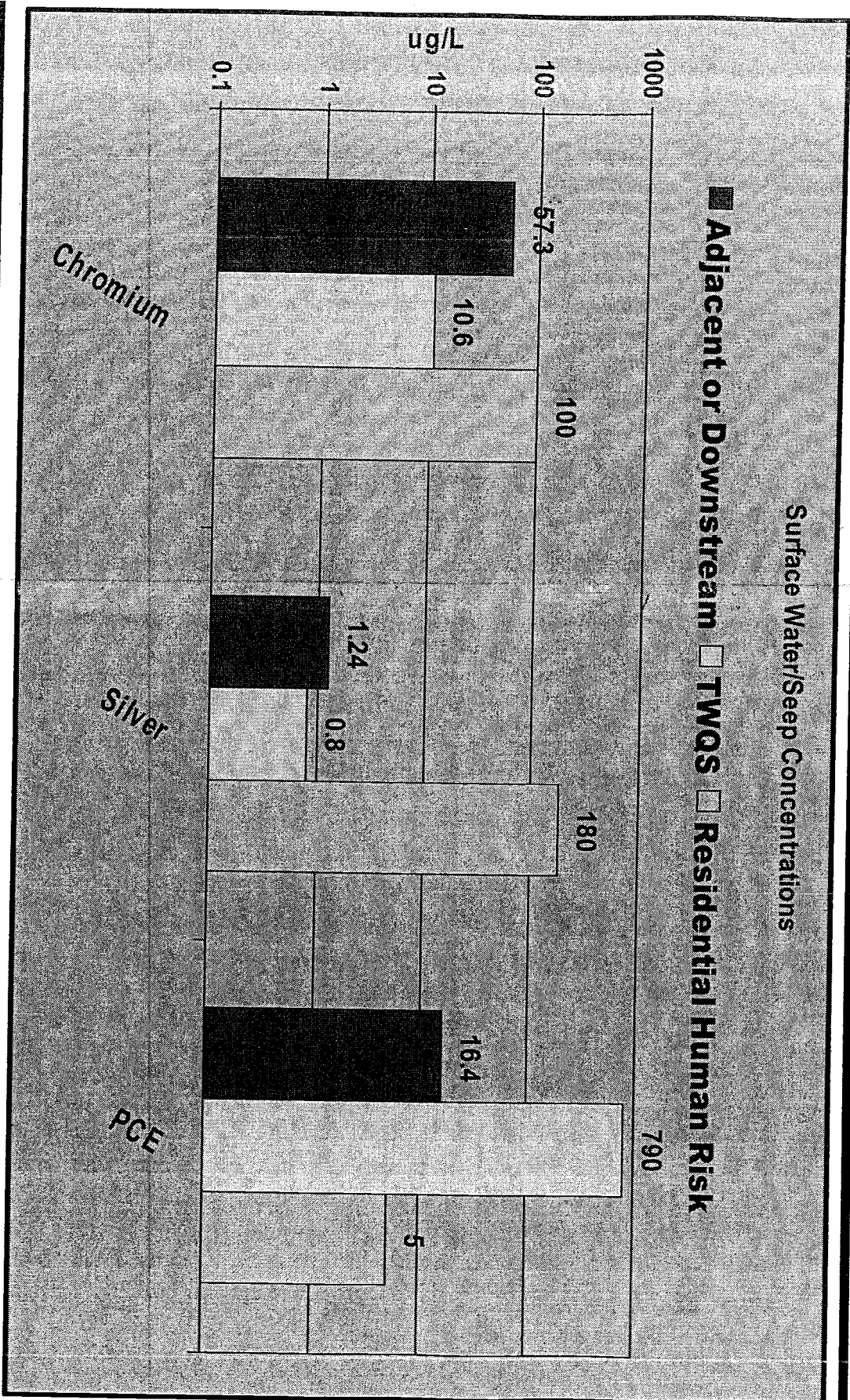
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# Leon Creek Surface Water /Seep Results



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# Part 2: Leon Creek Semiannual Assessment (cont)

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- Surface Water and Sediment Observations:
  - Some constituents found in Leon Creek surface water are potentially related to nearby groundwater plumes. However, other constituents directly related to upstream conditions, onsite storm water and wastewater outfalls draining into Leon Creek.
  - Trend analysis for Leon Creek have identified that the majority of exceedances for surface water and sediment have occurred in Zone 2.
  - Samples collected from the three reference creeks identified arsenic and selenium above TWQS in both the water and sediment.
    - USGS study on Lorence Creek Lake (in northern San Antonio) found increasing trends of chlordane and PAHs indicating water-quality degradation from urbanization.





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## ***Part 2: Leon Creek Semiannual Assessment (cont)***

- During July 2005 the following biological monitoring tests were conducted at 8 stream stations and 3 reference stations\* :
  - Rapid Bioassessment
  - Chronic Toxicity
  - Fish tissue

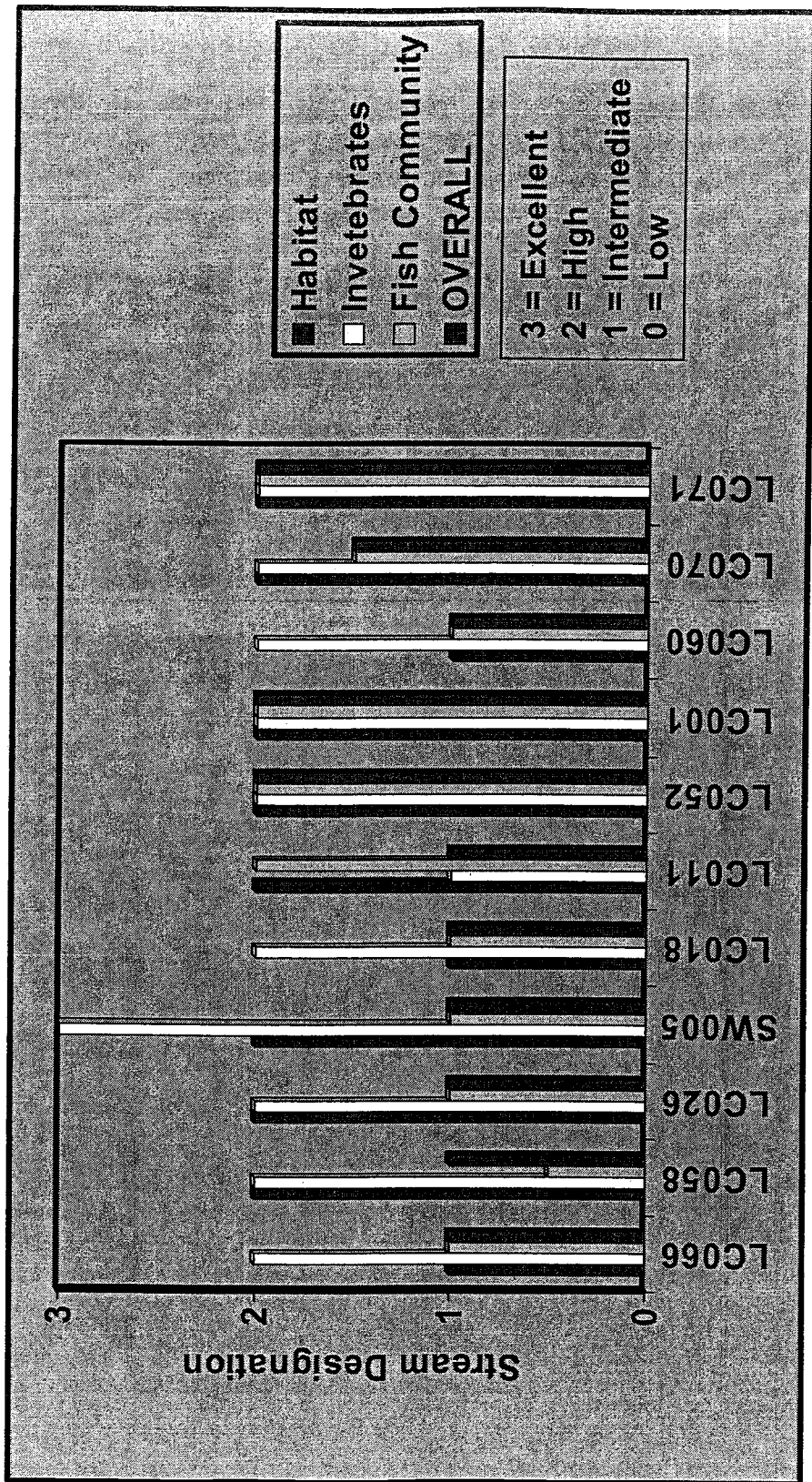
\* Reference stations: Medio and Salado Creeks, Medina River



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# Part 2: Leon Creek Semiannual Assessment (cont)

## Rapid Bioassessment



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# Part 2: Leon Creek Semiannual Assessment (cont)

## Chronic Toxicity

Station	Water Flea	Minnow	Algae	Amphipod
LC066	✓	✓	✓	X
LC058	✓	✓	✓	✓
LC026	✓	✓	✓	✓
SW005	✓	✓	✓	X
LC018	✓	✓	✓	X
LC011	✓	✓	✓	X
LC052	✓	✓	✓	✓
LC001	✓	✓	✓	✓
LC060	✓	✓	✓	✓
LC070	✓	✓	✓	✓
LC071	✓	✓	✓	✓

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## Part 2: Leon Creek Semiannual Assessment (cont)

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- Fish tissue samples were collected for the purpose of ecosystem monitoring at eight Leon Creek stations (KY030LC066, KY030LC058, KY030LC026, LA119SW005, KY030LC018, KY030LC011, KY030LC001, and KY030LC052) and three reference stations (KY030LC060 in Salado Creek, KY030LC070 in Medio Creek, and KY030LC071 in the Medina River).
- Six SVOCs, nine pesticides, three PCBs, and five metals were detected in the fish tissue (whole body) samples collected in July 2005.
- Three of the 23 detected parameters (PCB-1248, PCB-1254, and PCB-1260) exhibited concentrations that exceeded the applicable TCEQ screening levels

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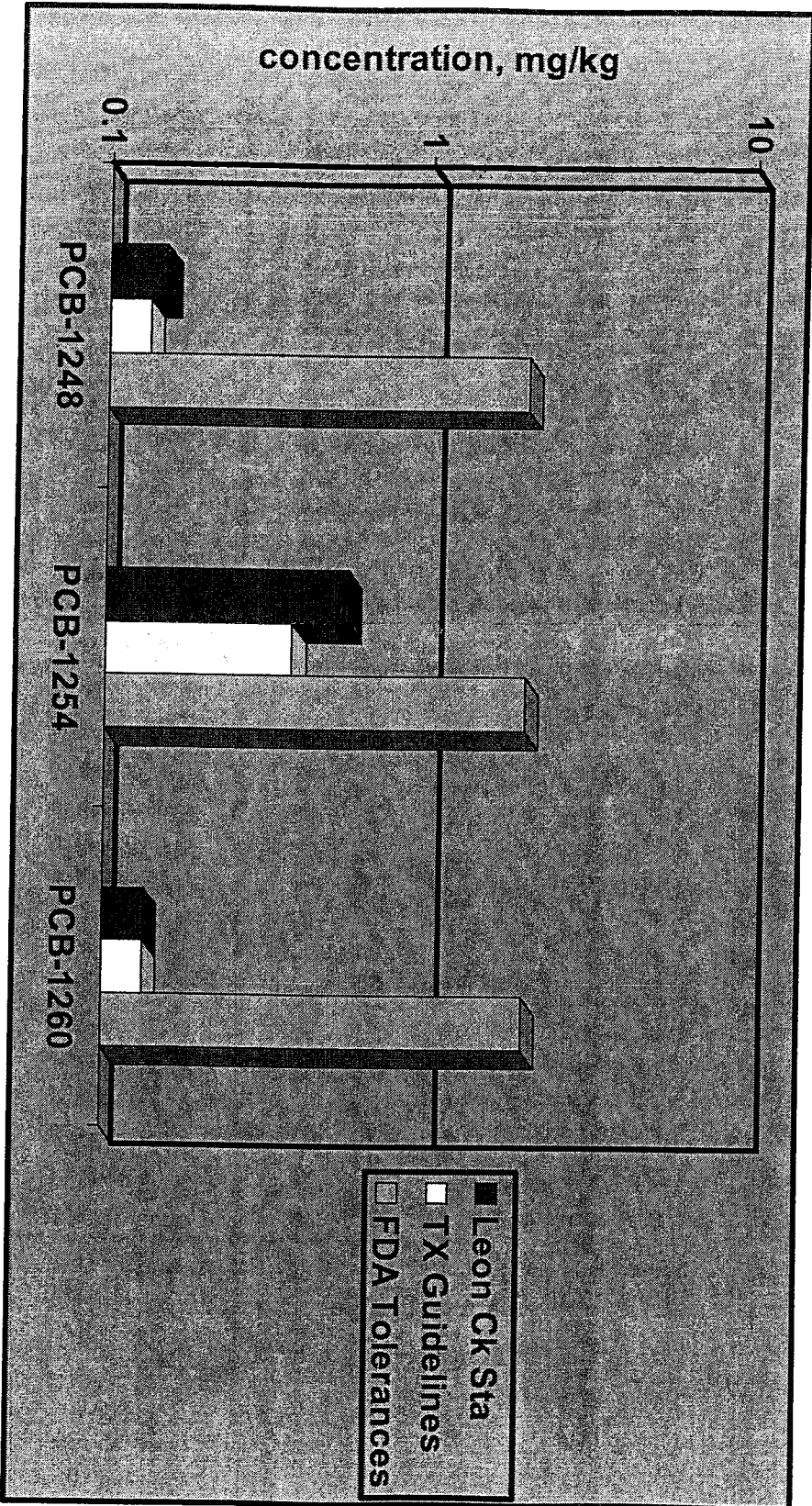
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# Part 2: Leon Creek Semiannual Assessment (cont)



1. FDA Regulation 21 CFR 109.30: Unavoidable Contaminants in Food for Human Consumption and Food Packaging Material



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## **Part 2: Leon Creek Semiannual Assessment – Overall Conclusion**

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*The structure of Leon Creek's biological communities is impaired. Some of this impairment can be attributed to habitat characteristics; however, many of the biological indices show that water quality may contribute to this effect. Water quality in this portion of Leon Creek may be affected by the surrounding land use, extreme water flow conditions, and elevated levels of some surface water and sediment contaminants.*

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## **Part 3: Semiannual Assessment of RCRA Regulated Units**

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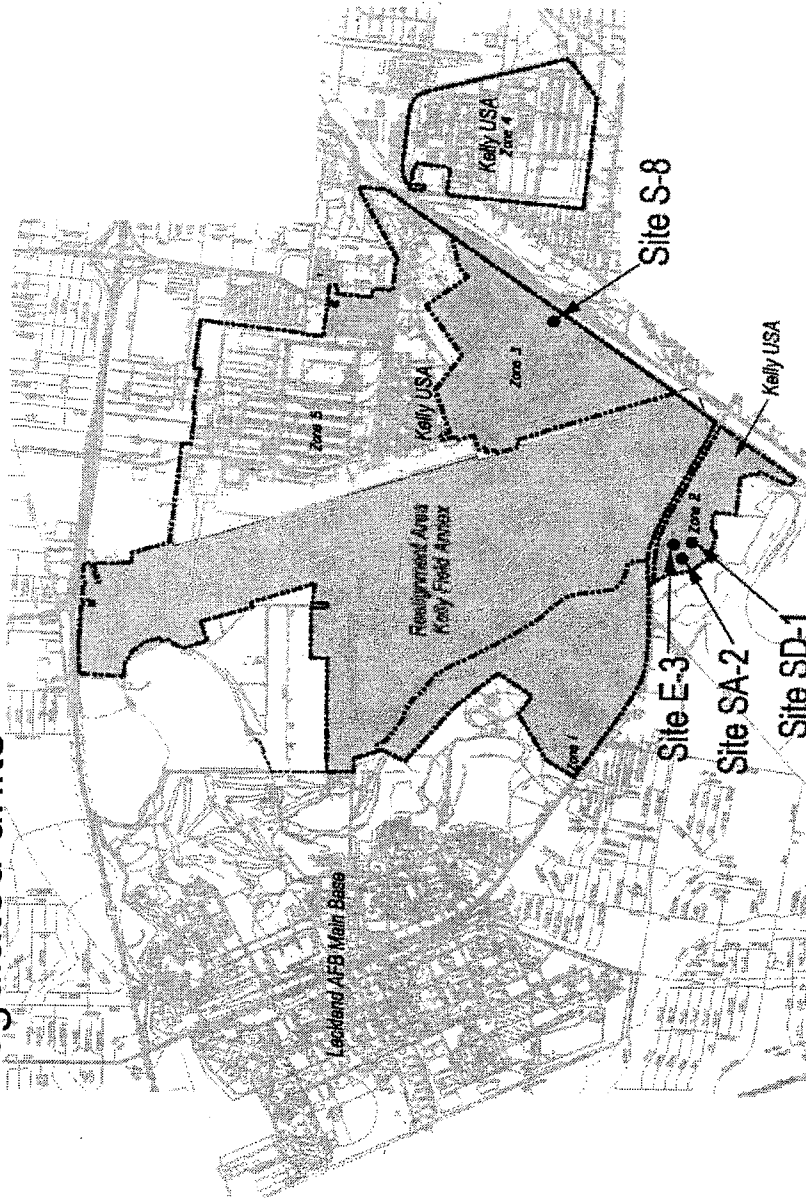
- Part 3 of the SCPR contains a summary of sampling events for the four RCRA regulated units:
  - E-3, a former chemical evaporation pit in Zone 2
  - SD-1, sludge drying beds from the former industrial wastewater treatment plant (IWTP) in Zone 2
  - SA-2, sludge drying lagoons at the former IWTP in Zone 2
  - S-8, a former underground tank farm containing solvents in Zone 3
- Purpose:
  - Conduct semiannual sampling to fulfill requirements of the compliance plan.
  - Evaluate whether ongoing activities have attained GWPS for the units.



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# Part 3: Semiannual Assessment of RCRA Regulated Units (cont)

Four RCRA Regulated units



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## **Part 3: Semiannual Assessment of RCRA Regulated Units**

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- The RCRA Units are assessed by analyzing groundwater samples from monitoring wells
- Sampled 40 monitoring wells during July 2005
- Samples sent to a laboratory for analysis of a broad range of chemicals including:
  - VOCs: volatile organic compounds
  - SVOCs: semi-volatile organic compounds
  - metals, cyanide, pesticides and polychlorinated biphenyls (PCBs)
  - (Pests/PCBs - Zone 2 only)
- Also field parameters
  - oxygen, redox potential, turbidity, pH, conductivity and temperature



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## **Part 3: Semiannual Assessment of RCRA Regulated Units**

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### Site SD-1 Summary

- TCEQ released site SD-1 from post closure care and approved the Air Force's request to stop monitoring On July 7, 2003.



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## **Part 3: Semiannual Assessment of RCRA Regulated Units**

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### **Site SA-2 Summary**

- On November 22, 2005, the TCEQ approved the Final Tier 2/Tier 3 Ecological Risk Assessment Report.
- Risk Reduction Standard Number 2 (RRS 2) closure approved for the site by TCEQ.
- Deed recordation in process. Once deed recordation has been completed, AFRPA will request to stop monitoring the site.



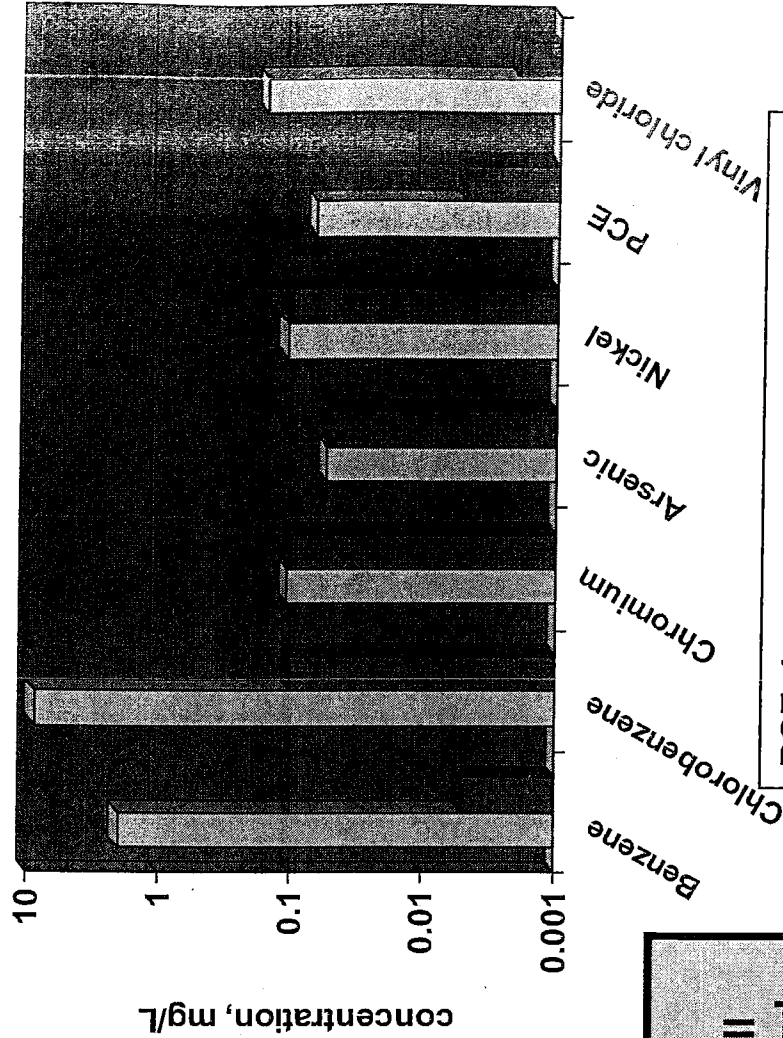
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# RCRA Sampling Results - E-3

## Site E-3

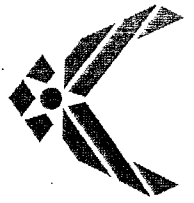
- E-3 undergoing active soil and groundwater remediation
- Several chemicals dissolved in groundwater exceed the cleanup criteria, mostly solvents (VOCs)
- VOC concentrations in the shallow groundwater have been reduced over time and now remain stable and confined within the recovery system perimeter
- Current monitoring network is adequate to evaluate the extent of these constituents
- Contaminants are still above GWPS, system operation and monitoring to continue.

POC/CAO
  GWPS



PCE detected in downgradient well.  
Likely from Zone 2 Plume.

**POC:** point of compliance well  
**CAO:** corrective action observation well  
**GWPS:** groundwater protection standard



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# RCPRA Sampling Results -- S-8

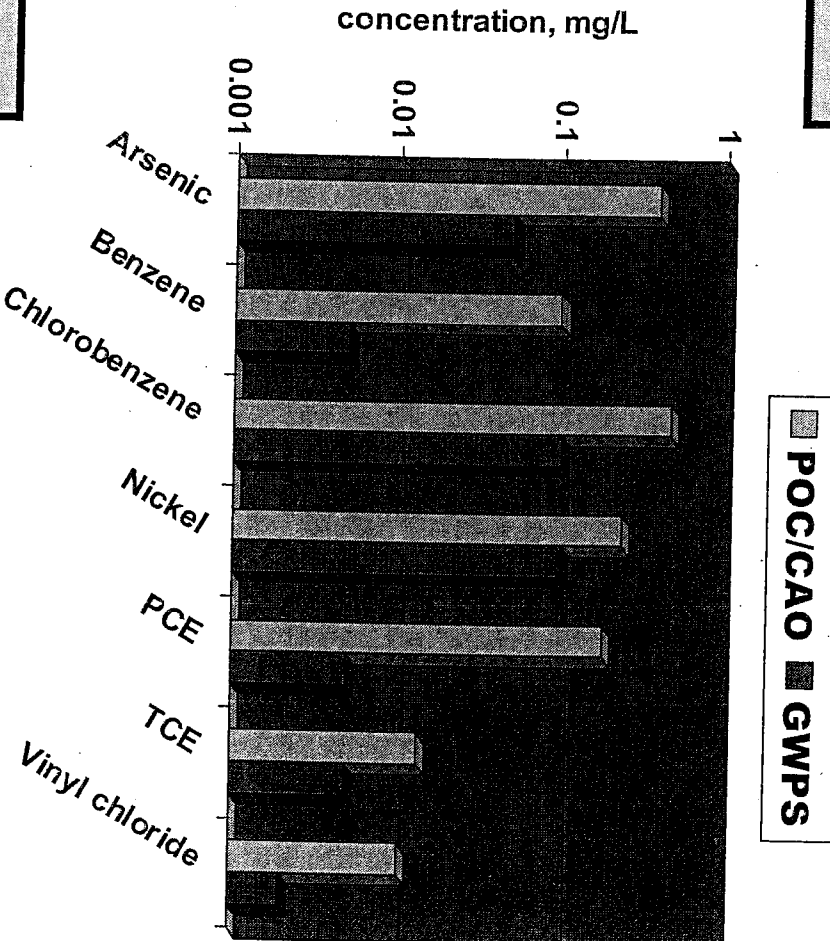
## Site S-8

- S-8 undergoing active soil and groundwater remediation
- Minor amounts of fuel are present on the water table and are being removed
- Several chemicals dissolved in groundwater exceed the cleanup criteria, mostly solvents (VOCs)
- Monitoring indicates that natural degradation is occurring
- Current monitoring network is adequate to evaluate the extent of these constituents
- Contaminants are still above GWPS, system operation and monitoring to continue.

**POC:** point of compliance well

**CAO:** corrective action observation well

**GWPS:** groundwater protection standard



**PCE and TCE are in background wells. Source is likely Building 301 Area**

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## **Part 3: Semiannual Assessment of RCRA Regulated Units**

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Recommendations from Part 3, RCRA Regulated Units:

- Continue operation of soil and groundwater treatment systems
- Although groundwater condition are improving for sites S-8 and E-3, levels of contaminants are still above the GWPS, and groundwater monitoring should be continued at these locations.



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## **Part 4: Annual SWMU Assessment**

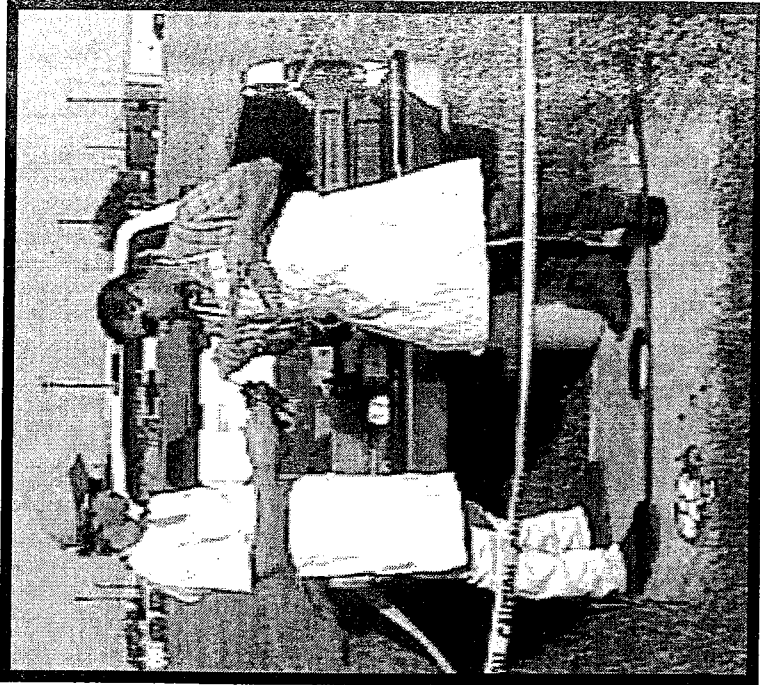
- The purpose of Part IV of the SCCR is:
  - To evaluate the effectiveness of ongoing groundwater remediation efforts and recommends future actions at the former Kelly AFB
  - To fulfill the sampling requirements of the TCEQ Compliance Plan CP No. CP-50310.
  - To describe current remedial activities, summarize results of groundwater data collected during 2005, and evaluate these results with respect to historical data.



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## **Part 4: Annual SWMU Assessment**

- Collected over 1,000 water level measurements in March 2005
- Sampled 463 monitoring wells on and off-base during April – June 2005
- Samples sent to a laboratory for analysis of a broad range of chemicals including:
  - VOCs: volatile organic compounds
  - SVOCs: semi-volatile organic compounds
  - metals, cyanide, pesticides and polychlorinated biphenyls (PCBs) (Pests/PCBs - Zones 1 & 2 only)
- Also field parameters
  - oxygen, redox potential, turbidity, pH, conductivity and temperature



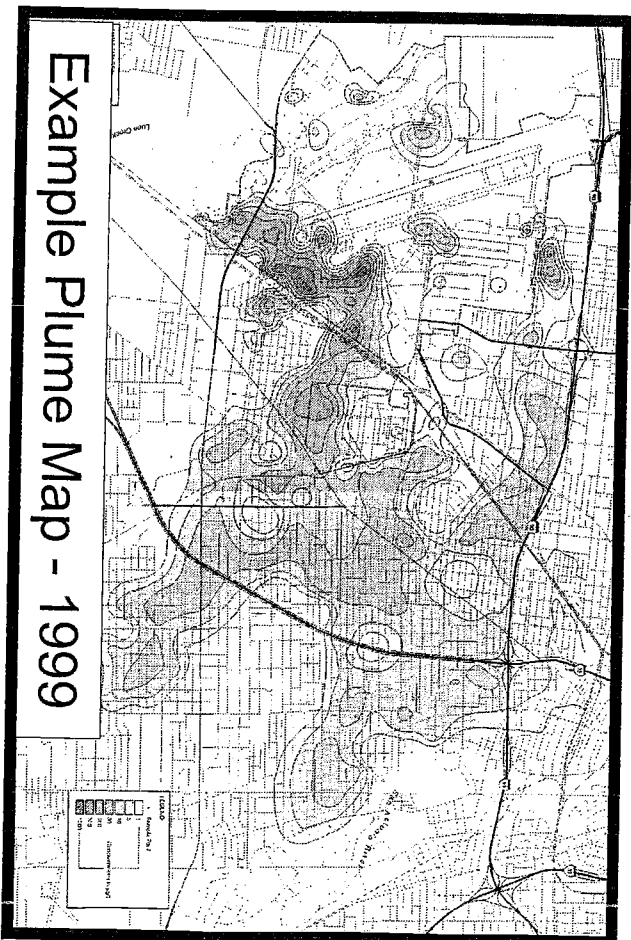




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## Part 4: Annual SWMU Assessment

- Site Status presented in Table 1.2
- Plume maps are the primary tool for evaluating changes in groundwater
- The use of Statistical analysis to evaluate whether the corrective action programs have attained the GWPS was not included in the 2006 report.



Example Plume Map - 1999



# Part 4: Annual SWMU Assessment

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## Conclusions:

- Comparison of 1995 through 2005 constituent distribution maps shows generally decreasing extent and magnitude
  - Notable decreases seen east of Zone 4 and downgradient east to southeast of Site MP
  - Notable decrease downgradient of Site S-4
- Interim recovery systems have effectively contained groundwater flow and controlled plume migration offbase
- PRBs installed offbase in Zone 3 and in the neighborhood north of Zone 5 show slight reductions in concentration and extent of VOC plumes
  - Reduction like those downgradient of Site MP have not yet occurred
- TCE plume that extended offbase to east of Zone 5 no longer extends beyond the installation boundary
  - Decrease in plume extent coincides with the installation of PRB adjacent to Building 1533

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## **Part 4: Annual SWMU Assessment**

### **Recommendations:**

- RA review of the historical data and data collected for the 2005 SWMU assessment showed Groundwater Protection Standards have not been met.
- Based on the results of the annual SWMU assessment, the Air Force recommends further monitoring and cleanup actions at the former Kelly AFB.



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# Questions ??

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## Report Available for Review at:

**(1) Public Library - Downtown**

Central Library - Government documents (2nd floor)  
600 North Soledad St.

**(2) Environmental Health and Wellness Center**

911 Castroville Road

**AFRPA Response to Comments**  
 Clearwater Revival Company Review of the  
 Semi Annual Compliance Plan Report – January 2005  
 Former Kelly Air Force Base

Clearwater Revival Company (CRC) was contracted by the AFRPA/DK to conduct a review of the above-referenced document in accordance with the Technical Assistance for Public Participation (TAPP) contract F41622-98-A-5882-call order 0601.

*Throughout the TAPP report, CRC consistently refers to the Permeable Reactive Barriers as “permeable-barrier reactors.” “Permeable-barrier reactors” is not the accepted nomenclature for the technology. Permeable Reactive Barriers is the proper name of the technology. The response to comments uses “permeable reactive barriers” in the response to the comments, but uses “permeable-barrier reactors” when identifying a CRC comment.*

The following comments were generated by CRC. AFRPA responses are presented for each recommendation and comment within the report.

<i>Reduction in Off-base Groundwater Plumes</i>
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At several locations within the TAPP review, CRC stated the concentrations of solvents are decreasing in close vicinity to groundwater recovery wells, but no reduction in contaminant concentrations is evident in off-base areas. The Air Force is combining all those comments so that they can be addressed collectively in this section.

- Concentrations of solvents are decreasing in close vicinity to groundwater recovery wells.
  - Contaminant concentrations in groundwater have been reduced within approximately 100 feet of groundwater recovery wells/trenches.
- Concentrations in solvents in off-base areas not affected by treatment systems remain stable.
  - No reduction in contaminant concentrations is evident in off-base areas.
  - In order to enhance groundwater cleanup, cleanup technologies need to be deployed throughout the off-base plume area.
- Zone 3 Contaminant trends
  - Much of the change in the Site MP plume has been in the vicinity of Kelly USA where active groundwater extraction systems are in place.
  - There has been little change to the off-base extent of PCE or TCE in historic comparisons from 1998 and 2004.
  - During the same time period the size of DCE and vinyl chloride plumes have been reduced in off-base areas.

***AFRPA Response: The following discussion will focus on three off base areas. CRC discussed two other areas that will not be discussed here. The first is the PCE that is found north of Zone 5. As noted in the Mitretek report (2001)<sup>1</sup>, the Air Force considers that this plume has an off-base source. The second location is Site S-4 where the reduction of plume extent and solvent concentrations were***

<sup>1</sup> Miller, J.K., *Physical and Chemical Characteristics of the Shallow Groundwater Zone and the Source of Groundwater Contamination in the Vicinity of Kelly Air Force Base, Texas, Addendum*, May, 2001. Mitretek Systems, Falls Church, VA.

noted by CRC.

No vinyl chloride above the Groundwater Protection Standard (GWPS) was found in residential areas for the 2004 or 2005 sampling events. While one well in the residential area had a detection above GWPS for total 1,2-DCE in the 2004 sampling event, no residential area wells had a detection above GWPS in the 2005 sampling event.

The Site S-4 and Zone 4 and Zone 5 Corrective Measure Studies evaluated various cleanup technologies within the off-base plume area to determine whether they would enhance groundwater cleanup. The CMS documents evaluated the time necessary to complete groundwater cleanup within the three areas using the Kelly AFB groundwater model. Based on these conclusions, the Air Force installed a groundwater collection trench along Quintana Road at Site S-4, added a barrier on the leading edge of the COSA storm water culvert in the Quintana Road area, installed a permeable reactive barrier along 34<sup>th</sup> Street (Zone 5), a permeable reactive barrier along Commercial Street (Zone 4) and a permeable reactive barrier south of Malone Street along the UPRR right of way.

Zone 5, East of Building 1533 Permeable Reactive Barrier. TCE above the GWPS has been found in this area in past sampling events. For the 2004 event (presented in the January 2005 Semi Annual Compliance Plan Report) and the 2005 sampling event, TCE and all other solvent constituents are found below GWPS (5 µg/L). Atch 1 shows TCE concentration trend charts showing the decrease in concentrations at monitoring wells SS050MW166 and SS050MW176. Each of these wells are located in off-base locations.

Zone 3, Site MP. As noted by CRC, groundwater concentrations of PCE, TCE, DCE and VC have decreased to concentrations near or below the GWPS outside the slurry wall and associated groundwater collection system for each of the constituents. CRC states that "much of the change in the Site MP plume has been in the vicinity of Kelly USA where active groundwater extraction systems are in place," CRC also states "there has been little change to the off-base extent of PCE or TCE in historic comparisons from 1998 and 2004." While the Air Force believes that there has been change in the off-base extent, we concede the point that overall size of the plume is subjective and open to interpretation. However, a general statement that "no reduction in contaminant concentrations is evident in off-base areas" is not correct and is not supported by the data. Atch 2 displays a series of trend charts showing the downgradient effect on groundwater concentrations in the Site MP plume by the installation of the source area slurry wall (installed in 1999) and the Zone 4 groundwater collection system (operational in July 2000). SS037MW215 is located approximately 1,000 feet downgradient of Site MP, well beyond the 100 feet cited by CRC. Prior to the installation of the slurry wall, concentrations of PCE and DCE ranged between 600 - 800 µg/L and concentrations of TCE were found around 300 µg/L. In the 2004 sampling event, these concentrations are approximately 9 µg/L for PCE and DCE and 6 µg/L for TCE. Trend charts for monitoring wells SS052MW629, SS052MW190, SS052MW277 and SS052MW326 are also included in the attachment. Each of these wells shows a trend that is decreasing with time.

***Zone 4, East of East Kelly.*** For the East Kelly plume, two source areas have been identified. The first is a TCE release originating from a former engine repair operation designated as Site SS051. The second source area may contain multiple sources and originates north of East Kelly and contributes PCE and TCE to the shallow groundwater. Based on the chemical characteristics of this source, the Air Force determined that this source was not the result of Air Force activities. Because the two plumes commingle east of the base, the Air Force installed a permeable reactive barrier north of East Kelly was completed in October 2005 to control migration from the non-Air Force source that. Therefore, contaminants from this source were not contained until late 2005. The SS051 plume used a combination of enhanced bioremediation and groundwater collection to control migration off-base. Groundwater containment of the SS051 plume began in July 2001.

***Atch 3 shows the trend data collected from monitoring wells SS052MW129 and SS052MW183.*** SS052MW129 is located on the base and shows the effects of the enhanced bioremediation source treatment at SS051. SS052MW183 shows the positive effects on TCE reduction due to the operation of the groundwater containment system.

***Trends further east of SS052MW183 begin to show the effects of the northern source.*** As noted by CRC, the permeable reactive barriers were recently installed and effects on the plume are not measurable at this time. Atch 4 shows the trend charts from several monitoring wells further east. In this area, groundwater contamination has been erratic because the source has not been contained.

***Groundwater fate and transport modeling for the January 2006 Semi Annual Compliance Plan Report contained the recently installed off-base PRBs.*** Modeling indicates the Site MP plume will be below GWPS by 2010. The East Kelly plume will be below GWPS by 2020 (Atch 5).

<i>Monitoring Wells Adjacent to Permeable Reactive Barriers and Slurry Walls</i>
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At several locations within the TAPP review, CRC commented on monitoring requirements for permeable reactive barriers and slurry walls. The Air Force is combining all those comments so that they can be addressed collectively in this section.

- Many recently installed slurry walls and permeable-barrier reactors do not have adequate monitoring wells to evaluate their effectiveness.
  - The monitoring need at permeable barrier reactors is the same analysis currently used at the RCRA Sites at Kelly USA.
  - Sufficient monitoring wells are needed to measure groundwater flow through the reactor.
  - Slurry wall monitoring requires a pair of wells on either side of the wall for monitoring the differences in groundwater depths.
- Permeable reactive barriers and slurry walls

- o Sufficient wells should be provided to monitor elevations near slurry walls and permeable-barrier reactors.

**AFRPA Response:** *The Air Force has installed monitoring well networks for all the permeable reactive barriers that have been installed. Figures showing the location of these wells are found in Atch 6. These wells have been sampled on a regular basis and the results have been presented at TRS meetings.*

*Since the sampling is not part of the annual groundwater sampling, the results are not presented in the January 2005 or January 2006 Semi Annual Report. A number of the wells, primarily downgradient wells, were sampled in November 2005. Beginning in July 2006, the PRBs will be sampled in conjunction with the RCRA sampling in July and January.*

Contaminants of Interest Table at Kelly USA
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- AF contends dissolved (arsenic) from soil due to high levels of groundwater pollution.
  - o **AFRPA Response:** *In Part III, Section 5.1.3 of the report arsenic distribution for Site E-3 states "This indicates that Site E-3 is likely a historical source of arsenic contamination or that in situ biodegradation of the organic compounds has resulted in a secondary release of arsenic from the aquifer matrix through biologically-mediated redox reactions." While arsenic may have been a site contaminant, the breakdown of the organic material at Site E-3 is likely to have created reducing conditions that have caused arsenic to be released, at least in part, from the aquifer materials. Arsenic is geochemically associated with iron oxides (Fe(OH)<sub>3</sub>). Arsenic will typically remain as an insoluble oxide unless geochemical conditions change (e.g., becomes reducing) and the iron becomes soluble which results in a corresponding release of arsenic. According to the pE/pH diagram provided in Stumm and Morgan (1981)<sup>2</sup>, this only occurs at low pH or under reducing conditions where nearly all oxygen has been removed from the groundwater system. These conditions typically occur where there are abundant, readily degradable organic compounds, such as fuels. The normal levels of arsenic in soils at Kelly AFB are usually between 2-15 ppm. Only a small fraction of the arsenic in soils needs to be dissolved (a few percent) to cause groundwater to exceed the GWPS. Arsenic in groundwater above GWPS is found at only four sites —Site S-1, Site S-4, Site E-3 and Site S-8—and a limited number of isolated locations on Kelly AFB.*
- AF contends dissolved (manganese) from soil due to high levels of groundwater pollution.
  - o **AFRPA Response:** *As determined in the Zone 4 RCRA Facility Investigation Report, the background concentration for manganese in groundwater was determined to be 340 µg/L. The majority of manganese concentrations from the 2004 sampling event are*

<sup>2</sup> Stumm, W. and Morgan, J.J., *Aquatic Chemistry, An Introduction Emphasizing Chemical Equilibria in Natural Waters*, 2<sup>nd</sup> Ed., 1981.



*within the range of the background concentration. Using information from Stumm and Morgan (1981), pH is the driving factor in manganese solubility. Manganese becomes soluble as the pH decreases below 8. The pH of the shallow groundwater is at or just below 7. The compliance plan report states "the presence of organic parameters in the soil and groundwater has been shown to enhance the solubility of manganese through chemical and biological activity."*

- (Nickel). Component of jet fuel. AF contends stainless steel well casings are the source.
  - **AFRPA Response: Based on the ATSDR Toxicology Profile for JP-4, nickel is not a component of jet fuel (<1 ppm). The compliance plan report states that the "lateral distribution of nickel in the surficial aquifer is characterized by a number of isolated plumes" and "it appears that most nickel in the surficial aquifer is probably due to leaching from the stainless-steel screens." The isolated plumes are most likely the result of the screens. The area of nickel found in the off-base area near Site S-4 is discussed later.**
- (Chromium). AF contends stainless steel well casings are the source.
  - **AFRPA Response: The compliance plan report states that the "Chromium-affected groundwater occurs in discrete areas that are primarily associated with Zone 3 sources, landfills, and sludge disposal areas in Zones 1 and 2 and in sporadic, isolated locations." The isolated locations are most likely the result of the screens. The chromium affected groundwater was evaluated as part of the Zone 2 and 3 Corrective Measures Study. However, several Air Force bases have conducted studies to show that stainless steel works fine UNTIL it begins to corrode in a few years and releases Ni and Cr. The isolated wells are likely related to well corrosion.**

*CRC reached the following general conclusions for the Semiannual Report. Additional items listed under the general comment are from CRC responses to the Technical Review Subcommittee comments.*

- Conclusions of the report can't be substantiated because of incomplete data reporting.
  - CRC's review also indicated that some data points were not found on plume maps found in Appendix M and some analytical results were not included in the laboratory report provided in Appendix D.
    - **AFRPA Response: No specific examples were given in the written report by CRC. Based on the Restoration Advisory Board (RAB) meeting presentation by Mr. Lynch, CRC appears to use Site E-3/SD-1 as the example. At this meeting, Mr. Lynch stated that through a comparison of Appendix H, Table D-3 and the plume map for PCE only 13 of the 24 wells sampled had data reports included in the report. This is not a correct statement. All the wells used for the statistical analysis have data reports in the document. Appendix H lists the wells that were used for the statistical evaluation.**

*The list included four background, twelve corrective action observation, two downgradient and 2 point of compliance monitoring wells. Of these 20 wells, ten have data reports in Appendix D of the Part IV Annual SWMU Assessment and Statistical Evaluation. The other 10 wells were sampled as part of the July 2004 RCRA sampling event. The lab results for those wells are found in Part III Semiannual Groundwater Assessment - Appendix B.*

*Mr. Lynch also stated at the RAB meeting that lab reports were not available for the monitoring wells at Sit SA-2. Because this site is a RCRA unit the lab results for those wells are found in Part III Semiannual Groundwater Assessment - Appendix B.*

*The general implication by Mr. Lynch at the RAB meeting was that "There is a lot of lab reports that weren't included." As part of the second semiannual RCRA groundwater sampling event at the former Kelly AFB, in July 2004, groundwater samples were obtained from 40 of the 45 RCRA monitoring wells. The lab results for all 40 wells are found in Part III Semiannual Groundwater Assessment - Appendix B.*

*Collection of groundwater samples was conducted at 473 monitoring wells during the basewide annual sampling event (April through June 2004). The lab results for all 473 wells are found in the Part IV Annual SWMU Assessment and Statistical Evaluation - Appendix D.*

*Although not a subject pertaining to the Compliance Plan Report, Mr. Lynch stated at the January 2006 RAB meeting that "at some point the reactor is going to stop treating the groundwater because that's what you are monitoring for. It is generally two or about three years." This statement does not correlate with the latest findings on permeable reactive barrier longevity. The projected life of permeable reactive barriers at former NAS Moffett Field and Lowry AFB is approximately 30 years in a study conducted by ESTCP (Atch 7).*

- Sampling for Agent Orange related compounds.
  - Compound used to manufacture 2,4,5-T is present in Leon Creek fish tissue. 1,2,4,5-tetrachlorobenzene was found in 5 of 31 fish tissue samples.
  - The presence of this compound in creek sediment and fish tissue is likely from a release of Agent Orange.
  - Sampling for 2,4,5-T, 2,4-D, and dioxin as part of future Leon Creek assessments is recommended.
    - ***AFRPA Response: The information provided does not justify the recommendation to sample for Agent Orange-related chemicals in Leon Creek. Furthermore, the statement that 1,2,4,5-tetrachlorobenzene (TCB) is likely the result of an Agent Orange release is speculative and made without apparent technical support. According to the EPA (see Atch 8), TCB, a common industrial chemical, is used as an intermediate or building block to make herbicides,***

*insecticides and defoliants. It is also used to make other chemicals such as 2,4,5-trichlorophenol (2,4,5-T) and 2,4,5-trichlorophenoxyacetic acid. As discussed at many Kelly RAB and TRS meetings, Agent Orange was stored at a location on East Kelly. That storage area has been closed in accordance with TCEQ Risk Reduction Standards. Because 2,4,5-T and other herbicides, insecticides and defoliants were not manufactured on Kelly AFB, the release of TCB is not likely. Based on the chemical fact sheets provided as Atch 9 and 10, 2,4,5-T and 2,4-D do not break down into TCB in the terrestrial environment. Lindane, a pesticide that had common usage throughout the United States, does break down into TCB in the terrestrial environment (Atch 11). The detections of TCB in fish tissue are two orders of magnitude below the laboratory reporting limit for the compound and the screening level for the compound. TCB was not detected in sediment samples. Therefore, the assertion by CRC that TCB is likely from a release of Agent Orange is unsubstantiated.*

- Comments were received asking whether groundwater contamination remained a danger. Absolutely.
  - ***AFRPA Response: A number of environmental and health risk assessment studies have been conducted at Kelly over the last decade. Overall, the risk assessment findings concluded that there is very little local groundwater use and the exposure is quite low. Three areas of concern were described by CRC. Responses to those concerns are noted below.***
  - A single undocumented and abandoned well within the identified groundwater contamination plume could result in contamination of the deep aquifer used by San Antonio for drinking water.
    - ***AFRPA Response: The Texas Bureau of Economic Geology (BEG)<sup>3</sup> conducted a study that considered two possible potential pathways for contaminants to reach the Edwards Aquifer, groundwater flow along faults and fractures and abandoned or undocumented wells. The BEG report concluded that undocumented wells are a more likely pathway to the Edwards Aquifer. Faults and fractures are likely to be tightly closed where they cross shale beds and are sealed by secondary minerals such as calcite and silica. The BEG report delineated an area where hydraulic head differences could allow shallow groundwater to flow downward in times of drought. This area is centered on main Kelly. However, an assessment of the BEG report by Mitretek Systems<sup>4</sup> concluded that the BEG report failed to note that groundwater in this area is thin (0-10 feet) and that***

<sup>3</sup> Hovorka, S.D., et al., *Evaluation of the Potential for Cross Contamination of the Edwards Aquifer from Dissolved Contaminants in the Shallow Groundwater Zone in the Vicinity of Kelly AFB via Faults and Wells*, July 2002.

<sup>4</sup> Miller, J.K., *An Independent Technical Assessment of the Final Report Prepared by the Bureau of Economic Geology on the Potential for Cross Contamination of the Edwards Aquifer at the former Kelly Air Force Base*, July, 2003. Mitretek Systems, Falls Church, VA.

*the saturated zone becomes thinner in times of drought with large portions of the shallow groundwater zone becoming "dry zones." Thus there is little water available when conditions are most favorable for downward flow. According to Mitretek, the BEG report's maximum potential downward flow is unrealistically high and serves no useful purpose. In areas where the Edwards Aquifer is under artesian conditions, groundwater flow would back up the wells and "flood" the shallow aquifer. There is no evidence in the potentiometric maps for the shallow water zone to suggest a connection between the shallow water zone and the Edwards Aquifer.*

- o Shallow groundwater use could result in accumulation of the dissolved metals arsenic, nickel or chromium in irrigated soils.
  - ***AFRPA Response: As determined in the Zone 4 RCRA Facility Investigation Report, the background concentration for arsenic, nickel and chromium in groundwater was determined to be 1.3 µg/L, 66 µg/L, and 19 µg/L, respectively. Therefore, these elements are also found naturally in the groundwater. Soil background in the Kelly vicinity for arsenic, nickel and chromium are 6,300 µg/kg, 22,680 µg/kg and 43,160 µg/kg. The Risk Reduction Standard No. 2 values that are protective for residential use for arsenic, nickel and chromium are 20,000 µg/kg, 19,000,000 µg/kg and 59,000,000 µg/kg, respectively. Even if the groundwater was used to irrigate soils, unrealistic amounts of water would be needed to increase soil concentrations above the risk level developed by the TCEQ, assuming that the relatively clean water didn't leach out the native metals.***
- o There is also a risk of exposure to solvent contamination as a result in indoor air infiltration.
  - ***AFRPA Response: This pathway has been evaluated by the Air Force and the City of San Antonio. In an effort to address community concerns relating to the possibility of shallow groundwater contaminant vapors inflowing to indoor air, the Air Force conducted a series of studies, with COSA oversight, to evaluate the groundwater-to-indoor air pathway. In 2000, the Air Force installed eight soil vapor monitoring wells in the community adjacent to existing groundwater monitoring wells to sample for the presence of soil contaminant vapors.<sup>5</sup> A seasonal variation of this study was conducted in 2002 to determine whether time of year affects the presence of soil contaminant vapors. Sampling results from both soil vapor monitoring well studies indicated that vapors are well below 10<sup>-6</sup> risk levels. In 2004, the Air Force completed sub-slab soil gas sampling to investigate the possibility of soil contaminant vapor migration into indoor air space.<sup>6</sup> Risks were determined to be below 10<sup>-6</sup> levels. The TCEQ and the***

<sup>5</sup> USAF, *Informal Technical Information Report for Zone 4 OU-2 and Site S-4 Vapor Monitoring*, March 2000.

<sup>6</sup> USAF, *Zone 4 Sub-Slab Soil Gas Sampling*, March 2004.

**EPA approved the methodology and results for the soil vapor studies.**

*Secondary Contamination Issue*

- Secondary contamination issues are impacting cleanup.
  - Increases in dissolved oxygen in groundwater as a result of rainwater and irrigation infiltration will be required to reduce manganese concentrations in groundwater.
- The breakdown of PCE and TCE has depleted dissolved oxygen in groundwater. The lack of dissolved oxygen changes the valence of iron and manganese in soil, to a form that is soluble.
  - **AFRPA Response: The breakdown of PCE and TCE does not deplete dissolved oxygen in groundwater. In order for dechlorination to proceed, oxygen must already be removed from the system. In the reaction, microorganisms are capable of using chlorinated solvents as electron acceptors.**
  - The effect of high dissolved iron and manganese levels on the effectiveness of the permeable barrier reactors needs to be evaluated.
    - **AFRPA Response: As part of the design process for the permeable reactive barriers, EnvironMetal Inc., the patent holder for the technology, conducted laboratory pilot testing to determine if the groundwater at the location where the permeable reactive barrier is to be installed is suitable for the technology. The tests indicated the technology was appropriate for use at the sites on Kelly AFB.**
- The presence of arsenic above drinking water protection standards has been explained as a result of high concentrations of dissolved manganese. High levels of arsenic and high levels of dissolved manganese are not consistently found in the same locations. Reduction of manganese will likely be required to remove dissolved arsenic.
  - **AFRPA Response: The Semiannual Compliance Plan report does not state that the presence of arsenic in groundwater is the result of high concentrations of manganese. If this correlation is being made by CRC, CRC is not correct. As noted above, manganese is relatively soluble under the geochemical conditions that exist in the vicinity of Kelly AFB. Arsenic in groundwater may be released from the soil if the iron oxide becomes soluble. Manganese reduction is not a condition to remove arsenic from the groundwater.**
- N-nitrosodiethylamine [DEN], a chemical associated with military ordnance disposal, are found in fish tissue taken from Leon Creek.
  - **AFRPA Response: According to the chemical fact sheet developed by Spectrum (Atch 12), DEN has been used as a gasoline and lubricant additive, antioxidant and stabilizer. According to the fact sheet, DEN is not associated with military ordnance disposal. DEN has been found in the air at dye, rubber and foundry industries. DEN has also been found in Philadelphia drinking water, in the passenger area of new cars, in cigarette smoke, and in cheese, bacon, beer and fish. Thus, the general population may**

**be exposed to DEN from riding in new cars, breathing cigarette smoke, drinking beer, or eating certain foods such as cheese, bacon, and fish.**

- Surface water samples from Leon Creek have reported dissolved oxygen levels below the water quality standard of 5mg/L dissolved oxygen.
  - Groundwater with high levels of dissolved manganese and iron entering Leon Creek may be responsible for part of this oxygen deficit.
    - **AFRPA Response: Leon Creek is a small, shallow, slow moving urban stream that is a receptacle for urban runoff. Lack of tree cover causes high water temperatures, which reduces the amount of oxygen in the water. As water increases in temperature, oxygen becomes less soluble and therefore the concentrations become less. In the yearly July sampling events, water temperatures nearing 30°C are not uncommon in Leon Creek. Because oxygen is abundant in the atmosphere, the equilibrium between atmospheric oxygen and dissolved oxygen will control the oxygen levels in Leon Creek, not the concentration of dissolved metals in groundwater.**

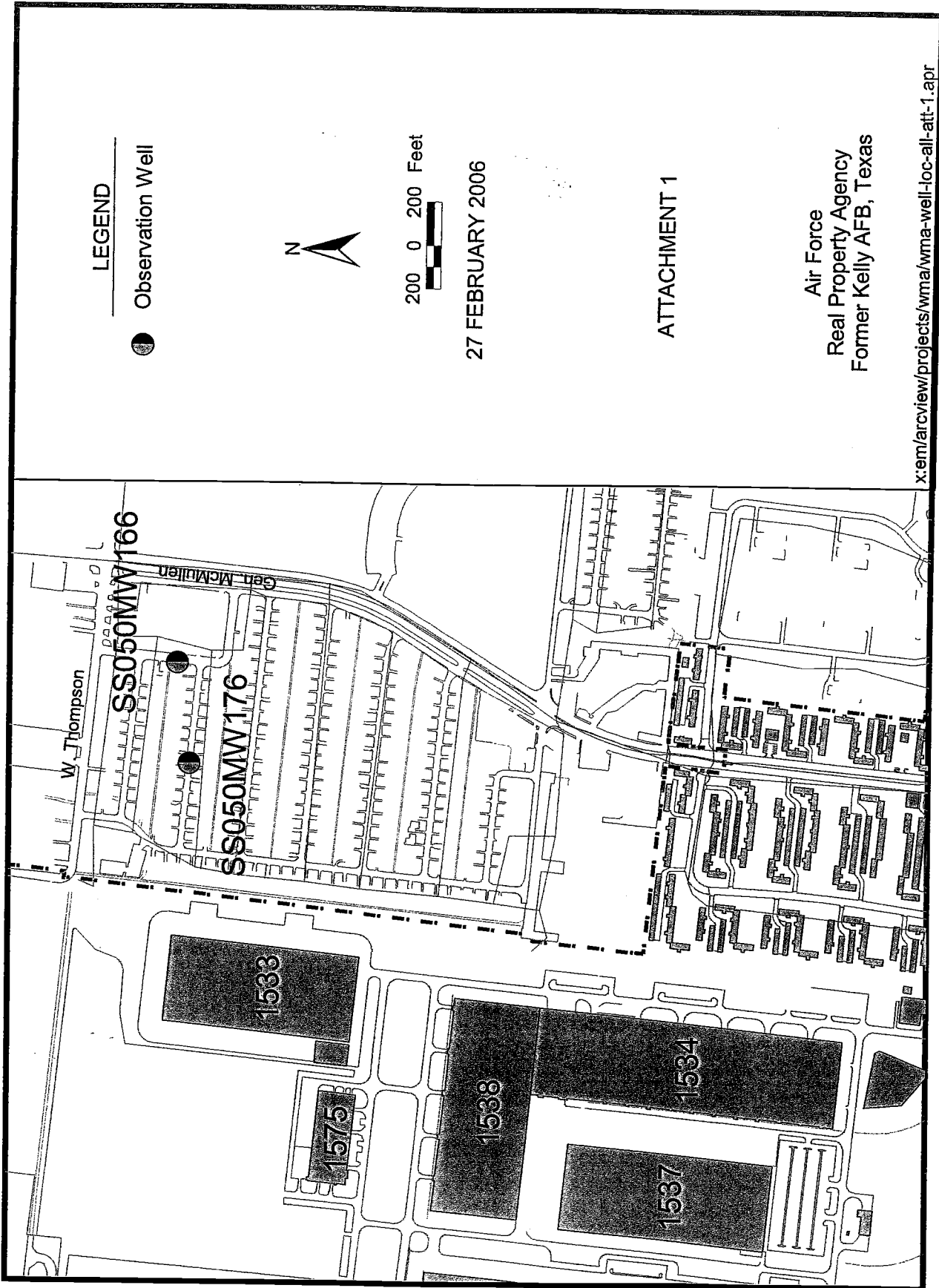
<i>Other General Comments</i>
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- Site MP – Groundwater elevations within the slurry wall are not significantly below groundwater elevations measured outside the wall.
  - Groundwater extraction from inside the slurry wall would improve containment.
    - **AFRPA Response: As noted in Table 6.1 and Section 6.8.2 of the Compliance Plan Report, a gradient control well was installed inside the slurry wall and has been operating for many years. Groundwater samples collected outside the slurry wall confirm the effectiveness of the slurry wall and associated groundwater recovery well.**
- Site S-4 – Contamination is within the groundwater drain installed by the City of San Antonio.
  - **AFRPA Response: The City of San Antonio installed a stormwater culvert, not a “groundwater drain,” in the Site S-4 area. A protective barrier was added to the culvert to prevent infiltration of groundwater into the culvert. We are not sure what CRC is trying to describe in this section.**
  - Nickel is found above groundwater protection standards in a plume that extends from Site S-4 beyond the groundwater drain a distance of about a half-mile to the southeast of the base.
    - **AFRPA Response: Nickel is found above groundwater protection standards in off-base areas near the city stormwater culvert. However, as seen on Figure M12 (sheet 3 Of 3) of the January 2005 Report, nickel concentrations located on the former Kelly AFB are well below the GWPS, whereas nickel concentrations within the area beyond the UPRR yard are well above the GWPS.**
- Sampling more of the existing off base (Site S-4) wells would provide greater

confidence in the extent of contamination.

- **AFRPA Response: The Site S-4 Corrective Measures Implementation Work Plan, approved by the TCEQ in conjunction with the Site S-4 Compliance Plan Modification, evaluated the appropriate monitoring network for the site. The network is more than sufficient to determine changes in the extent of contamination.**
- At the January 2006 RAB Meeting, Mr. Lynch stated that some pentachlorophenol was found in some groundwater on East Kelly.
  - **Two monitoring wells, not located on East Kelly, had detections of the compound in groundwater in 2004. Well SS052MW471 is located near Malone and Dittmar Street. Well SS052MW592 is located near the intersection of Somerset and New Laredo Highway. Past detections have been rare, with concentrations near the detection limit. The 2004 detections were the first since 2001 and no detections were found in the 2005 sampling event.**
- Groundwater gradient and plume maps
  - The accuracy of groundwater gradient and plume maps could be improved by reducing the time period in which measurements and samples are collected and reducing the distance between monitoring points.
    - **AFRPA Response: The Air Force has used monitoring optimization tools to determine that adequate monitoring locations exist. Each year, the sample locations are collected in the same general order. Therefore, year to year, groundwater samples are collected at the same time of year. Reducing the time frame for sampling will not alter the accuracy of the maps.**
  - Greater care could be used in preparing gradient and plume maps. On one plume map (Figure M.2, Sheet 3 of 3) the contamination is depicted as being east of the wells where the samples were collected.
    - **AFRPA Response: Sheet 3 of 3 is an insert area of Figure M.2 that provides more detail for the Zones 2 and 3 areas. Contours are developed for Figure M.2 based on the entire field of the data and the AF has determined that the contours are correct as drawn. The contour overlying the word "Quintana" has data to the east to support the extension of the plume. At Kelsey and Price, the data point is labeled to the left of the well because the label would have been hidden by the line showing the area of the cutout.**

**At the January 2006 RAB meeting, Mr. Lynch, referring to arsenic in Zone 3, stated: "One of the downgradient wells is a value of 110 parts per million. And I can't find the value mapped on -- I mean, there should be 110 right over here and I can't see it. So it doesn't even appear to be placed on the well." Figure M13 (Sheet 3 of 3) clearly labels the monitoring well that had the 110 µg/L detection of arsenic.**



**LEGEND**

● Observation Well



200 0 200 Feet

27 FEBRUARY 2006

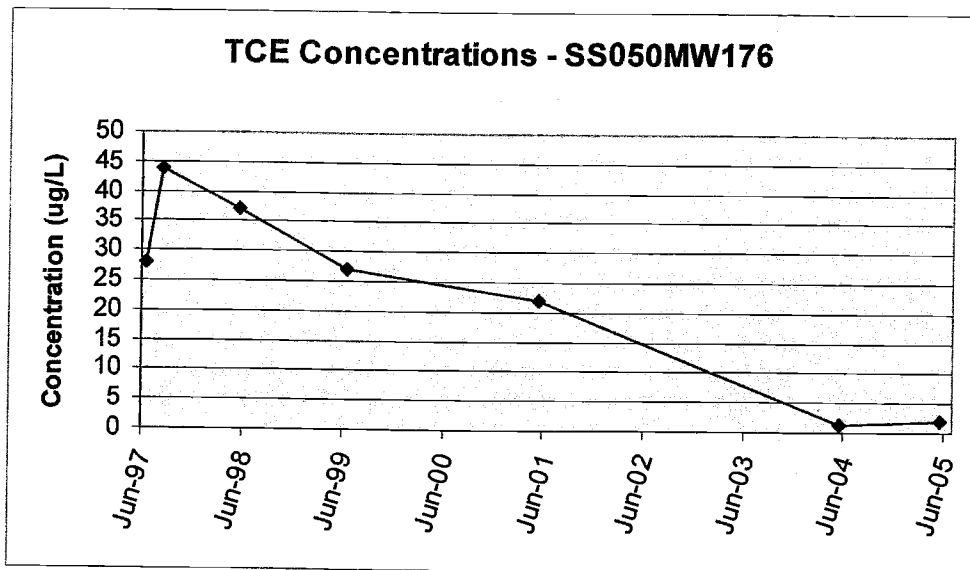
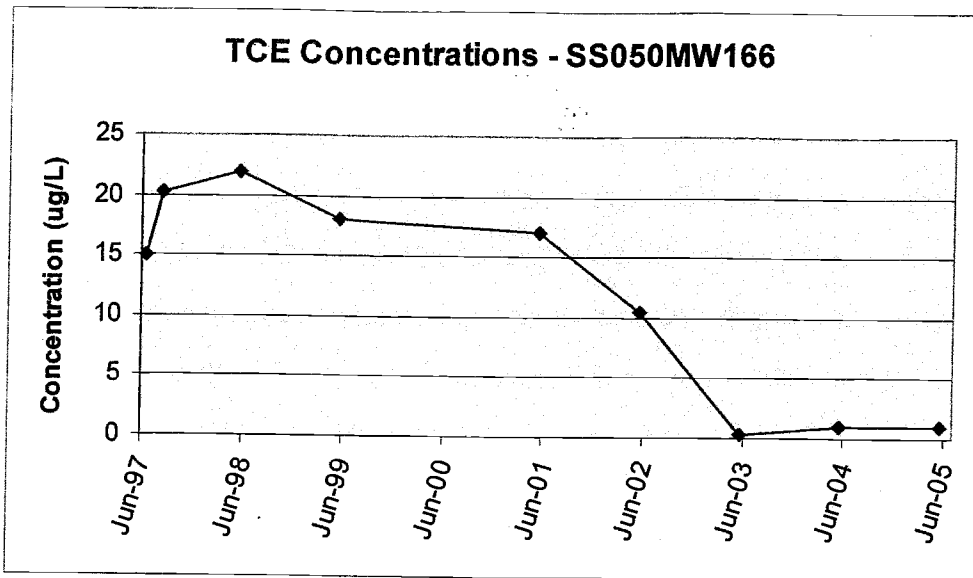
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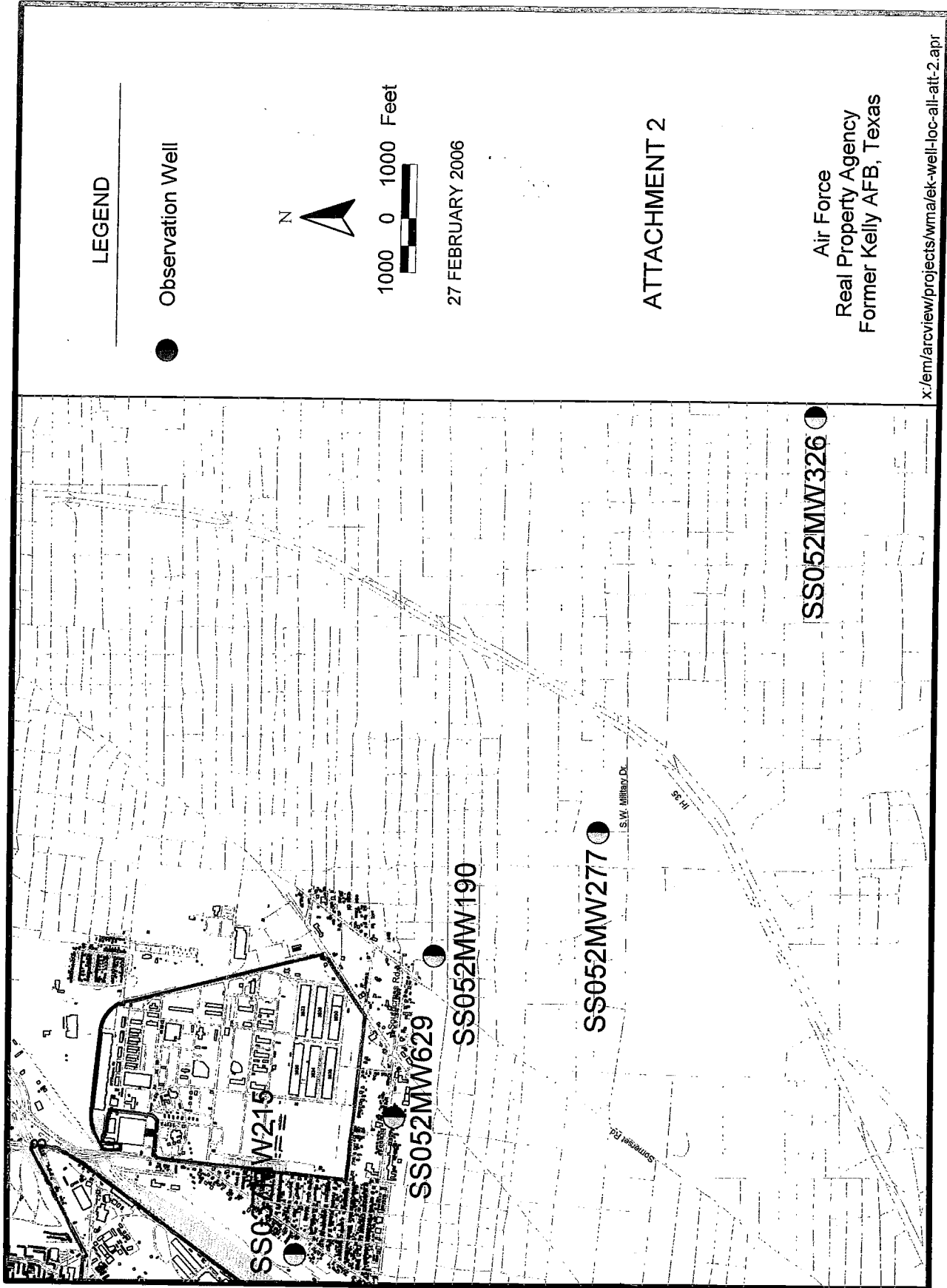
Air Force  
Real Property Agency  
Former Kelly AFB, Texas

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**Atch 1. Zone 5 Off-base TCE Trends in Groundwater  
(GWPS for TCE is 5 µg/L)**





LEGEND

● Observation Well



1000 0 1000 Feet



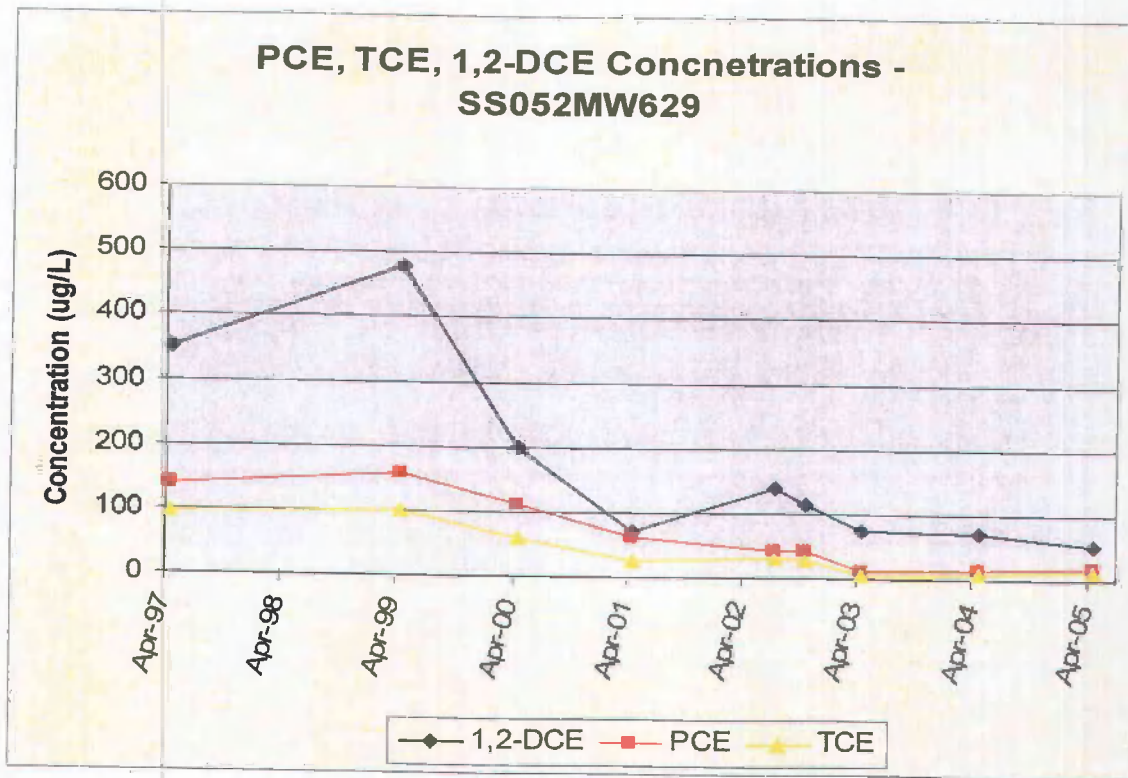
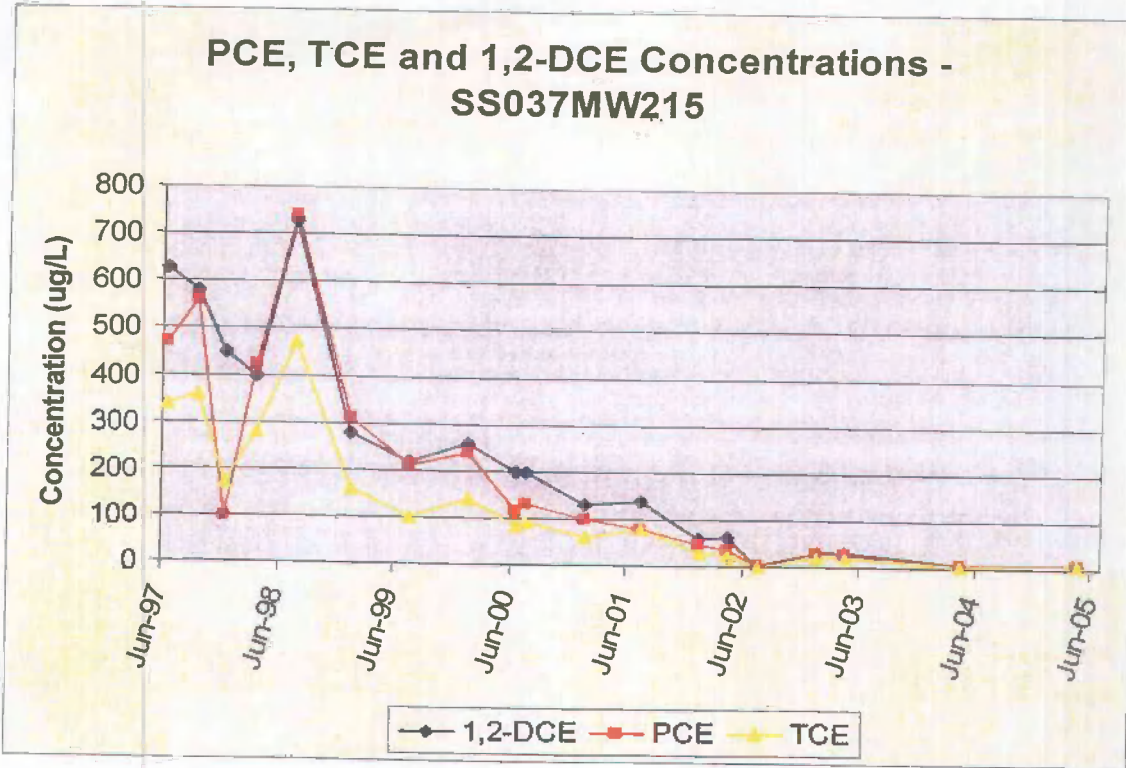
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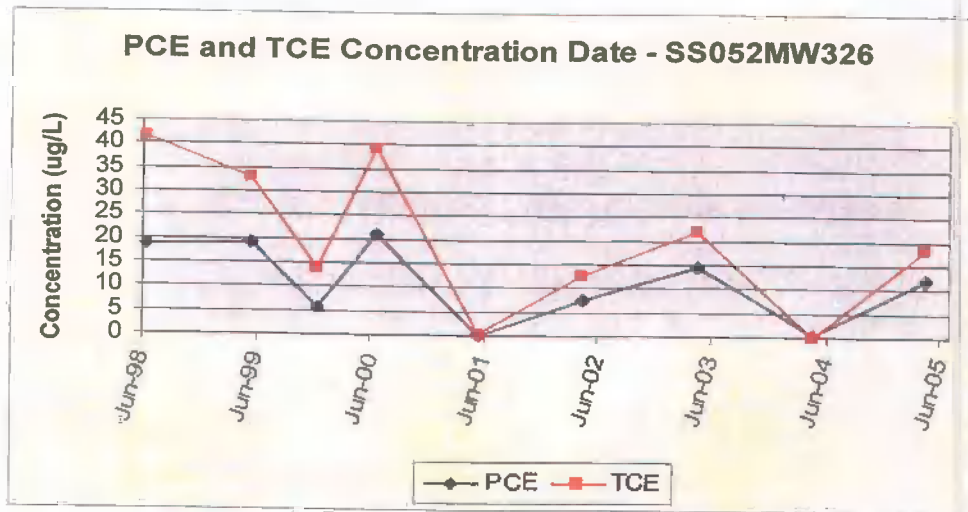
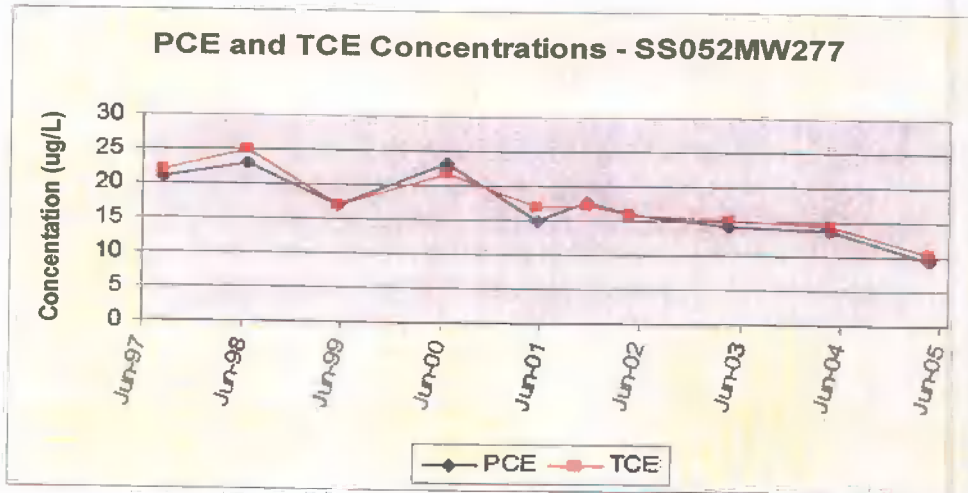
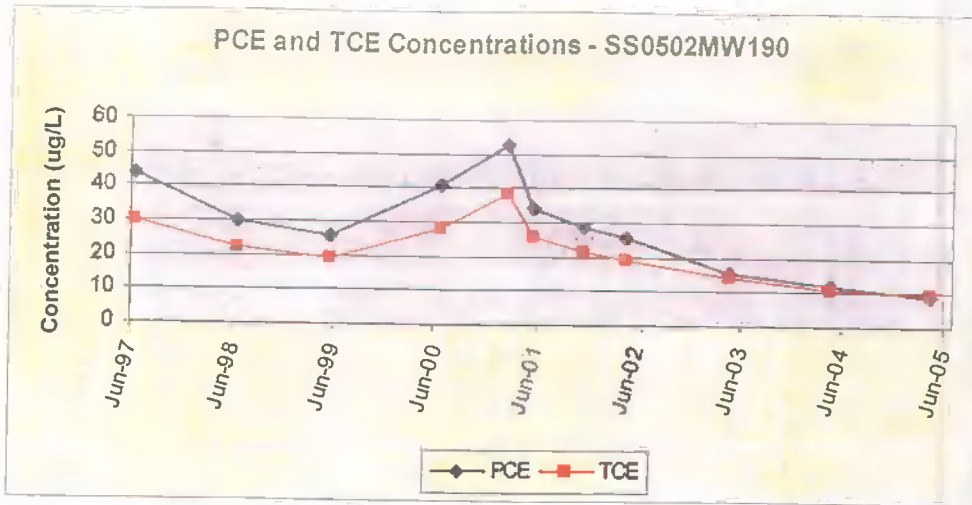
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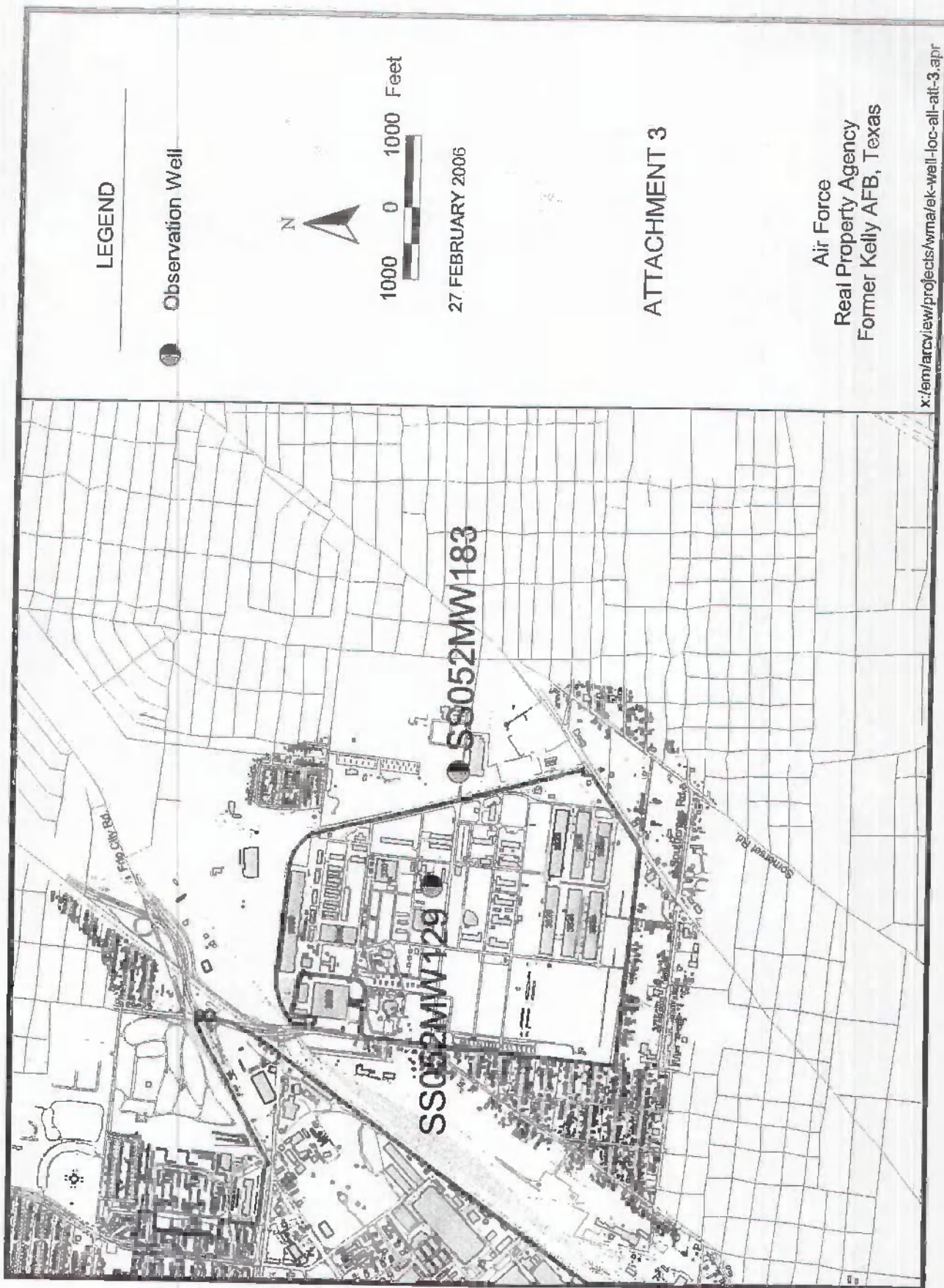
Air Force  
Real Property Agency  
Former Kelly AFB, Texas

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**Atch 2. Site MP Plume Off-base Trends in Groundwater  
(GWPS for PCE and TCE is 5 µg/L and 70 µg/L for DCE)**







LEGEND

● Observation Well



1000 0 1000 Feet

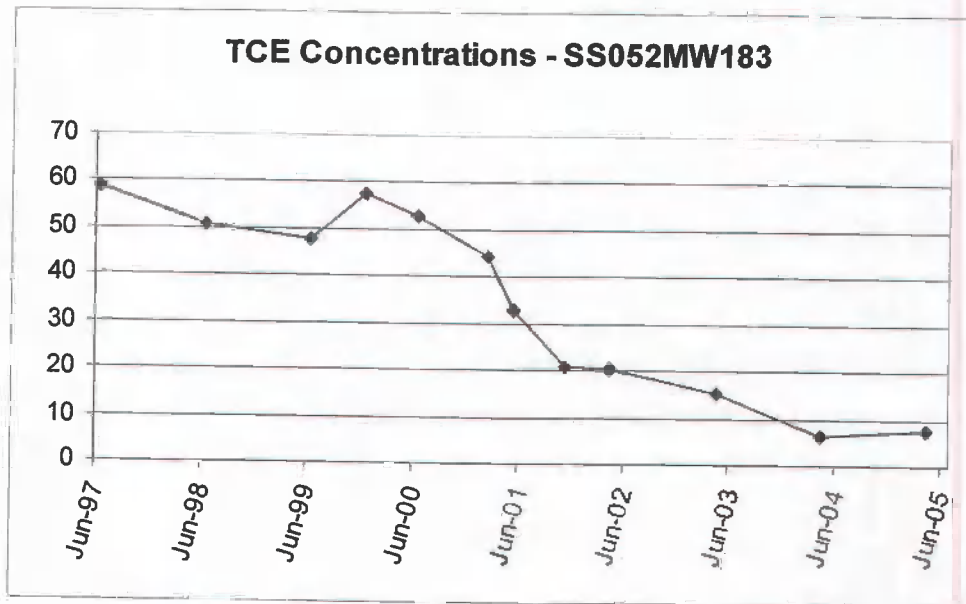
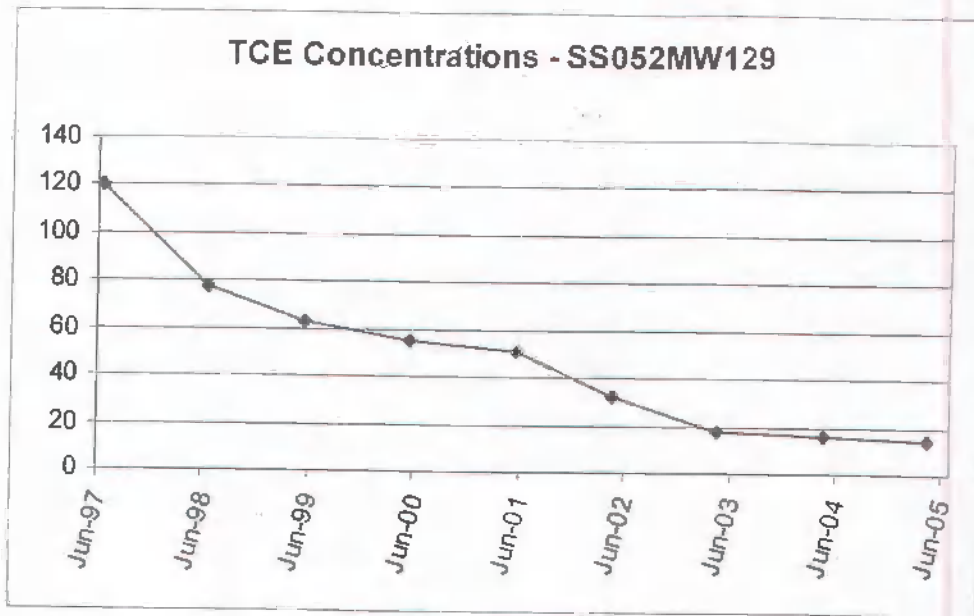
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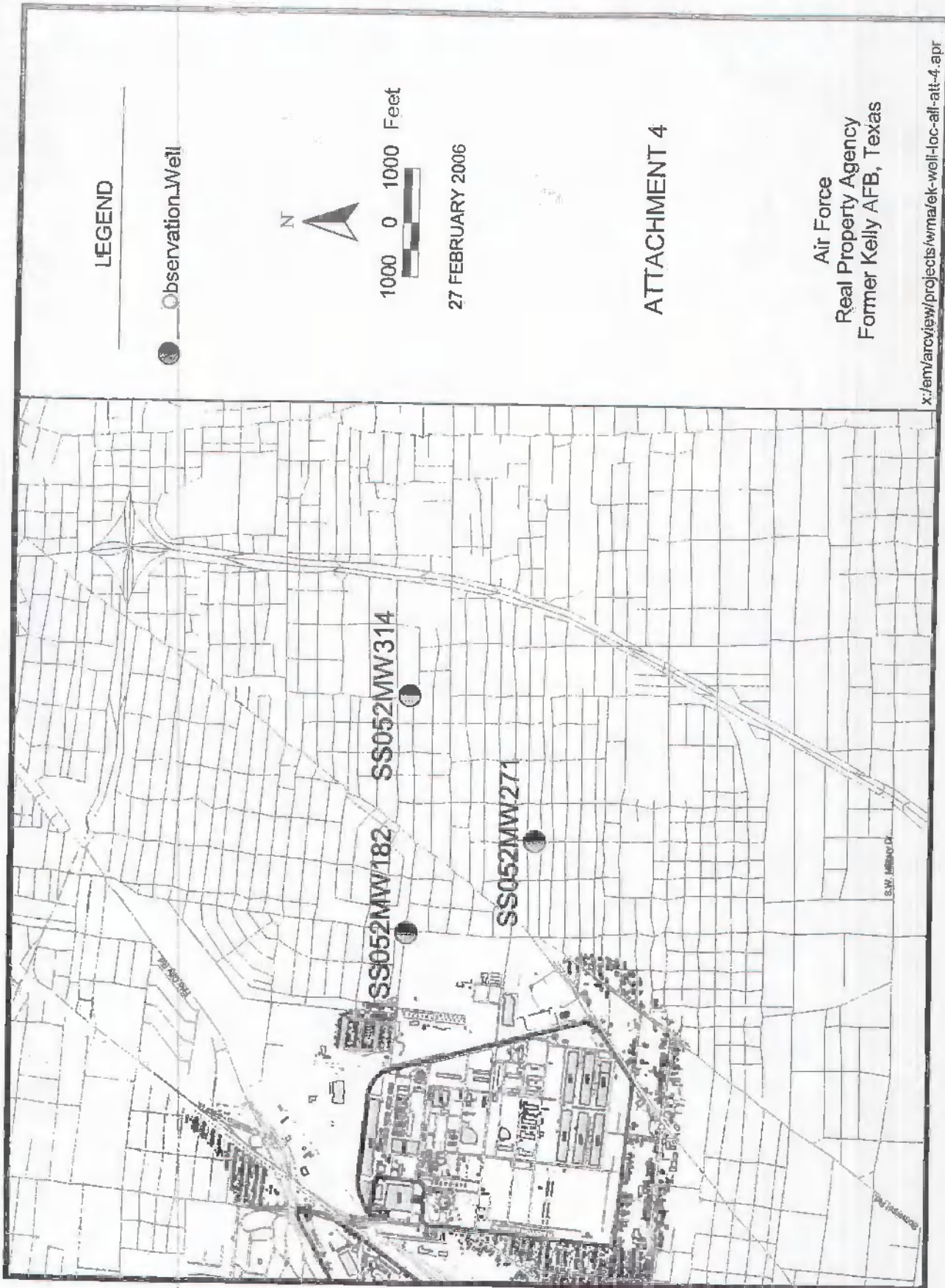
ATTACHMENT 3

Air Force  
Real Property Agency  
Former Kelly AFB, Texas

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### Atch 3. East Kelly Plume Off-base Trends in Groundwater (GWPS for TCE is 5 µg/L)





LEGEND

● Observation Well



1000 0 1000 Feet

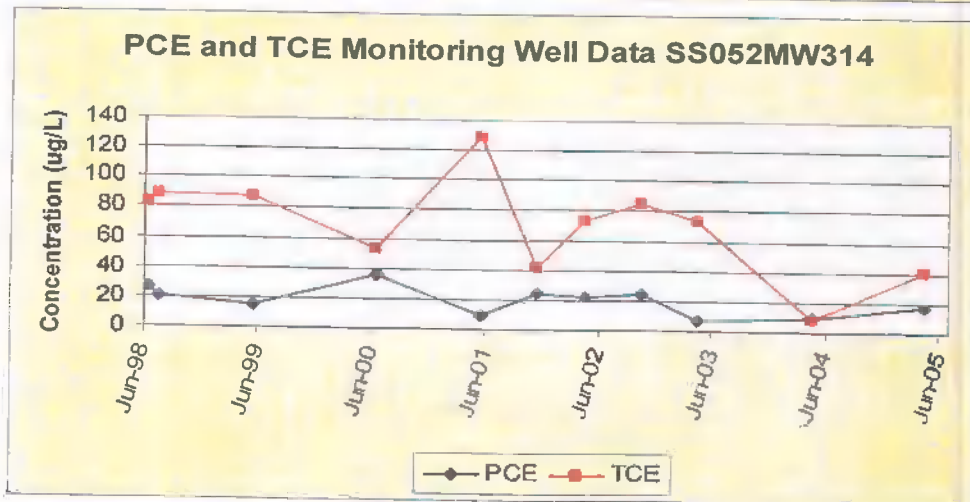
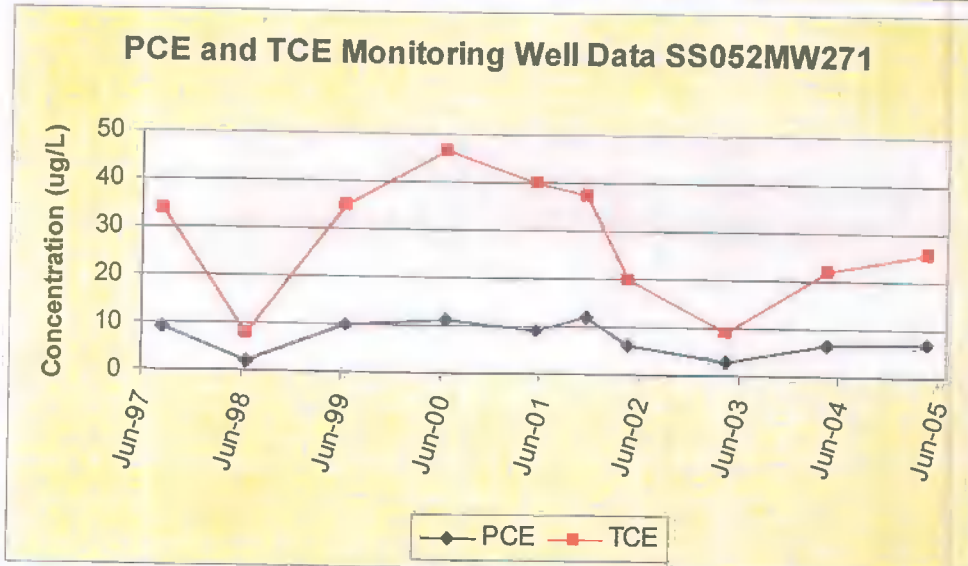
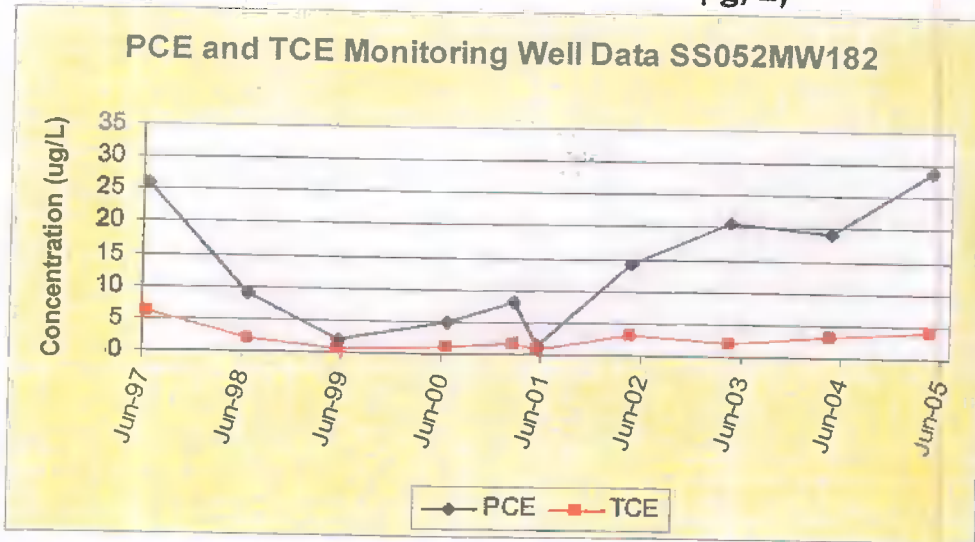
27 FEBRUARY 2006

ATTACHMENT 4

Air Force  
Real Property Agency  
Former Kelly AFB, Texas

x:/em/arcview/projects/wma/ek-well-loc-att-4.apr

**Atch 4. Northern East Kelly Plume Off-base Trends in Groundwater  
(GWPS for PCE and TCE is 5 µg/L)**





**Atch 5. Zone 4 Model Results from January 2006  
Semianual Compliance Plan Report**



Figure 6-8 Model Distribution of PCE Concentration Based on 2005 Concentration Contours and Data

D:\Kell

ment\_report\_AI.doc

U.S. Air Force Center for Environmental Excellence

1



Figure 6-9 Model Distribution of TCE Concentration Based on 2005 Concentration Contours and Data



Figure 6-10 Predicted PCE Concentration Contours at 5 Years

U.S. Air Force Center for Environmental Excellence



Figure 6-11 Predicted PCE Concentration Contours at 10 Years

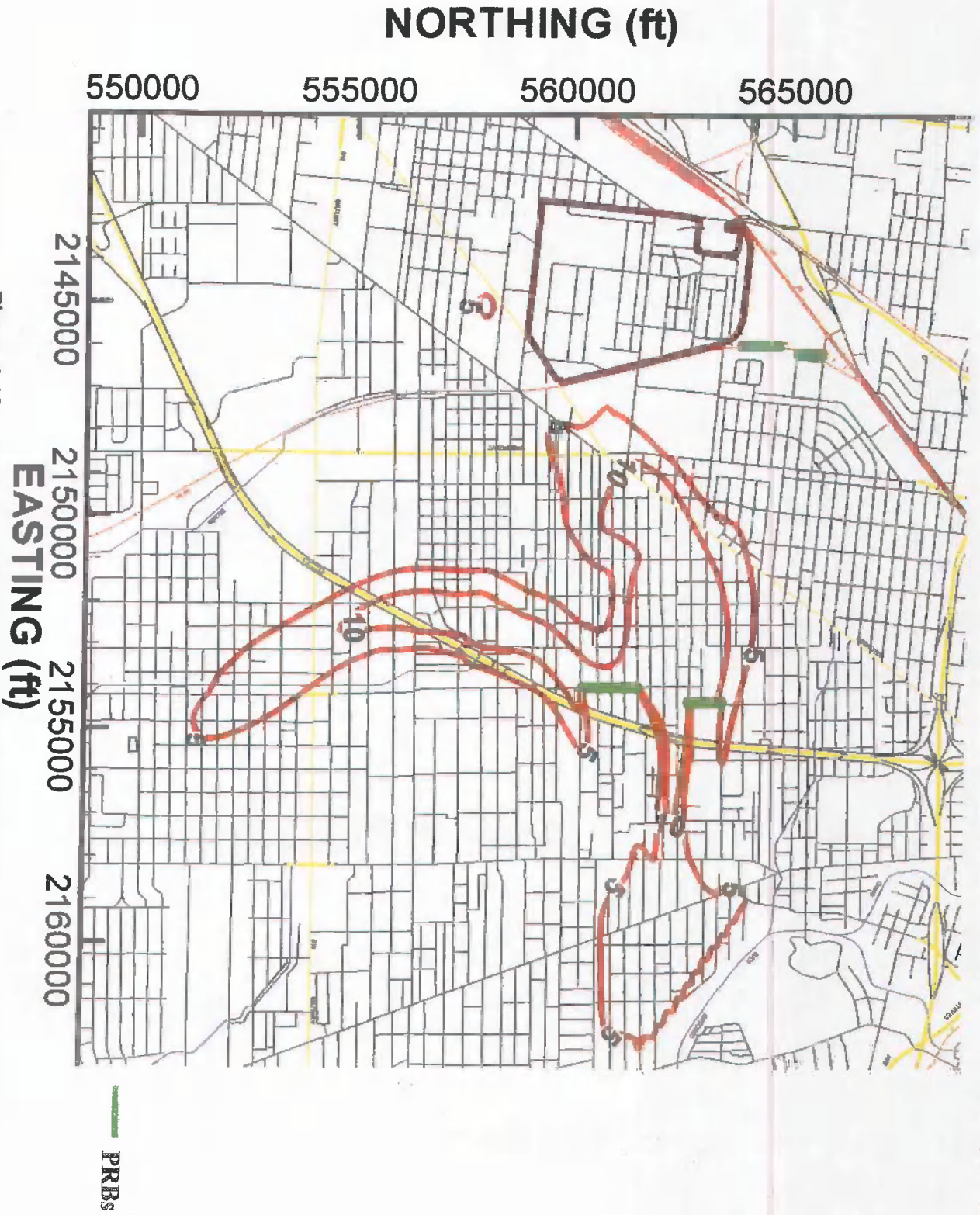


Figure 6-12 Predicted TCE Concentration Contours at 5 Years

U.S. Air Force Center for Environmental Excellence

2005 Basewide Remedial Assessment - Groundwater Model Simulations, Former Kelly AFB, Texas



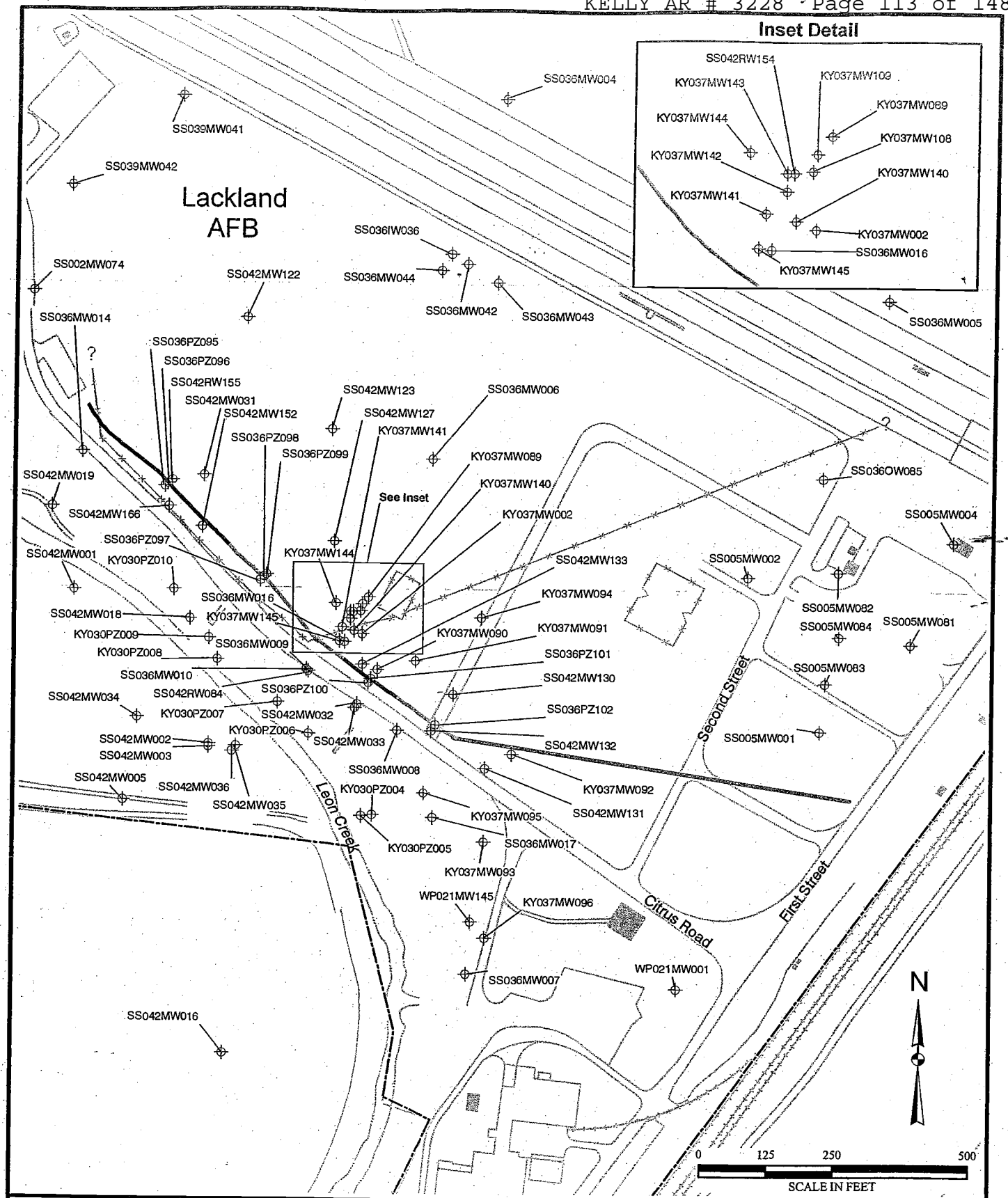
Figure 6-13 Predicted TCE Concentration Contours at 10 Years

U.S. Air Force Center for Environmental Excellence


6-16

**Atch 6. PRB Monitoring Well Locations**





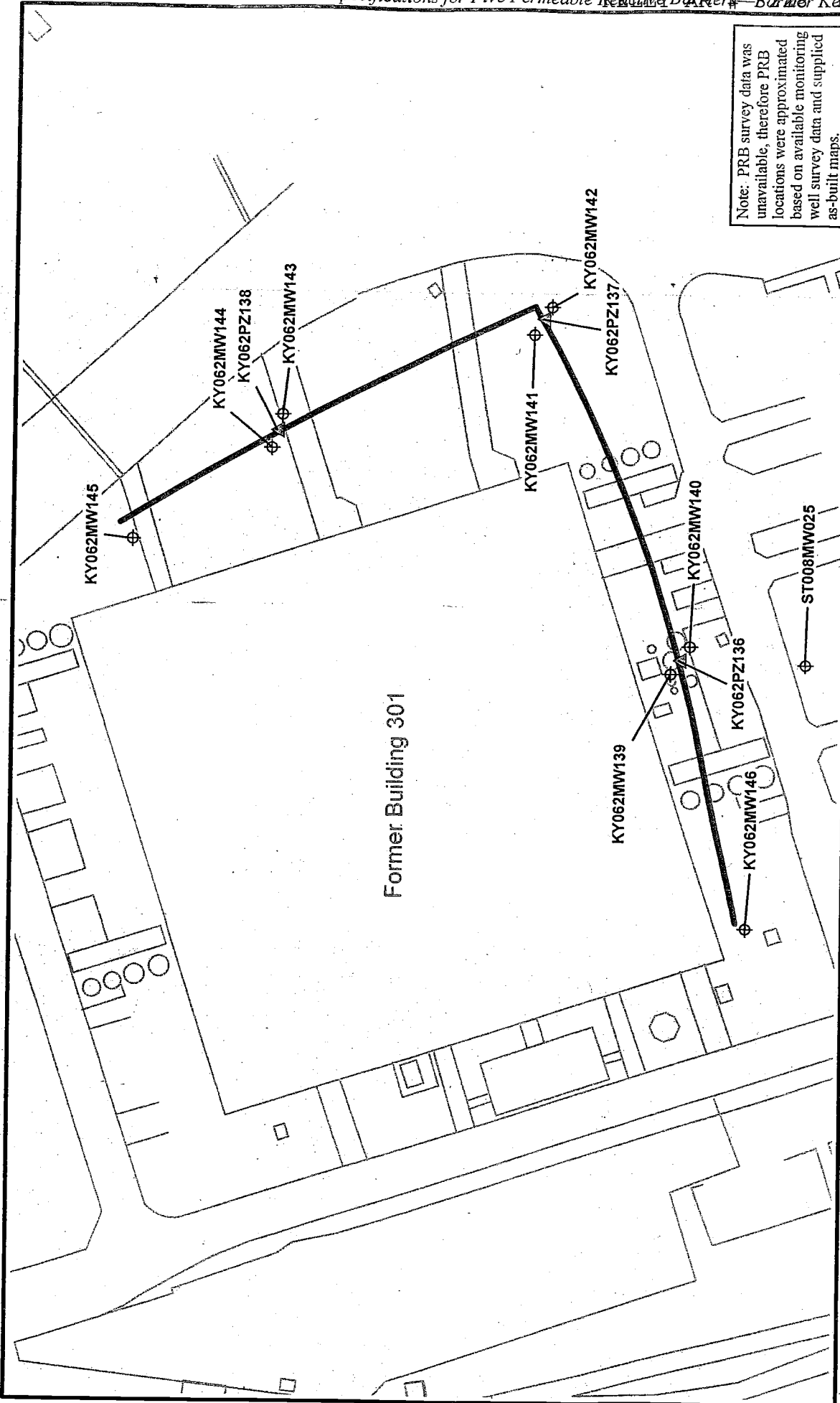
Map Source: AFCEE  
 X:\AFC002\Kelly\_AFB\TO40\Maps/  
 TO40\Maps\PRB\_Asbuilt\PRB\_and\_MW.mxd  
 06/23/05 ASC



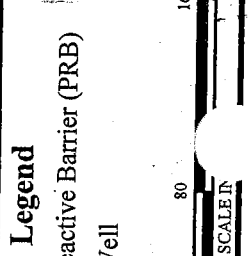
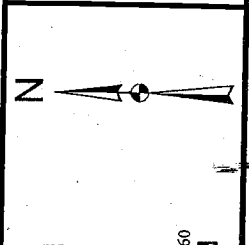
Legend			
	PRB 100% Iron		Former Kelly AFB Boundary
	PRB 40% Iron		Fence
	PRB 21% Iron		Monitoring Well
	Slurry Wall		Quarterly Sampling Well
	Sand 100%		




**Figure 2.2**  
**Location of PRB and**  
**Slurry Wall**  
**Former Kelly AFB**


Note: PRB survey data was unavailable, therefore PRB locations were approximated based on available monitoring well survey data and supplied as-built maps.



**Figure 3.2**  
**Former Building 301 PRB**  
**Monitoring Point Locations**  
**Former Kelly AFB, Texas**

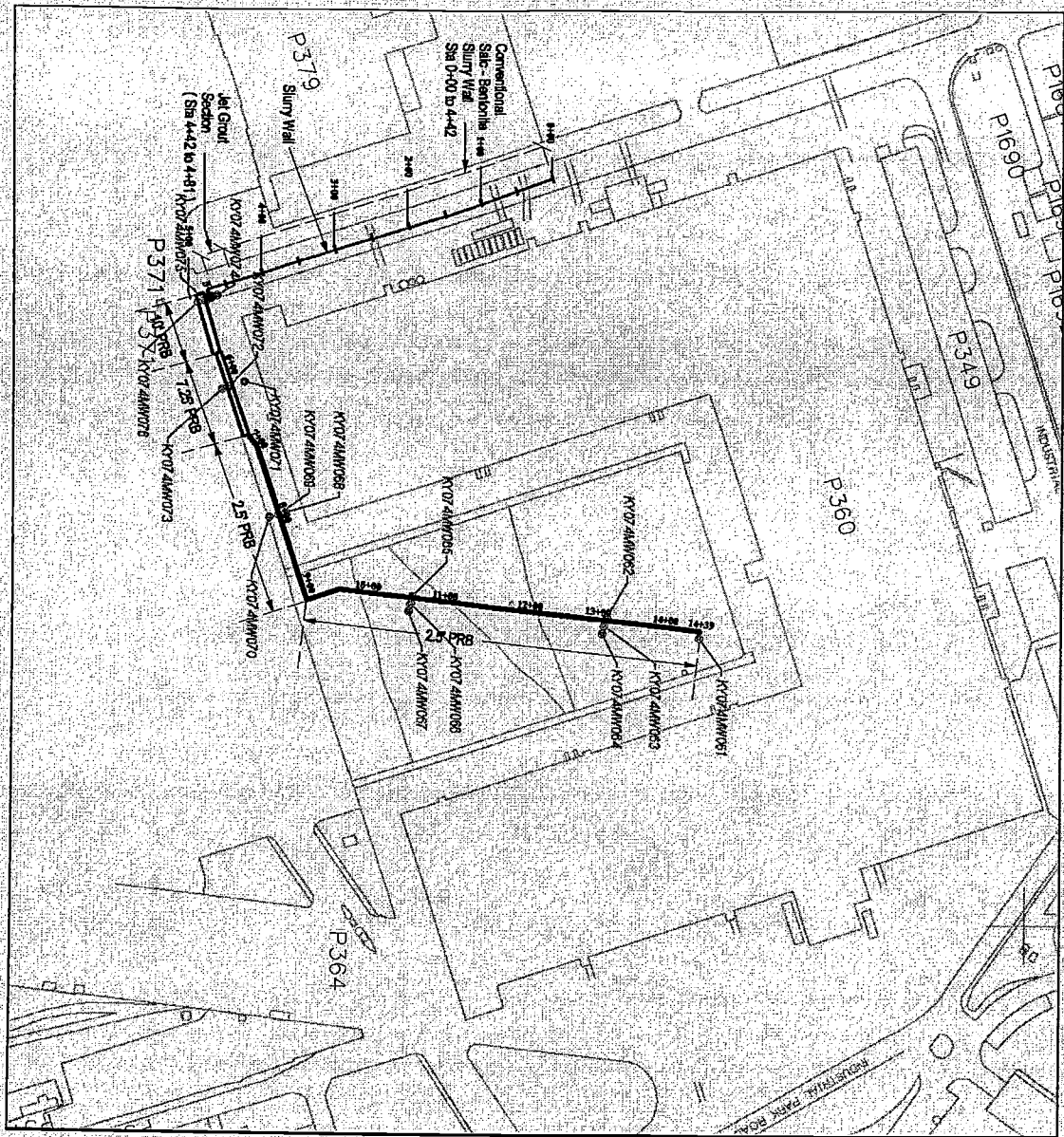


- Legend**
-  Permeable Reactive Barrier (PRB)
  -  Monitoring Well
  -  Piezometer



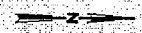
X:\AFC002\Kelly\_AFB\TO40\Maps\PRB\_Asbuilt\PRB\_Bldg\_301\_MW\_Locs.mxd  
 06/23/05 acarriger  
 Source: HGL GIS Database

FOR PAPER BUILDING AND  
CONSTRUCTION COMPLIANCE



000

CONTRACT NO. E419441-D-001018



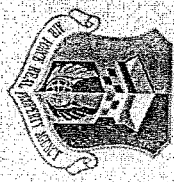
**LEGEND**

Monitoring Wells  
PRB

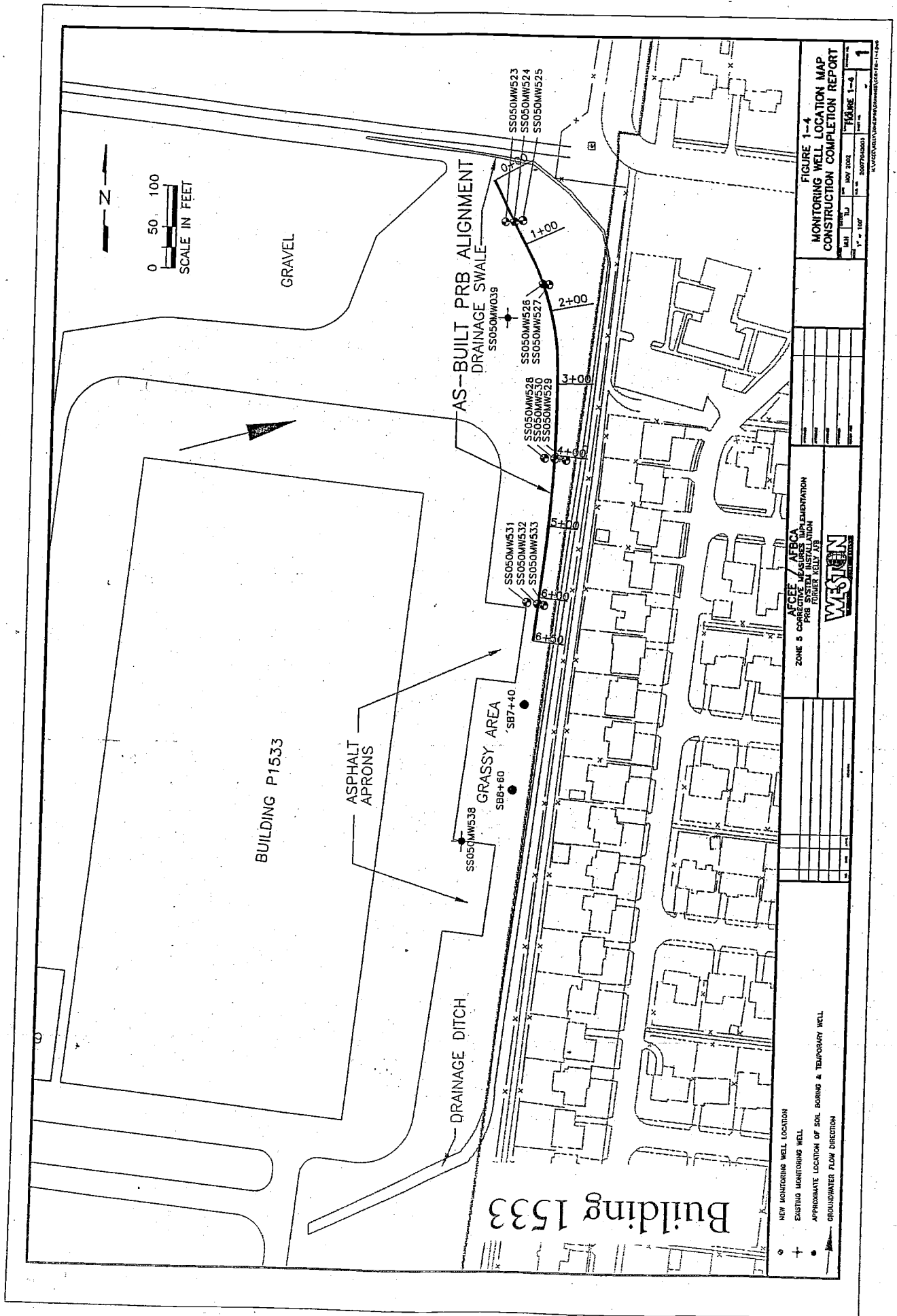
**NOTE**  
PRB Thickness & ZVI Content Vary as Follows:  
Section A: 10 Feet, 100% ZVI  
Section B: 7.25 Feet, 100% ZVI  
Section C thru Section F: 2.5 Feet, 37% ZVI & 63% sand by weight

PROJECT: 1/2/2015-3/30/2015-359-PRB-LR  
DATE: 2-11-2014

**FIGURE 42**  
Layout of Building 360  
Restoration System  
Former Kelly AFB, Texas



**CH2M HILL**



**FIGURE 1-4**  
**MONITORING WELL LOCATION MAP**  
**CONSTRUCTION COMPLETION REPORT**

DATE	BY	NO.	FIGURE
			1-3

**AFCEE / AFCEA**  
**ZONE 5 CORRECTIVE MEASURES IMPLEMENTATION**  
**SYSTEM INSTALLATION**  
**FOR THE KELLY AFB**

NO.	DATE	BY	DESCRIPTION

**WESTERN**  
**ENGINEERING**

11000 WESTERN BLVD., SUITE 100  
DALLAS, TEXAS 75240  
TEL: 972.346.1100  
WWW.WESTERN-ENGINEERING.COM

AECOM Contract No. F41024-01-D-8341  
 Shaw Project No. 845444, T.O. No. 100

- LEGEND:**
- MONITORING WELL
  - SOIL BORING
  - SIDEWALKS
  - LOCATION/POSITION OF PRB TRENCH
  - MW612 MONITOR WELL SS050MW612
  - 40%+ IRON
  - 75%+ IRON

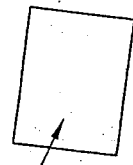
**NOTES:**

1. THE NORTH END OF THE PERMEABLE REACTIVE BARRIER (PRB) WALL COINCIDES WITH SOIL BORING SS050SB557.
2. THE SOUTH END OF THE PRB WALL COINCIDES WITH SOIL BORING SS050SB575. THE APPROXIMATE LENGTH OF THE PRB WALL IS 540 FEET.

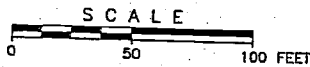
34<sup>th</sup> Street

MW615  
 MW600

34th ST.



CUSTOM READY  
 MIX 2710 34th SW



MW598  
 MW613

MW597

SS050SB577

3-6

FORWARD KELLY AIR FORCE BASE  
 SAN ANTONIO, TEXAS

FIGURE 3-2  
 PRB ALIGNMENT

Construction Completion Report  
 May 2005

**Atch 7. ESTCP Cost and Performance Report**

## 1.0 EXECUTIVE SUMMARY

The goal of this project was to evaluate short- and long-term performance issues associated with permeable reactive barriers (PRBs) installed at several U.S. Department of Defense (DoD) sites. A PRB is a passive, in situ technology, in which natural groundwater flow brings contaminants into contact with a reactive or adsorptive material that removes the dissolved contaminants and protects downgradient receptors. Therefore, PRBs have potentially lower life cycle costs compared to an equivalent pump-and-treat system. The key regulatory driver for the technology is the proven ability of common barrier materials, such as elemental iron, to meet groundwater cleanup standards for many common contaminants, including chlorinated solvents and certain heavy metals. Regulatory interest in this project was driven by the two challenges involved in implementing PRBs, namely, their longevity and hydraulic performance.

The Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) sponsored this project. The Naval Facilities Engineering Service Center (NFESC) was the lead agency for the DoD project. Battelle, under contract to NFESC, planned and implemented the technical scope and has prepared this report to summarize the results. The Remediation Technologies Development Forum (RTDF) Permeable Barriers Work Group and the Interstate Technology Regulatory Council (ITRC) Permeable Reactive Barriers Team provided document review support for the project.

The two primary technical objectives of the project were:

- Assessing the longevity of PRBs made from iron, the most common reactive medium used to date. Longevity refers to the ability of a PRB to maintain its reactivity and hydraulic performance over long-term operation.
- Assessing the hydraulic performance of various PRBs in terms of their ability to meet the desired groundwater capture zone and residence time requirements.

### *Longevity*

The longevity evaluation focused primarily on the PRBs at former Naval Air Station (NAS) Moffett Field and former Lowry Air Force Base (AFB). These two sites were selected because the PRBs at these sites had sufficient history of field operation and because the groundwater at these sites had moderate to high levels of total dissolved solids (TDS), an important factor in precipitation processes that affect longevity.

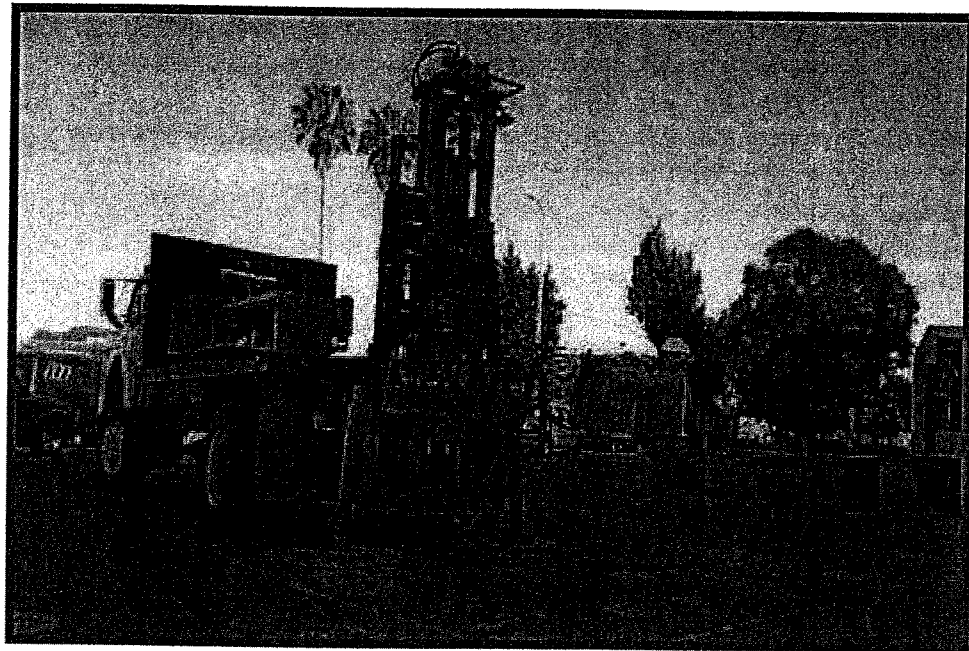
The longevity evaluation consisted of the following elements.

- Groundwater geochemistry monitoring
- Iron core collection and analysis
- Geochemical modeling
- Accelerated column tests

For the longevity evaluation, the accelerated column tests provided the best quantitative estimate of the useful life of a PRB; the other tools provided mostly qualitative results. The column tests

# ESTCP Cost and Performance Report

(CU-9907)



## Evaluating the Longevity and Hydraulic Performance of Permeable Reactive Barriers at Department of Defense Sites

January 2003



ENVIRONMENTAL SECURITY  
TECHNOLOGY CERTIFICATION PROGRAM

U.S. Department of Defense



showed that the reactivity of the iron declines with long-term exposure to groundwater. The rate of decline in reactivity was higher for the Lowry AFB columns, because the groundwater at Lowry AFB contains a higher level of dissolved solids than the NAS Moffett Field groundwater. Declines in reactivity occurred in both columns even though the pH and ORP distributions in the columns remained constant. Based on the rate of loss of reactivity in the columns and on the estimated groundwater velocity at these two sites, the projected life of the PRBs at former NAS Moffett Field and Lowry AFB is approximately 30 years. The "life" of these PRBs was defined as the time period over which the reactivity of the iron declines by a factor of two. The slower groundwater flow at Lowry AFB leads to approximately the same mass flux of dissolved solids through the PRBs at both sites, even though the absolute level of dissolved solids is higher in the groundwater at Lowry AFB. The precipitation causing this loss of reactivity appears to be forming thin films over the iron surfaces, and tracer tests in the columns did not indicate any significant porosity loss or clogging.

### *Hydraulic Performance*

The hydraulic performance evaluation focused primarily on the PRBs at former NAS Moffett Field (funnel and gate), former Lowry AFB (funnel and gate), Seneca Army Depot (continuous reactive barrier), and Dover AFB (funnel with two gates).

The hydraulic performance evaluation made use of the following tools.

- Water level measurements and slug tests
- HydroTechnics™ flow sensors and colloidal borescope
- Groundwater flow and solute transport modeling

For the hydraulic evaluation, careful water level measurements coupled with groundwater modeling gave the best results at the evaluated sites and may be the most useful of the available tools. The direct flow measurements with flow sensors and the borescope sometimes provided groundwater flow velocities and directions that contrasted sharply with the results of water level measurements. The direct flow measurements are point estimates. Bulk flow estimates provided by water levels are probably more indicative of the flow regimes around the PRBs. The sensors or borescope may be useful for further delineation of flow at highly heterogeneous sites, or at sites where groundwater chemistry or water levels have indicated sub-optimal hydraulic performance.

A present value comparison of the costs of a PRB and an equivalent pump-and-treat system at various sites has shown that it takes approximately 7 to 10 years to obtain a payback on the initial capital investment in a PRB. The longevity evaluation provides some reassurance that, at many sites, the useful life of zero-valent iron PRBs will exceed the projected payback period. At many sites, PRBs are installed within the boundaries of the plume; therefore, it may take several years for a noticeable improvement in water quality to appear downgradient of the PRB. Regulatory agencies currently are addressing this issue in the short term by monitoring groundwater quality inside the PRB and ensuring that it meets target cleanup goals. In the long term, as treated water exiting the PRB continues to flush the aquifer, it is expected that the compliance point will be shifted to a suitable location (such as a property boundary) downgradient of the PRB.

**Atch 8. 1,2,4,5 Tetrachlorobenzene Fact Sheet**

*on 1,2,4,5-Tetrachlorobenzene.*

Environmental Criteria and Assessment  
Office, Office of Health and Environmental  
Assessment, Cincinnati, OH.

4. U.S. Department of Health and Human  
Services. Hazardous Substances Data  
Bank (HSDB, online database). National  
Library of Medicine Bethesda, MD, 2001.

# 1,2,4,5-Tetrachlorobenzene

CAS Number: 95-94-3

## What is 1,2,4,5-tetrachlorobenzene?

1,2,4,5-Tetrachlorobenzene is an odorless man-made substance that can range in appearance from a colorless crystal to a white flaky or chunky solid.

## What is 1,2,4,5-tetrachlorobenzene used for?

1,2,4,5-Tetrachlorobenzene is used as an intermediate or building block to make herbicides, insecticides and defoliants. It is also used to make other chemicals like 2,4,5-trichlorophenol and 2,4,5-trichlorophenoxyacetic acid.

## How can 1,2,4,5-tetrachlorobenzene enter and leave your body?

1,2,4,5-Tetrachlorobenzene can enter your lungs if you breathe contaminated air. It can enter your body if you eat contaminated food or be absorbed through your skin if you come into contact with the substance.

## How can you be exposed to 1,2,4,5-tetrachlorobenzene?

If you work in a factory that makes or uses 1,2,4,5-tetrachlorobenzene, you can be exposed by breathing contaminated air. You could also be exposed if you eat contaminated food like fish or if your skin comes into contact with the substance.

## What are the health effects of exposure to 1,2,4,5-tetrachlorobenzene?

Exposure to 1,2,4,5-tetrachlorobenzene can

irritate or bother your eyes and skin and can affect your ability to breathe. It can also affect the mucous membranes. In addition, laboratory animals exposed to 1,2,4,5-tetrachlorobenzene experienced lesions, or changes to the liver and kidney.

## What levels of exposure have resulted in harmful health effects?

The U.S. Environmental Protection Agency established an oral reference dose (RfD) of 0.34 milligrams per kilogram per day for oral exposure to 1,2,4,5-tetrachlorobenzene. The RfD is an estimate of the highest daily oral exposure humans can be exposed to without resulting in harmful effects.

## Where can you get more information?

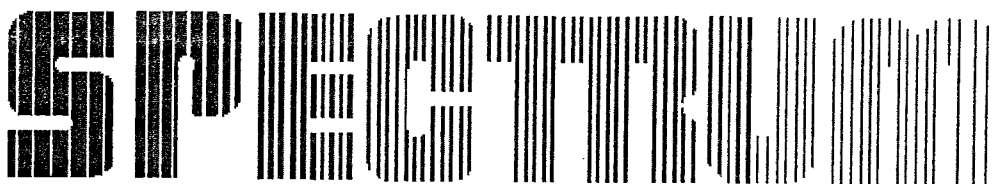
Contact your state health or environmental department, or:

Agency for Toxic Substances and Disease Registry  
Division of Toxicology  
1600 Clifton Road, N.E., E-29  
Atlanta, Georgia 30333

## References

1. International Labor Organization. International Occupational Safety and Health Information Centre (CIS). *1,2,4,5-Tetrachlorobenzene ICSC*, 1994.
2. National Toxicity Program (NTP). *NTP Chemical Repository 1,2,4,5-Tetrachlorobenzene* (Radian Corporation, August 29, 1991).
3. U.S. Environmental Protection Agency. *Integrated Risk Information System (IRIS)*

**Atch 9. 2,4,5 - T Fact Sheet**



## Chemical Fact Sheet

<b>Chemical Abstract Number (CAS #)</b>	93765
<b>Synonyms</b>	2,4,5-T
	2,4,5-Trichlorophenoxyacetic acid
	Weedone
	Acetic acid, (2,4,5-trichlorophenoxy)-
<b>Analytical Methods</b>	EPA Method 515.1
	EPA Method 515.2
	EPA Method 555
	EPA Method 615
	EPA Method 8150B
	EPA Method 8151
<b>Molecular Formula</b>	$C_8H_5Cl_3O_3$
<b>Use</b>	<p>HERBICIDE FOR INDUSTRIAL SITES, LUMBER YARDS &amp; VACANT LOTS, RANGELAND &amp; RICE, LAWNS &amp; TURF (INCL ITS ESTERS &amp; SALTS), AQUATIC USE (INCL ITS ESTERS &amp; SALTS), HOME USE (FORMER USE FOR GRANULES), RECREATION AREAS (FORMER USE FOR GRANULES), FOOD CROPS FOR HUMANS (FORMER USE). 2,4,5-T IS USED POST-EMERGENCE ALONE OR WITH 2,4-D FOR THE CONTROL OF SHRUBS AND TREES; IT IS ALSO USED FOR GIRDLING, INJECTION OR CUT-STUMP TREATMENT FORMER USES/. Has been used as a growth regulator to increase size of citrus fruits and reduce excessive drop of deciduous fruit. The use of 2,4,5-T in the United States has been cancelled since 1985. Some or all applications may be classified by the USEPA as Restricted Use Pesticides. In Canada, phenoxy herbicides (almost exclusively 2,4-D) are registered for macrophyte control in lakes and ponds at 22-45 kg/ha, and along ditches and irrigation networks.</p>
<b>Consumption Patterns</b>	FORMER USES: INDUSTRIAL & COMMERCIAL USES, 63%; RANGELAND, 26%; RICE (EXCLUDING ISOCTYL ESTER) 8%; LAWNS & TURF, 3% (1983-INCL 2,4,5-TRICHLOROPHENOXYACETIC ACID, ESTERS, & SALTS)
<b>Apparent Color</b>	WHITE SOLID ; LIGHT TAN SOLID
<b>Odor</b>	Odorless
<b>Boiling Point</b>	Decomposes
<b>Melting Point</b>	153 DEG C
<b>Molecular</b>	255.49

<b>Weight</b>	
<b>Density</b>	SP GR: 1.80 AT 20 deg C/20 deg C
<b>Sensitivity Data</b>	Irritant to eyes, nose, and throat.
<b>Environmental Impact</b>	<p>Release of 2,4,5-T to the environment occurred during its past use as a herbicide and it can form in the environment as a hydrolysis product of its herbicide esters. Other sources of release may include losses during formulation, packaging or disposal of 2,4,5-T, its esters and the acaricide, tetradifon. Since 2,4,5-T has a pKa of 2.88 it will be found in the dissociated form in all environmental media. If released in soil, 2,4,5-T can biodegrade and its mobility is expected to vary from highly mobile in sandy soil to slightly mobile in muck (due to adsorption to humic acids and other organic matter). Removal by biodegradation apparently limits the extent of leaching, however, and groundwater contamination is likely only by rapid flow through large channels and deep soil cracks. 2,4,5-trichlorophenol and 2,4,5-trichloroanisole are the primary microbial degradation products of 2,4,5-T. Chemical hydrolysis in moist soils and volatilization from dry and moist surfaces should not be significant. The persistence of 2,4,5-T in soil is reported to vary between 14 to 300 days, but usually does not exceed one full growing season regardless of the application rate. Degradation under anaerobic conditions in flooded soils is much slower (half-life less than or equal to 48 weeks) than in field moist soils. If released to water, photochemical decomposition, volatilization and biodegradation of 2,4,5-T appear to be the dominant removal mechanisms. The primary degradation product of 2,4,5-T in water is 2,4,5-trichlorophenol. The aquatic near surface half-life for direct photolysis has been calculated to be 15 days during summer at latitude 40 deg. Humic substances can photosensitize 2,4,5-T and humic induced photoreactions may dominate photodegradation processes when humic substance concentrations exceed 15 mg/l of organic C/l. Primary photodegradation products are 2,4,5-trichlorophenol and 2-hydroxy-4,5-dichlorophenoxyacetic acid. Adsorption of 2,4,5-T to humic acids in suspended solids and sediments may be significant. Oxidation, chemical hydrolysis, volatilization and bioaccumulation should not be significant. If released to the atmosphere, 2,4,5-T should exist as fine droplets and adsorbed on airborne particulates. 2,4,5-T has the potential to undergo (a) direct photolysis due to uv absorption at &gt;290 nm, (b) a reaction with photochemically generated hydroxyl radicals (estimated vapor phase half-life= 1.12 days) or (c) be physically removed by settling out or washout in rainfall. The most probable route of exposure to 2,4,5-T would be inhalation and dermal exposure of workers involved in the manufacture, handling or application of 2,4,5-T, related ester compounds or certain tetradifon formulations which contain 2,4,5-T. The general public could potentially be exposed by inhalation of particulate matter or ingestion of fruit, milk or drinking water contaminated with 2,4,5-T.</p>
	<p>TERRESTRIAL FATE: FOUR (14)C-LABELED HERBICIDES INCLUDING 2,4,5-T WERE APPLIED AS FOLIAR SPRAY AT 0.28 KG/HA IN A TERRESTRIAL MICROCOSM CHAMBER TO EXAMINE THEIR TRANSPORT AND METABOLISM IN COMPARISON TO DIELDRIN. TOTAL HERBICIDE RESIDUES IN SOIL AVERAGED 0.14 PPM FOR ALL COMPOUNDS BY 20 DAYS POSTTREATMENT. RYE GRASS SHOOTS CONTAINED 2.5 PPM 2,4,5-T. 2,4,5-T WAS ONE OF THE MOST RAPIDLY DECOMPOSED HERBICIDES. TERRESTRIAL FATE: If released to soil, 2,4,5-T is likely to biodegrade and its mobility is expected to vary from highly mobile in sandy soil and moderately mobile in clay and silt loams to slightly mobile in muck (due to adsorption to humic acids and other organic matter). Removal by biodegradation apparently limits the extent of leaching, however, and groundwater contamination is likely only by rapid flow through large channels and deep soil cracks . 2,4,5-Trichlorophenol and 2,4,5-trichloroanisole the primary degradation product of 2,4,5-T in soil . The anisole is apparently formed by microbial methylation of the phenol. Chemical hydrolysis in moist soils should not be significant. The persistence of 2,4,5-T in soil is reported to vary from 14 to 300 days depending upon climatic conditions and population of soil microorganisms, but usually does not exceed one full growing season regardless of the application rate</p>

<p><b>Environmental Fate</b></p>	<p>(2,3,4,5). Degradation under anaerobic conditions is much slower than under aerobic conditions, thus 2,4,5-T persists longer in flooded soils (half-life of less than or equal to 48 weeks) than in field moist soils. AQUATIC FATE: Since 2,4,5-T has a pKa of 2.88 at 25 degC , it will be dissociated in water. If released to water, photochemical decomposition volatilization and biodegradation of 2,4,5-T should be the dominant removal mechanisms. 2,4,5-Trichlorophenol is the primary degradation product of 2,4,5-T in water. Data regarding the biodegradation of 2,4,5-T in soil suggest that biodegradation may contribute significantly to the degradation of 2,4,5-T in aquatic systems. The aquatic near surface half-life for direct photolysis has been calculated to be 15 days during summer at latitude 40 deg. Humic substances can photosensitize 2,4,5-T and humic induced photoreactions may dominate photodegradation processes when humic substance concentrations exceed 15 mg of organic C per liter. 2,4,5-T may also be degraded by photocatalytic processes involving iron species and peroxides. The primary products of 2,4,5-T photodegradation are 2,4,5-trichlorophenol and 2-hydroxy-4,5-dichlorophenoxyacetic acid. Adsorption of 2,4,5-T to humic acids in suspended solids and sediments may be significant. Oxidation, chemical hydrolysis, volatilization and bioaccumulation should not be significant. ATMOSPHERIC FATE: If released to the atmosphere, 2,4,5-T may exist in vapor form, as fine droplets and adsorbed on air-borne particulates as a result of vapor phase adsorption, or as a result of wind erosion of treated soils(1, SRC). 2,4,5-T has the potential to undergo (a) direct photolysis due to uv absorption at &gt;290 nm, (b) reaction with photochemically generated hydroxyl radicals (estimated vapor phase half-life= 1.12 days) or (c) be physically removed by settling or washing out in rainfall. TERRESTRIAL FATE: THE DEGRADATION KINETICS OF (14)C-LABELED 2,4-D &amp; 2,4,5-T WERE STUDIED IN A NUMBERS OF SOILS. DEGRADATION RATES IN SOILS WERE NOT SIMPLE FIRST ORDER BUT GENERALLY INCREASED UNTIL APPROX 20% OF CHEMICAL REMAINED, AFTER WHICH THEY DECLINED. AVERAGE 50% DECOMPOSITION TIME OF 4.0 &amp; 14 DAYS WAS OBSERVED FOR 2,4-D &amp; 2,4,5-T, RESPECTIVELY. 2,4,5-TRICHLOROPHENOL AND 2,4,5-TRICHLOROANISOLE WERE FORMED. THE ANISOLE APPARENTLY WAS FORMED FROM PHENOL THROUGH A MICROBIAL METHYLATION PROCESS. 2,4,5-T ESTERS ARE RAPIDLY HYDROLYZED AFTER SPRAYING, &amp; THE 2,4,5-T IS THEN FURTHER DECOMPOSED BY BACTERIAL ACTION. THE MAJOR PRODUCT OF 2,4,5-T PHOTODECOMPOSITION IS 2,4,5-TRICHLOROPHENOL. OTHER PRODUCTS IDENTIFIED INCLUDED 4,6-DICHLORORESORCINOL, 4-CHLORORESORCINOL, 2,4,5-TRICHLOROANISOLE.</p>
<p><b>Drinking Water Impact</b></p>	<p>SURFACE WATER: During the 1976- 1980 national surface water monitoring program 2,4,5-T occurred in 0.4% of water samples and the maximum detectable concentration was 12.90 ug/l . In Allen County, Indiana from 1977 to 1978 - 8 samples, 100% pos - 1.0-7.7 ug/l 2,4,5-T detected, mean value 3.0 ug/l . In western Canada from 1971 to 1977 - 1426 samples, 8.2% pos. - &lt;0.002 to 3.12 ug/l 2,4,5-T detected, mean value &lt;0.002-0.090 ug/l . In Ontario, Canada from 1975 to 1977 - 949 samples, 2.2% pos. - 0.1-1.1 ug/l 2,4,5-T detected, mean value &lt;0.1 ug/l . In Western U.S. from 1967 to 1971, levels of 2,4,5-T ranged from ND to 0.40 ug/l (5,6). DRINKING WATER: 2,4,5-T has been qualitatively identified in drinking water .</p>

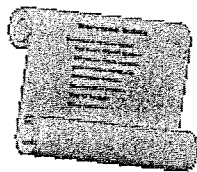
DISCLAIMER - Please Read

Return to :

Alphabetical List of Compounds

List of Compounds by CAS Number



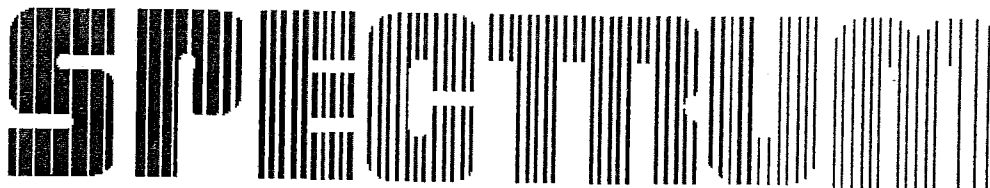


List of Services



Spectrum Laboratories Homepage

**Atch 10. 2,4 - D Fact Sheet**



## Chemical Fact Sheet

<b>Chemical Abstract Number (CAS #)</b>	94757
<b>Synonyms</b>	2,4-D 2,4-Dichlorophenoxyacetic acid, salts and esters Acetic acid, (2,4-dichlorophenoxy)-
<b>Analytical Methods</b>	EPA Method 515.1 EPA Method 515.2 EPA Method 555 EPA Method 615 EPA Method 8150B EPA Method 8151
<b>Molecular Formula</b>	$C_8H_6Cl_2O_3$
<b>Use</b>	IT IS REGISTERED IN USA AS A HERBICIDE FOR CONTROL OF BROADLEAF PLANTS & AS A PLANT-GROWTH REGULATOR. HERBICIDE USED ON GRASSES, WHEAT, BARLEY, OATS, SORGHUM, CORN, SUGARCANE, & NONCROP AREAS PASTURE AND RANGE LAND; LAWNS & TURF/ FOR POST-EMERGENT CONTROL OF CANADA THISTLE, DANDELION, ANNUAL MUSTARDS, RAGWEED, LAMBSQUARTERS & OTHERS. SOME FORMULATIONS FOR PINE RELEASE, WATER HYACINTH CONTROL & PREVENTION OF SEED FORMATION; DOUBLE-GEE, WILD RADISH, TURNIP & OTHER BROADLEAF WEEDS IN CEREALS. REGISTERED FOR USE ON RICE IN THE PHILIPINES. 2,4-D when applied properly, will incr the red color in potatoes. It is used on tomatoes to cause all fruits to ripen at the same time for machine harvesting. /2,4-D free acid serves as the basic material from which the soluble esters & salts are produced. Used in forest management: Brush control; Conifer release; Tree injection. To increase latex output of old rubber trees. Fruit drop control HERBICIDE FOR PASTURE & RANGELANDS; AGRICULTURAL USE-EG, WHEAT, CORN, GRAIN SORGHUM, RICE AND OTHER GRAINS; INDUSTRIAL/COMMERCIAL USES; LAWNS, TURF, & AQUATIC USE; OTHER FIELD CROPS-EG, NUTS; COMPONENT OF HERBICIDE FOR JUNGLE DEFOLIATION-FORMER USE. 2,4-D, ITS SALTS AND ESTERS ARE SYSTEMIC HERBICIDES, WIDELY USED FOR WEED CONTROL IN CEREALS & OTHER CROPS AT 0.28 to 2.3 KG/HA. CHLOROPHENOXY COMPOUNDS INCLUDING ACIDS, SALTS, AMINES AND ESTERS ARE USED IN AGRICULTURE FOR CONTROL OF BROAD-LEAF WEEDS & IN CONTROL OF WOODY PLANTS ALONG ROADSIDE, RAILWAYS & UTILITIES RIGHTS OF WAY. CHLOROPHENOXY COMPOUNDS
	HERBICIDE FOR PASTURE & RANGELAND, 26%; FOR WHEAT, 26%; FOR CORN, 14%; FOR OTHER GRAINS EXCEPT SORGHUM, 12%; FOR INDUSTRIAL/COMMERCIAL USES, 11%; FOR LAWNS & TURF, 3%; FOR AQUATIC USES, 3%; FOR GRAIN SORGHUM, 3%; FOR

<b>Consumption Patterns</b>	OTHER FIELD CROPS-EG, CITRUS, FRUITS, NUTS, & VEGETABLES, 2%; (1982) SRP: PREVENTION FOR FRUIT DROPPING. RIPENING AGENT. 75% AS A SELECTIVE HERBICIDE FOR BROADLEAF WEEDS & BRUSH, ON SMALL GRAINS, CORN, SORGHUM, RICE, OTHER MINOR CROPS, & GRAZING LAND; 13% FOR INDUSTRIAL & COMMERCIAL USE ON NON-CROPLAND; 6% BY GOVERNMENT AGENCIES ON NON-CROPLAND; 6% FOR HOME & GARDEN USE ON TURF (1972). PASTURE & RANGELANDS, 26%; WHEAT, 26%; CORN, 14%; INDUSTRIAL/COMMERCIAL USES, 11%; LAWNS & TURF, 4%; AQUATIC USES, 3%; GRAIN SORGHUM, 3%; RICE, 1%; OTHER GRAINS, 11%; OTHER FIELD CROPS-EG, DECIDUOUS NUTS & FRUITS, CITRUS, & VEGETABLES, 2% (1982).
<b>Apparent Color</b>	WHITE TO YELLOW CRYSTALLINE POWDER SRP: YELLOW COLOR IS PHENOLIC IMPURITIES ; COLORLESS POWDER SRP: WHITE
<b>Odor</b>	ODORLESS WHEN PURE ; A slight phenolic odor
<b>Boiling Point</b>	160 DEG C AT 0.4 MM HG
<b>Melting Point</b>	138 DEG C
<b>Molecular Weight</b>	221.04
<b>Density</b>	1.416 @ 25 deg C
<b>Odor Threshold Concentration</b>	Detection: 3.13 mg/kg SRP: Technical grade
<b>Sensitivity Data</b>	Dust may irritate eyes. Acute eye or skin irritation has been reported in agricultural and forestry workers following occupational exposure.
<b>Environmental Impact</b>	2,4-D is released into the environment through its use in herbicide formulations and as a hydrolysis product of 2,4-D esters or from spills. If released on land, it will probably readily biodegrade (typical half-lives <1 day to several weeks). Its adsorption to soils will depend upon organic content and pH of the soil (2,4-D pKa= 2.64). Leaching to groundwater will likely be a significant process in coarse-grained sandy soils with low organic content or with very basic soils. If released to water, it will be lost primarily due to biodegradation (typical half-lives 10 to >50 days). It will be more persistent in oligotrophic waters and where high concentrations are released. Degradation will be rapid in sediments (half-life <1 day). It will not bioconcentrate in aquatic organisms or appreciably adsorb to sediments, especially at basic pH's. If released in air, it will be subject to photooxidation (estimated half-life of 1 day) and rainout. Human exposure will be primarily to those workers involved in the making and using 2,4-D compounds as herbicides as well as those who work in and live near fields sprayed and treated with 2,4-D compounds. Exposure may also occur through ingestion of contaminated food products and drinking water.
	TERRESTRIAL FATE: Biodegradation is by far the most important loss process for 2,4-D in most soils, leading to various hydroxylic aromatic products . The rate of degradation is affected by the conditions, especially the concentrations of 2,4-D and water content temperature and the organic content of soil and the status of preexposure of the soil to 2,4-D or its salts or its esters(1-3). Typical half-lives are short, ranging from <1 day to several weeks(4-8). Longer half-lives in dry or sandy soils with low organic content are possible(7). Adsorption to soil will probably not be significant but will depend on type of soil and organic content(8-11). In coarse-grained sandy soils where both biodegradation and adsorption will be low, leaching to groundwater may occur(12). In other soils rapid biodegradation is expected to prevent significant leaching(4-8, SRC). Evaporation and hydrolysis will be negligible(13-14). AQUATIC FATE: When 2,4-D is released to water, it will tend to biodegrade with the rate especially dependent upon level of nutrients present, temperature, availability of oxygen, and whether or not the water has a prior history of contamination by 2,4-D or other phenoxyacetic

**Environmental  
Fate**

acids . Typical half-lives of 10 to >50 days have been reported with longer half-lives expected in oligotrophic waters and where a high concentration of 2,4-D is present(1-2). Degradation in sediments and lake muds is expected to be rapid with half-lives of <1 day reported(3-4). Products of biodegradation include 2,4-dichlorophenol, other hydroxylic aromatics and polymeric acids . 2,4-D will also be subject to photolysis with a reported approximate half-life of several days for water solutions irradiated at 356 nm. Adsorption to sediments will not be expected to be extensive and volatilization and hydrolysis will be negligible(5-6). **ATMOSPHERIC FATE:** The primary source of 2,4-D in air is spray applications of the herbicide or its mixture. Spray drift is capable of carrying it up to a few km . Any 2,4-D in the air will be subject to photooxidation by reaction with hydroxyl radicals with an estimated half-life of 1 day. Direct photooxidation may also be important as 2,4-D absorbs light at wavelengths >290 nm. Gravitational settling of aerosol and rainout (due to its significant solubility in water) may also be significant removal processes. **AQUATIC FATE:** Persistence in aquatic systems depends on the water type, organic particulate matter, rain, sunlight, temperature, microbial degradation, volatilization, and oxygen content of the water. Accumulation in bottom sediments may also be a factor, but in general, not for the phenoxy. Microbial activity is the major means for detoxification of the phenoxy in soils, but is relatively unimportant in natural waters, but dominates in bottom mud sediments and in sludge. **TERRESTRIAL FATE: THE DEGRADATION KINETICS OF (14)C-LABELED 2,4-D & 2,4,5-T WERE STUDIED IN A NUMBER OF SOILS. DEGRADATION RATES IN SOILS WERE NOT SIMPLE FIRST ORDER BUT GENERALLY INCREASED UNTIL APPROX 20% OF CHEMICAL REMAINED, AFTER WHICH THEY DECLINED. AVERAGE 50% DECOMPOSITION TIME OF 4.0 & 14 DAYS WAS OBSERVED FOR 2,4-D & 2,4,5-T, RESPECTIVELY. 2,4,5-TRICHLOROPHENOL AND 2,4,5-TRICHLOROANISOLE WERE FORMED. THE ANISOLE APPARENTLY WAS FORMED FROM PHENOL THROUGH A MICROBIAL METHYLATION PROCESS. TERRESTRIAL FATE: 2,4-D,** its salts and esters are systemic herbicides, widely used for weed control in cereals and other crops at 0.28 to 2.3 kg/ha, the highest rate persisting in soil about 30 days. Various amounts of 2,4-D products applied to a target area may be distributed in the general environment, within a few hours or days, by the movements of air, water, or soil, particularly during periods of rain, high winds, or high temperature. Persistence or accumulation of 2,4-D residues from normal use is occasionally possible, mainly under dry or cold conditions where there is little biological activity. **AQUATIC FATE:** Persistence: Persistence in aquatic systems depends on the water type, organic particulate matter, rain, sunlight, temperature, microbial degradation, volatilization, and oxygen content of the water. Accumulation in bottom sediments may also be a factor, but in general, not for the phenoxy. Microbial activity is the major means for detoxification of the phenoxy in soils, but is relatively unimportant in natural waters, but dominates in bottom mud sediments and in sludge. **TERRESTRIAL FATE:** Laboratory studies were conducted to determine the adsorption, desorption, hydrolysis, and breakdown of commercially formulated isooctyl ester and dimethylamine salt of 2,4-D in a Naff silt loam soil. More 2,4-D was adsorbed to the surface soil than to soil at lower depths, and the percentage of 2,4-D adsorbed decreased as the total amount of 2,4-D present increased. Adsorbed 2,4-D was gradually desorbed from soil by successively exchanging the solution in equilibrium with soil with distilled water. Formulated 2,4-D isooctyl ester applied to moist soil underwent hydrolysis to the anionic form at a rapid rate, with 80% of the ester hydrolyzed in 72 hr. High amounts of 2,4-D in runoff (sediment and water) retarded the active degradation of carboxyl (14)C 2,4-D when 2,4-D was incubated in runoff from a wheat field treated with various formulations and rates of 2,4-D. The presence of the ester formulation at the high rate of application increased the lag period before degradation of carboxyl-(14)C and ring-(14)C 2,4-D was initiated, however, little difference could be detected in the degradation patterns. At the end of the 10 wk of incubation in runoff or in soil, only 1% of the (14)C 2,4-D originally applied to the soil could be identified as 2,4-D.

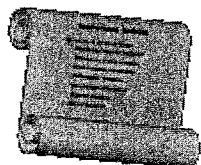
Available data indicate that residues of 2,4-D rarely exceed several ug/liter in water. Exceptions may occur in the vicinity of 2,4-D herbicide spills or when the herbicide is used in quantities far in excess of the rates applied in normal agricultural or forestry practice. Reported as 2,4-D equivalents.

**Drinking  
Water Impact**

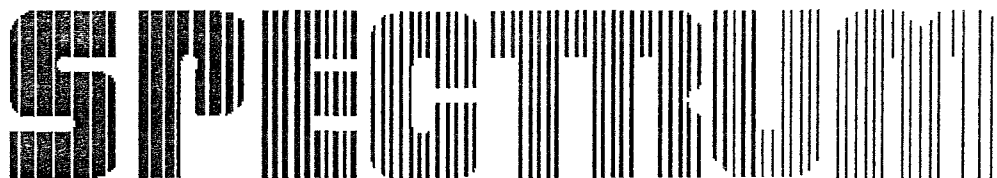
DRINKING WATER: 237 wells in Ontario Canada were sampled over a 10 yr period and 2,4-D occurred in 23 wells as the single contaminant, 50 wells with 4 other contaminants, concentrations ranging from 0.01-14,600 ppb . In a National survey of pesticides in groundwater, it was detected in groundwater from 5 of 50 states at a maximum and mean concentration of 49.5 ppb and 1.2 ppb, respectively . Reported as 2,4-D equivalents. SURFACE WATER: Georgia and Florida pond waters - max 0.345 ppm and 0.692 ppm after 28 days declined to less than 0.005 ppm. Missouri pond water - max 0.630 ppm after 56 days declined to less than 0.005 ppm . 1-10% occurrence in streams in a survey of 11 Ontario agricultural watersheds monitored for 81 pesticides with 66 of 949 initial stream waters being positive . Tested for but not detected in Lake Erie (Monroe Water Treatment Plant), Lake Huron nearshore water and tributaries, or Detroit River, Lake St Clair and St Clair River (detection limit= 0.05-5 parts/trillion) . Sciote R, Highby OH - 0.12 ppb . Reported as 2,4-D equivalents. SURFACE WATER: Hillsboro Canal, Laxahatchu National Wildlife Refuge, FL - 0.037 ppm on day following application of 4.48 kg/ha acid equivalent to 0.001-0.004 ppm 56 days later . Levels in Guntersville Reservoir (TVA) 6 months after application of 20-40 pounds acid equivalent/acre - less than 0.001 ppm . 2,4-D was detected in 18 of 20 midwest streams sampled over a four year period at concentration range 0.02-0.99 ppb . Fourteen of 20 streams positive in an earlier 2 year study, 36 occurrences, concentration 0.01-0.24 ppb and not detected in 11 of 11 streams in the original 1967 study . 0.245 ppb measured in South Skunk River Water, Iowa 1975(6). Less than 0.01 ppb measured in Rhine River Water at km 865(7). Reported as 2,4-D equivalents. SURFACE WATER: Following spraying in Cairn Edward Forest, Kircudbrightshire, Great Britain (4.5 kg in 135 l water/ha), 1,2,4,7 and 28 days later, 1.5, 1.6, 2.0, 1.6, not detected ppm were measured, (detection limit= 0.005 ppm), in drainage furrows . Detected in 17% of agricultural watersheds in Ontario, Canada monitored during 1981-85. In Thames River, the mean concentrations in 1981, 1982, 1983, 1984 and 1985 were 0.7 ppb, 0.6 ppb, 0.3 ppb, 0.5 ppb and 0.5 ppb, respectively . In a U.S. National Surface Water Monitoring Program conducted during 1976- 80, 2,4-D was detected in 1.6% of surface waters at a maximum concentration of 1.9 ppb .

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**Atch 11. Lindane Fact Sheet**



## Chemical Fact Sheet

<b>Chemical Abstract Number (CAS #)</b>	58899
<b>Synonyms</b>	Lindane
	gamma-BHC
	Hexachlorocyclohexane (gamma)
	gamma-Benzenehexachloride
	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1-alpha, 2-alpha,3-beta, 4-alpha, 5-alpha, 6-beta)
	HCH-gamma
<b>Analytical Methods</b>	EPA Method 505
	EPA Method 508
	EPA Method 525
	EPA Method 608
	EPA Method 617
	EPA Method 625
	EPA Method 8080A
	EPA Method 8081
	EPA Method 8250A
<b>Molecular Formula</b>	$C_6H_6Cl_6$
<b>Use</b>	INSECTICIDE FOR FIELD CROPS CORN, WHEAT INSECTICIDE FOR ORNAMENTALS, PASTURE, & FORAGE CROPS INSECTICIDE FOR FORESTRY, TIMBER PROTECTION, & LIVESTOCK INSECTICIDE FOR SOIL & SEED TREATMENT & VITICULTURE Medication (Human: pediculicide, scabicide; Vet: ectoparasiticide) Used in baits & seed treatments for rodent control. Application rates: Range from 0.25 to 2.25 ounces/100 lb of seed for seed treatment; 0.1 to 2.06 lb/acre for foliar and soil treatment; 0.8 to 1.5 oz/50,000 cubic feet of greenhouse; 0.006 to 0.11 lb/gallon for bark; 0.023 to 3% sprays, dips, and dusts for indoor and animal treatment; <0.01 lb/1000 square feet for animal premises; <4 lb/1000 square feet (14.64% solutions) for wood, and wooden structures; and 1% dust for human skin/clothing treatment (military use only). Medication: pediculicide, scabicide Medication (vet): ectoparasiticide
<b>Consumption Patterns</b>	INSECTICIDE USED ON WHEAT, 25%; INSECTICIDE USED ON OTHER FIELD CROPS-EG, CORN, 25%; NON-AGRICULTURAL USES, 50% (1982)
<b>Apparent Color</b>	WHITE, CRYSTALLINE POWDER ; COLORLESS, CRYSTALLINE SOLID ; NEEDLES FROM ALCOHOL



<b>Odor</b>	SLIGHT MUSTY ODOR ; SLIGHT AROMATIC ODOR ; Pure lindane is odorless.
<b>Boiling Point</b>	323.4 DEG C AT 760 MM HG
<b>Melting Point</b>	112.5 DEG C
<b>Molecular Weight</b>	290.85
<b>Density</b>	1.85
<b>Sensitivity Data</b>	VAPORS MAY IRRITATE EYES, NOSE, & THROAT.
<b>Environmental Impact</b>	<p>Lindane is used as an insecticide on hardwood logs and lumber, seeds, vegetables and fruits, woody ornamentals, hardwood forests, livestock and pets, and existing structures. When released to water, lindane is not expected to volatilize significantly. Lindane released to acidic or neutral water is not expected to hydrolyze significantly, but in basic water, significant hydrolysis may occur (<math>t_{1/2}=95</math> hr at pH 9.3). Transport to the sediment should be slow and result predominantly from diffusion rather than settling. Release of lindane to soil will most likely result in volatilization and slow leaching of lindane to groundwater. Lindane in the atmosphere is likely to be subject to rain-out and dry deposition. The estimated half-life for the reaction of vapor phase lindane with atmospheric hydroxyl radicals is 1.63 days. Lindane may slowly biodegrade in aerobic media and will rapidly degrade under anaerobic conditions. Lindane has been reported to photodegrade in water in spite of the lack of a photoreactive center, but photolysis is not considered to be a major environmental fate process. Lindane will bioconcentrate slightly in fish. Monitoring data indicate that lindane is a contaminant in air, water, sediment, soil, fish and other aquatic organisms, wildlife, food, and humans. Human exposure results primarily from food.</p>
	<p><b>TERRESTRIAL FATE:</b> As the sole carbon source, lindane was found to support the growth of 71 of 147 microorganisms isolated from loamy sand. Chloride ion formation was noted in these cultures. The extent of lindane biodegradation by these pure cultures was not given. From moist, aerated soil, 62% of the lindane applied was recovered, and 3% of the applied (14)C was released as (14)CO<sub>2</sub> after 105 days. After 140 days, 17.8% of the applied (14)C was released from submerged soil. As measured by gas-liquid chromatography, the loss of lindane from submerged anaerobic soil was nearly quantitative, with only 4% of the applied lindane recoverable. Six weeks following treatment of soil with lindane and submergence of the soil, 1,2,4-trichlorobenzene, 1,2,3,5- and/or 1,2,4,5-tetrachlorobenzene, 1,2,3,4-tetrachlorobenzene, gamma-2,3,4,5,6-pentachlorocyclohex-1-ene and gamma-3,4,5,6-tetrachlorocyclohexene were detected in the soil by GC. The absence of these products from sterilized soil treated with lindane was cited as evidence that the lindane metabolites resulted from biodegradation. Incubation of aerobic and anaerobic soil suspensions of lindane for three weeks resulted in the disappearance of 0 and 63.8% of the applied lindane, respectively. This result was said to indicate that anaerobic degradation of lindane is more extensive than aerobic degradation. Agricultural loam plots treated with 10 or 100 lb of lindane retained only 0.2% of the added lindane on the plots after 15 years regardless of the dosage applied. After 50 hr, 26% and 100% of the surface applied lindane remained on Hatboro silt loam and Norfolk sandy loam, respectively(6). The resistance of lindane on the sandy loam to volatilization was concluded to be due to the dryness of the soil. From a moist soil surface, the lindane content decreased to 50% and 10% of the amount applied after 6 hr and 6 days, respectively, while 50 hr after lindane application to dry soil, 88% of the applied lindane remained(6). A mean Koc of 1080.9 was obtained from Koc determinations on three soils(7). The average organic carbon content of the soils used was 13%(7). Based on this moderate Koc value and a water solubility of 17 ppm(8), lindane is expected to leach slowly to groundwater. The leaching of lindane from Gezira soil (38.8% sand, 34.7% silt, 26.2% clay and 4.6% organic carbon) from the Sudan was slow(9). After 45 days, &lt;50% of the applied lindane had leached from the soil(9). Freundlich constants for lindane sorption and desorption were determined for four systems as follows.</p>

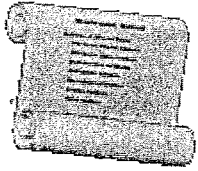
**Environmental  
Fate**

Montmorillonite clay-distilled water: 1258.9 or both sorption and desorption, Roselawn Cemetery water-sediment: 354.8 and 4.26, Cross Lake water- sediment: 2238.7 and 4.26 for sorption and desorption, respectively. The high desorption constant for the Cross Lake system was said to suggest a strong interaction between lindane and the organic material in the samples, although the organic contents, 1.34% and 1.33% for the Roselawn Cemetery and Cross Lake, respectively, of the two sediment samples were similar(10). AQUATIC FATE: Hydrolysis rate constants of  $7.5 \times 10^{-3}$ ,  $8.99 \times 10^{-4}$ , and  $1.07 \times 10^{-3}$  1/hr were determined in surface water samples from a eutrophic pond in Texas, a dystrophic reservoir in Louisiana and an oligotrophic rock quarry in Indiana, respectively . The corresponding hydrolysis half-lives are 92, 771, and 648 hr for the TX, LA, and IN samples, respectively. The hydrolysis reactions follow first-order kinetics. A temperature of 25 deg C was used and pH's were 7.3 (LA), 7.8 (IN), and 9.3 (TX). First order aqueous photolysis of lindane was observed in direct sunlight photolysis experiments. The rate constants were  $4.1 \times 10^{-3}$  (TX),  $3.9 \times 10^{-4}$  (LA), and  $4.5 \times 10^{-4}$  1/hr (IN). The half-life values were 169 (TX), 1,791 (LA), and 1.540 hr (IN). The relative rapidity of reaction in the TX water samples was attributed to its higher pH. The reaction products of lindane hydrolysis were said to be more susceptible to photolysis than lindane . After 16 weeks, <30% of the applied lindane remained in unsterilized natural waters in capped bottles . Biodegradation was concluded to be responsible for this result, although it was unclear to what extent hydrolysis may have contributed to the result . River, lake and groundwater half-lives for lindane were estimated from degradation data in these bodies to be 3-30, 30-300, and >300 days, respectively . The fate of lindane has been studied in a field experiment . The role of particle transport in the transport of lindane to the sediment was found to be small compared to diffusion . After 100 days, 75% of the lindane added was found in the water column and sediment layer of the quarry. The water column contained more than 75% of this amount . The volatilization half-life of lindane from water has been estimated to be 115 days . Assuming a depth of 1 m, the volatilization half-life of lindane from water was estimated to be 191 days(6). A half-life of 3.2 days for the volatilization of lindane from 4.5 cm deep, still, pure water at 24 deg C while with stirring, the half-life was 1.5 days(7). Using an equation relating water depth to volatilization half-life(7), the experimental half-life of 3.2 days from 4.5 cm was used to project a half-life of 692 days from a depth of 1 m. This figure is of the same order of magnitude as the estimated half-lives of 115 and 191 days for volatilization from 1 m, so these figures can be considered to be valid estimates of the tendency of lindane to volatilize. ATMOSPHERIC FATE: The half-life of the reaction of lindane with hydroxyl radicals in the atmosphere was estimated to be 1.63 days . Lindane removal rates in percent/week by rainfall and dry deposition are 2.5 and 3.3, respectively, and the estimated residence time of lindane in the atmosphere is 17 weeks . Aquatic Fate : The fate of lindane in a very oligotrophic, lentic lake aquatic system was studied/. Equal concentrations of lindane and DDE were added in late May to a flooded limestone quarry and the pesticide concentrations in the water, sediment, and biota were monitored for a year's time. The lake was thermally stratified during the summer, was intermittently covered with ice in the winter, and received a large influx of sediment because of a rainstorm that occurred one day after the pesticides were introduced into the system Conclusions drawn indicate the following/:

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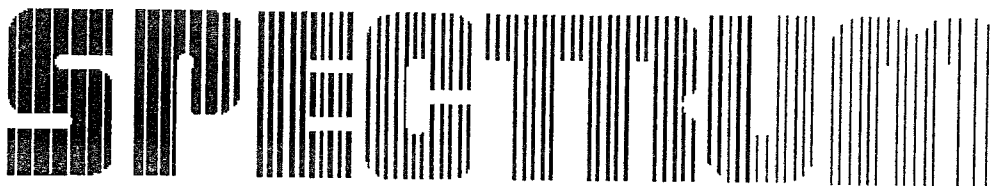


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**Atch 12. N-nitrosodiethylamine Fact Sheet**



## Chemical Fact Sheet

<b>Chemical Abstract Number (CAS #)</b>	55185
<b>Synonyms</b>	N-Nitrosodiethylamine Ethanamine, N-ethyl-N-nitroso-
<b>Molecular Formula</b>	$C_4H_{10}N_2O$
<b>Use</b>	GASOLINE & LUBRICANT ADDITIVE; ANTIOXIDANT; STABILIZER. RESEARCH CHEMICAL.
<b>Apparent Color</b>	YELLOW LIQUID
<b>Boiling Point</b>	175-177 DEG C
<b>Molecular Weight</b>	102.14
<b>Density</b>	0.9422 at 20 deg C/4 deg C
<b>Environmental Impact</b>	<p>Recent information on N-nitrosodiethylamine (DEN) production was not available; however, two producers reported production of &lt; 1000 pounds in 1977. DEN may also form in the environment from the reaction of nitrite with Rhodamine B and Rhodamine WT tracer dyes. DEN has been used as a gasoline and lubricant additive, antioxidant and stabilizer. Because of its low estimated KOC value of 43, DEN is expected to be moderately to highly mobile in soil. Volatilization from soil surfaces will be rapid while volatilization of DEN incorporated into the soil will be slower but may nevertheless be significant. One study reported a DEN half-life in soil of about 3 weeks. The primary fate mechanism for DEN in water may be photolysis. Because of insufficient data, the importance of biodegradation can not be assessed. In water, DEN is not expected to partition to sediments, suspended organic matter, or biota. Volatilization from water will probably not be significant. Hydrolysis is probably not a significant removal process. Estimated atmospheric residence time for DEN is &lt; 0.3 days with photolysis probably the primary removal mechanism. DEN has been found in the air at dye, rubber and foundry industries. DEN has also been found in Philadelphia drinking water, in the passenger area of new cars, in cigarette smoke, and in cheese, bacon, beer and fish. Thus, the general population may be exposed to DEN from riding in new cars, breathing cigarette smoke, drinking beer, or eating certain foods such as cheese, bacon, and fish.</p>
<b>Environmental</b>	<p>TERRESTRIAL FATE: The estimated soil adsorption coefficient (Koc) for N-nitrosodiethylamine (DEN) is 43 . This indicates that DEN is moderately to highly mobile in soil . DEN volatilization will probably be rapid from soil surfaces while volatilization of DEN incorporated into the soil will not be as rapid but may be significant. One study found that DEN at a concentration of 18.0 ppm nitroso-N slowly disappeared in soil after a lag of several weeks . DEN seemed to have a half-life of about 3 weeks in the Matapeake loam at 30 deg C . The primary removal mechanisms were volatilization (significant during the first few days)and biodegradation . AQUATIC FATE: N-nitrosodiethylamine (DEN) released to water is expected to stay in solution and not partition to organic matter (Koc =</p>

<b>Fate</b>	43 ). The estimated Henry's Law constant for DEN is $1.1 \times 10^{-8}$ atm-cu m/mol; therefore, volatilization from water will probably not be significant. Photolysis may be the most significant removal process for DEN since 89% degradation occurs in 7 hours with sunlight . Incubation studies for 108 days in lake water at 30 deg C in the dark indicate that hydrolysis and bioconcentration are not significant processes. ATMOSPHERIC FATE: The half-life for N-nitrosodiethylamine (DEN) was found to be about 1-2 hours in a Teflon outdoor smog chamber irradiated with sunlight . Estimated atmospheric residence time for DEN is <0.3 days with photolysis probably the primary removal mechanism .
<b>Drinking Water Impact</b>	DRINKING WATER: Philadelphia tap water contained <0.1-0.7 ng/l N-nitrosodiethylamine . EFFL: Chemical plant effluent released to a river contained 132 ng N-nitrosodiethylamine/l .

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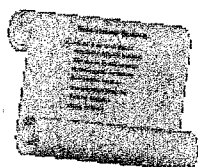
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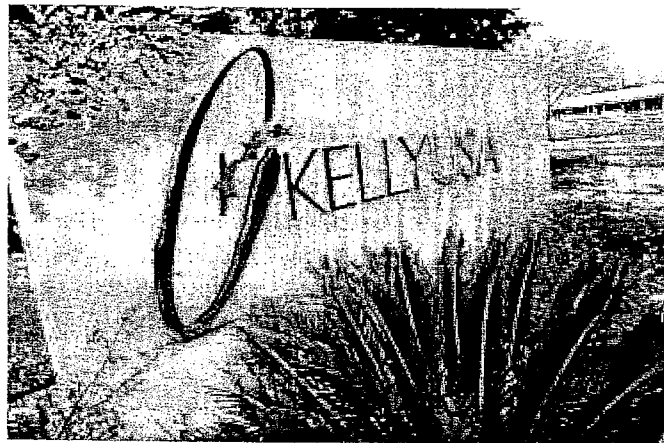
News

## Bad news bearers

By Lisa Song

State, fed agencies seem unfazed by troubling Kelly reports

When you sift through the hundreds of pages of numbers and the long chemical names, the situation at Kelly Air Force Base boils down to this: The water, dirt, and fish in Leon Creek are contaminated with toxic chemicals. The Air Force's incomplete data is hampering an independent consultant's ability to evaluate how military contractors are cleaning up the former base and the residential neighborhood that abuts it. And, at this rate, a complete cleanup is decades away.



KellyUSA, site of the former Kelly Air Force Base, is the likely source for contaminants that have leaked into adjacent Leon Creek. (Photos by [Mark Greenberg](#)).

In January, biochemist Wilma Subra and civil engineer Patrick Lynch delivered sobering presentations about the ongoing cleanup of contamination at Kelly. [See related story, "[Report bears little good news for Kelly cleanup](#)," January 4-10, 2006.] The presentations were part of a meeting of the Kelly Air Force Restoration Advisory Board, which hired consultants Subra and Lynch to review the military's data. Members of the RAB, as it's known, include residents from the affected community, scientists, and an Air Force representative. Staff from the Texas Commission on Environmental Quality and the Environmental Protection Agency also attend the meetings.

Among the many issues the RAB faces are the chemicals found in Leon Creek, which are the same as were used at Kelly when it was a military base. While TCEQ's Mark Weeger said the fish could have been contaminated elsewhere and migrated to the creek, Subra noted that, "Kelly is the biggest elephant around."

Subra unveiled 2004 data showing that surface water in Leon Creek exceeded Environmental Protection Agency thresholds for four chemicals, including mercury. Creek sediment had excessive levels of 22 chemicals, including arsenic, cadmium, and DDT — an insecticide banned in 1972. Fish tissue sampled in 2004 also contained higher than permissible levels of four chemicals, including hexachlorobutadiene, which can cause kidney tumors. Eighteen of 30 fish-tissue samples exceeded screening levels for various toxic chemicals.

## Citizens voice concerns over former KAFB

Web Posted: 01/11/2006 11:21 PM CST

### KENS 5 Eyewitness News

Southside residents were given their opportunity to voice concerns over the ongoing cleanup of the former Kelly Air Force Base.

"We've been fighting this for ten years here on the South Side this is our life and it's not much of a life," Robert Alvarado, a concerned citizen said

A former KAFB spokesperson, Sonja Coderre answered questions about the contamination and the new efforts to clean it up.

For years, residents in that area have been fighting to have the ground water tested and the area cleaned.

"Cleanup is ongoing we are just now working into the final phases of having our systems finalized, and then going into long time monitoring," Coderre said.

Residents spent the night looking at provided maps and had the chance to look at documents that contain information about the cleanup process.





## Kelly's agency gets new name: Port Authority

Web Posted: 01/13/2006 12:00 AM CST

Greg Jefferson  
Express-News Staff Writer

The Greater Kelly Development Authority, like the Air Force base it was charged with redeveloping, is history.

The City Council on Thursday unanimously approved recasting the entity as the Port Authority of San Antonio — a gesture reflecting the drive to direct more international distribution business through the industrial park.

The management authority's name change is effective immediately. The name KellyUSA, the industrial park it oversees, will be changed later. One possibility: the Port of San Antonio at Kelly.

The redevelopment agency has the authority to own, lease and operate port facilities for air, trucking and rail transportation, giving it the makings of an inland port. But the name "Kelly" doesn't help sell the former military installation to foreign companies and governments, said board Chairman Arthur Rojas Emerson.

"When we bring up Kelly, it's not exactly a name that's well-established," he said.

Councilman Richard Perez, whose Southwest Side district encompasses KellyUSA, agreed with the change. While most overseas firms understand what a port authority is, he said, very few know what the Greater Kelly Development Authority stands for.

"We're trying to be a port for (entities) outside of San Antonio, outside of Texas, outside of the country," Councilman Roger Flores added.

The name Kelly clearly is being downplayed, but Emerson told council members it's not going away. The industrial park's Kelly Field, Kelly Aviation Center and its burgeoning Kelly Towne Center won't lose their names.

"Kelly will always be Kelly," Emerson said. "The Kelly name must be sustained."

He was reassuring Councilwoman Elena Guajardo, who worried about the loss of part of the city's identity.

Kelly AFB, which closed in 2001, spawned thousands of civilian jobs and decades ago helped forge San Antonio's Hispanic middle class.

"To lose that recognition I think is very dangerous," Guajardo said.

But in the end she got enough assurance that the name wouldn't disappear that she voted for the measure.

The GKDA was created in 1999 as the successor to Greater Kelly Development Corp. But under either name, its task was to draw private industry and jobs to the installation.

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## Study targets liver cancer deaths

Web Posted: 02/10/2006 12:00 AM CST

**Jerry Needham**  
Express-News Staff Writer

The San Antonio Metropolitan Health District launched a study Thursday aimed at determining if environmental contamination from the former Kelly AFB has played a role in excessive liver cancer deaths in ZIP codes around the facility.

Health Care Resolution Services Inc., a Maryland firm selected after a request for proposals was issued last October, will conduct the six-month study, said Fernando Guerra, district health director.

About 40 people showed up for a public meeting at Brentwood Middle School on Thursday night in response to 23,000 letters the health department sent out to get public input into the study.

Tim Aldrich, an epidemiologist who is a professor at East Tennessee State University, will lead the \$20,000 study. The Air Force Real Property Agency, which is overseeing the cleanup of pollution at and around the former base, which closed in 2001, is paying for the study.

A plume of contaminated groundwater drifted up to five miles off the base and underneath 20,000 homes south and east of the base. Residents are worried that fumes from that plume or other pollutants released into the neighborhood over the decades the base operated have caused illness.

"Diabetes and lifestyle — we're tired of hearing that," said Robert Silvas, a member of the Kelly AFB Restoration Advisory Board, alluding to previous studies that showed no link to residents' health problems and base pollution, instead suggesting that various ailments could have been brought on by living conditions or choices made by residents.

Aldrich said his team will take the 330 liver cancer deaths that occurred in 14 ZIP codes around Kelly from 1995 through 2002 and interview friends, neighbors and family members of many of them to try to zero in on the risk factors that may have led to their illness.

In response to suggestions from the public Thursday, Aldrich said he would include in the study analysis of data on other types of cancer in the selected ZIP codes.

Aldrich said that hepatitis B and alcoholism are known risk factors for liver cancer and that a certain number of such cancers would be expected in any population.

He said it's possible the study will find no explanation for the high rates of liver cancer, but he hopes to find clear-cut links to environmental factors.

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