KELLY AFB
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 3303

KELLY AIR FORCE BASE TECHNICAL REVIEW SUBCOMMITTEE

MEETING AGENDA

21 April 1998 @ 6:30 P.M.
Garni Hall, Room 217, St. Mary's University

Topic	Time	Presenter
I. Introduction (Agenda Review)	6:30 - 6:40	Damian Sandoval
II. TAPP Grant – Identifying Projects	6:40 – 7:10	Damian Sandoval
III. Review Proposed Monitoring Wells Plan (East and South of Zone 4)	7:10 – 7:40	Capt. Tom de Venoge
IV. Break	7:40 - 7:55	All
V. Organizational Tasks	7:55 – 8:30	Damian Sandoval
A. Approve 3-10-98 Minutes		Capt. Tom de Venoge
B. Prioritize Document Reviews		Camille Hueni
C. Review TRS Technical Issues		Damian Sandoval
D. North Kelly Garddens Report/CEJA		David Johnson
E. Update of Letter to General Childress		George Rice
F. Update of KAFB Program Schedule – Zone 3 ROD		Capt. Tom de Venoge
G. Update on WEB Page/Electronic Media Improvements		Capt. Tom de Venoge
H. Update on Site Specific Critical Path Schedule		Capt. Tom de Venoge
I. Review Upcoming RAB Introspection Meeting		Damian Sandoval
J. Solicit Topics for TRS and/or Rab		Damian Sandoval
VI. Action Items/Summary	8:30 – 8:45	Damian Sandoval
A. Location/Time of Next TRS Meeting Fire Station of Zarzamora Street		
VII. Adjournment	8:45	Damian Sandoval

Kelly AFB Technical Review Subcommittee
March 10, 1998 Meeting Minutes

- **Introduction:** The Kelly Air Force Base (AFB) Restoration Advisory Board (RAB) Technical Review Subcommittee (TRS) met on Tuesday, March 10, 1998, at 6:30 p.m. in Room 217, Garni Hall, St. Mary's University. TRS members present were:

  Mr. Damian Sandoval, TRS Chair/RAB Community Chair
  Mr. Gordon Banner, TNRCC
  Mr. Dean Pound, GKDC
  Mr. Sam Sanchez, SA Metropolitan Health District
  Dr. Gene Lene, St. Mary's University
  Capt. Tom deVenoge, Kelly AFB Environmental Management
  Mr. Joe Ebert, Kelly AFB Environmental Management
  Ms. Camille Hueni, EPA Region 6

- **Update on Building 1592 Air Monitoring:** Tom informed the TRS that the draft report of the base's air sampling near the North Kelly Gardens area (Bldg. 1592 area) would be finalized by the end of March. Damian asked that the TRS be copied on the report. → FINAL

- **Review of Informational Map for General Distribution:** Tom distributed copies of the draft map of Basewide contamination for TRS review and comments. The map will be distributed as a hand-out to the community to show areas impacted by the ground water plume. The map is based on the 1997 Basewide Remedial Assessment (BRA) report; expect no changes for the time being. However, the map can be easily updated to reflect changes as the off-site plume is delineated. Tom indicated that everything that is shaded on the map represents concentrations exceeding the drinking water standard, or MCL, and that Manganese (Mn) was not included with the represented metals. Including Mn as a contaminant on the map would obscure the distribution of the chlorinated solvent plume. Also, Mn is an indicator of anaerobic degradation and may not necessarily be indicated as a parent constituent. TRS members made the following recommendations:

  (1) Clarification that fuel spill areas overlay metal contamination, which overlay the solvent plume; the outer boundary indicates the total area of contamination, with the solvent plume being the most widespread.
  (2) Clarify the definition of MCL; retitle to a simpler "Metals, Solvents, and Fuels in the Shallow Ground Water.
  (3) Develop accompanying text in English and Spanish.
  (4) Dash boundary of the plume where delineation has not yet been completed.
  (5) Pull out the zone boundaries; retain base boundary only.
  (6) Include points of contact as part of the accompanying text (Kelly AFB, Health offices, RAB members, etc.)
  (7) Could Kelly provide access to BRA ground water data through computer data base queries at the RAB meetings/Info Fairs?

- **Update of Letter to General Childress:** Tabled; George Rice was not present.

- **Update on Next City/County Forum:** The next forum is scheduled for Marc 31, 1998. Questions and issues raised at the previous forum included: the request for information on water wells; property rights issues; and health issues. The forum format has not yet been determined. However, Sam Sanchez indicated that written responses will include the latest updates on the ground water sampling results. At this point, the use of private water wells can be eliminated. **Action:** Sam Sanchez will follow-up at the next RAB meeting, with the latest water well sampling information. Sam also suggested that the RAB can involve the community in discussions of health effects through a break-out of interested parties, perhaps a subcommittee.

- **TRS Scheduled Meetings:** April 21, 1998; May 19, 1998; June 23, 1998; and July 21, 1998.

- **Update on the Kelly AFB WEB Page/Electronic Media Improvements:** Tom informed the TRS that Kelly is updating the public access website for Kelly AFB; the website will contain information about the activities of the Restoration Advisory Board and the Technical Review Subcommittee. Kelly has also reorganized the Information Repository at the public library to make it more user friendly. A comprehensive User's Guide and information pamphlet has also been prepared which will guide people to the documents which may more directly answer their questions. Copies of the User's Guide and information pamphlet will be available at the next City\County Forum scheduled for March 31, 1998.

- **Update on the TAPP Process:** The information formulated at the last meeting was submitted to the RAB for consideration. A majority vote recommended to proceed toward the application of TAPP funds.

- **Brainstorming:** Damian suggested that the TRS develop a list of positive things or accomplishments that the TRS has been involved in since its re-establishment. Sam Sanchez suggested that the RAB form a link to neighboring school districts. The RAB could "take the show on the road" to get the word out about the Kelly issues and the work that is being done by the RAB and the TRS, for example, in speaking to area PTA's.

- Summary - Action Items:

(1) Damian will speak to General Barnidge regarding TRS and RAB review of off-site plume delineation monitoring locations and negotiate a press release to coincide with submittal of the Work plan.

(2) Damian will speak to General Barnidge about the discharge to Six Mile Creek, proposed in the FFS for Sites SS051 and SS040. Reopen issue of water reuse versus

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS SAN ANTONIO AIR LOGISTICS CENTER (AFMC)
KELLY AIR FORCE BASE, TEXAS

IRS 4-21

27 FEB 1998

SA-ALC/CC
100 Moorman St., Suite 1
Kelly AFB, Tx 78241-5808

Mr George Rice
414 E. French Pl
San Antonio, Tx 78212

Dear Mr Rice

Thank you for your interest in our Cleanup Program and your request for Kelly Air Force Base Cleanup Program Information. We at Kelly are all equally concerned about the pace of our Cleanup Program at Kelly and at all Air Force installations, and are interested in coming to as rapid a closure as possible. It may interest you to know that Kelly has been able to successfully accelerate the schedule of the cleanup process, using several procedures that get cleanup systems in-place faster than the usual regulatory process dictates.

You asked two questions. The first was, "Has KAFB decided to clean-up any portions of the off-base contaminant plumes?" The answer to that is an unequivocal "Yes." In fact, we are directed by law to clean up any contamination which the Air Force may have caused to the satisfaction of law and regulation – no matter where the location is. Your second question was, "If so, will you provide me with a map or other description of the portions that KAFB intends to clean up?" A description of the extent of sites that are in the Cleanup Program is complex, temporal (changing with time), and will always be, at best, an estimate. When the estimated extent of contamination is characterized and re-characterized from time-to-time, ás addtional information becomes available, maps estimating the extent of contamination are made available to yourself or any other member of the public at the San Antonio Central Public Library, at 600 Soledad Plaza San Antonio, TX 78205-1200. Their operating hours are Monday through Thursday, 9:00 AM to 9:00 PM; Friday through Saturday, 9:00 AM to 5:00 PM; and Sundays, 11:00 AM to 5:00 PM. Their phone number is (210) 207-2500. In the Government Documents Repository on the second floor, in the Kelly AFB section, there are documents known as the Basewide Remedial Assessment reports. The most recent version there is for data collected in 1996, published in 1997; it is titled, "1996 Basewide Remedial Assessment Report." The 1997 data, to be published this year, will soon be available in the library. You have already seen some of the maps from this report which were presented at the 28 Sep 97 Restoration Advisory Board meeting, where copies were provided to you.

Sincerely

JAMES S. CHILDRESS
Major General, USAF
Commander

SAN ANTONIO
TESTING LABORATORY, INC.

REPORT OF CHEMICAL ANALYSIS

Report No. 9802-02
Page 5 of 7

ARMANDO QUINTANILLA'S WELL - ARMANDO'S SAMPLE

SAMPLE ID #3: Sample

SURROGATE	% RECOVERY	LIMITS
Dibromofluoromethane	105	(60-127)
Toluene-d8	96	(90-127)
4-Bromofluorobenzene	91	(64-110)

VOLATILE TARGET COMPOUNDS	RESULTS (ug/L)	MDL (ug/L)	METHOD#	ANALYZED
Dichlorodifluoromethane	<3.0	3.0	8260A	02-11-98
Chloromethane	<1.8	1.8	8260A	02-11-98
Vinyl Chloride	<2.1	2.1	8260A	02-11-98
Bromomethane	<1.4	1.4	8260A	02-11-98
Chloroethane	<1.7	1.7	8260A	02-11-98
Acetonitrile	<3.0	3.0	8260A	02-11-98
Acrolein	<3.0	3.0	8260A	02-11-98
Trichlorofluoromethane	<1.9	1.9	8260A	02-11-98
Acetone	<5.0	5.0	8260A	02-11-98
1,1-Dichloroethene	<1.2	1.2	8260A	02-11-98
Acrylonitrile	<3.0	3.0	8260A	02-11-98
Methylene Chloride	<1.0	1.0	8260A	02-11-98
Carbon Disulfide	<1.8	1.8	8260A	02-11-98
trans-1,2-Dichloroethene	<2.0	2.0	8260A	02-11-98
Methyl-t-butyl ether	<1.0	1.0	8260A	02-11-98
2-Butanone	<3.0	3.0	8260A	02-11-98
Methacrylonitrile	<1.0	1.0	8260A	02-11-98
cis-1,2-Dichloroethene	<1.0	1.0	8260A	02-11-98
Bromochloromethane	<1.0	1.0	8260A	02-11-98
Chloroform	<1.0	1.0	8260A	02-11-98
2,2-Dichloropropane	<1.0	1.0	8260A	02-11-98
1,2-Dichloroethane	<1.0	1.0	8260A	02-11-98
1,1,1-Trichloroethane	<1.0	1.0	8260A	02-11-98
1,1-Dichloropropene	<1.0	1.0	8260A	02-11-98
Carbon tetrachloride	<1.0	1.0	8260A	02-11-98
Benzene	<1.0	1.0	8260A	02-11-98
Dibromoethane	<1.0	1.0	8260A	02-11-98
1,2-Dichloropropane	<1.0	1.0	8260A	02-11-98
Trichloroethene	5.24	1.0	8260A	02-11-98
Bromodichloromethane	<1.0	1.0	8260A	02-11-98
Methyl methacrylate	<1.1	1.1	8260A	02-11-98
2-Chloroethyl vinyl ether	<1.1	1.1	8260A	02-11-98
cis-1,3-Dichloropropene	<1.0	1.0	8260A	02-11-98
4-Methyl-2-pentanone	<1.0	1.0	8260A	02-11-98
trans-1,3-Dichloropropene	<1.0	1.0	8260A	02-11-98
1,1,2-Trichloroethane	<1.0	1.0	8260A	02-11-98
Toluene	<1.0	1.0	8260A	02-11-98
Ethyl methacrylate	<1.0	1.0	8260A	02-11-98

SAN ANTONIO TESTING LABORATORY, INC.

REPORT OF CHEMICAL ANALYSIS

Report No. 9802-02
Page 6 of 7

VOLATILE TARGET COMPOUNDS	RESULTS (ug/L)	MDL (ug/L)	METHOD#	ANALYZED
1,3-dichloropropane	<1.0	1.0	8260A	02-11-98
2-Hexanone	<1.0	1.0	8260A	02-11-98
Dibromochloromethane	<1.0	1.0	8260A	02-11-98
1,2-Dibromoethane	<1.0	1.0	8260A	02-11-98
Tetrachloroethene	<1.2	1.2	8260A	02-11-98
1,1,1,2-Tetrachloroethane	<1.0	1.0	8260A	02-11-98
Chlorobenzene	<1.0	1.0	8260A	02-11-98
Ethylbenzene	<1.0	1.0	8260A	02-11-98
m-Xylene / p-Xylene	<2.2	2.2	8260A	02-11-98
Styrene	<2.2	2.2	8260A	02-11-98
1,1,2,2-Tetrachloroethane	<1.0	1.0	8260A	02-11-98
o-Xylene	<1.0	1.0	8260A	02-11-98
1,2,3-Trichloropropane	<1.0	1.0	8260A	02-11-98
Isopropylbenzene	<1.0	1.0	8260A	02-11-98
Bromobenzene	<1.3	1.3	8260A	02-11-98
n-Propylbenzene	<1.2	1.2	8260A	02-11-98
2-Chlorotoluene	<1.1	1.1	8260A	02-11-98
4-Chlorotoluene	<1.0	1.0	8260A	02-11-98
1,3,5-Trimethylbenzene	<1.3	1.3	8260A	02-11-98
tert-Butylbenzene	<1.2	1.2	8260A	02-11-98
1,2,4-Trimethylbenzene	<1.2	1.2	8260A	02-11-98
sec- Butylbenzene	<1.3	1.3	8260A	02-11-98
1,4-Dichlorobenzene	<1.2	1.2	8260A	02-11-98
1,3-Dichlorobenzene	<1.2	1.2	8260A	02-11-98
p-Isopropyltoluene	<1.6	1.6	8260A	02-11-98
1,2-Dichlorobenzene	<1.2	1.2	8260A	02-11-98
n-Butylbenzene	<1.7	1.7	8260A	02-11-98
1,2-dibromo-3-chloropropane	<3.0	3.0	8260A	02-11-98
1,2,4-Trichlorobenzene	<2.2	2.2	8260A	02-11-98
Naphthalene	<1.9	1.9	8260A	02-11-98
Hexachlorobutadiene	<3.0	3.0	8260A	02-11-98
1,2,3-Trichlorobenzene	<2.0	2.0	8260A	02-11-98

M.D.L.: Method Detection Limit
ug/L: Micrograms per Liter
Test Methods: Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Rev. March 1983
Test Methods for Evaluating Solid Waste, SW-846, EPA, Revised September 1994

Respectfully Submitted,

Richard Hawk

Richard Hawk
General Manager

ARMANDO QUINTANILLA - USAF - AIR FORCE SAMPLE

VOLATILE ORGANICS ANALYSIS DATA SHEET

Northeast Analytical Inc.		SDG No.:	020398SSP
ELAP ID No.:	11078	CLIENT ID:	Q002
Matrix:	WATER	LAB SAMPLE ID:	AB00492
Sample wt/vol:	5.00 (mL)	LAB FILE ID:	M1021013
Level:	LOW	DATE RECEIVED:	02/03/98
% Moisture:		DATE ANALYZED:	02/10/98
GC Column:	DB624	DILUTION FACTOR:	1
Soil Extract Volume:	(uL)	Soil Aliquot Volume:	- (uL)
Method:	SW-846 8260		

NEA Form ID: S:\FORMS\CATB\CLP-1A1 WK4

NEA File ID: S:\CERT96\980223NG SSP

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L)	Q
75-43-4	DICHLOROFLUOROMETHANE	10.0	U
74-87-3	CHLOROMETHANE	10.0	U
74-83-9	BROMOMETHANE	10.0	U
75-01-4	VINYL CHLORIDE	10.0	U
75-00-3	CHLOROETHANE	10.0	U
75-69-4	TRICHLOROFLUOROMETHANE	10.0	U
75-35-4	1,1-DICHLOROETHENE	10.0	U
156-59-4	CIS-1,2-DICHLOROETHENE	2.62	J
75-15-0	CARBON DISULFIDE	10.0	U
67-64-1	ACETONE	10.0	U
75-34-3	1,1-DICHLOROETHANE	10.0	U
75-09-2	METHYLENE CHLORIDE	10.0	U
156-60-5	TRANS-1,2-DICHLOROETHENE	10.0	U
108-5-4	VINYL ACETATE	10.0	U
67-66-3	CHLOROFORM	10.0	U
74-97-5	BROMOCHLOROMETHANE	10.0	U
107-06-2	1,2-DICHLOROETHANE	10.0	U
590-20-7	2,2-DICHLOROPROPANE	10.0	U
71-55-6	1,1,1-TRICHLOROETHANE	10.0	U
563-58-6	1,1-DICHLOROPROPENE	10.0	U
56-23-5	CARBON TETRACHLORIDE	10.0	U
75-27-4	BROMODICHLOROMETHANE	10.0	U
74-95-3	DIBROMOMETHANE	10.0	U
78-87-5	1,2-DICHLOROPROPANE	10.0	U
10061-01-5	CIS-1,3-DICHLOROPROPENE	10.0	U
10061-02-6	TRANS-1,3-DICHLOROPROPENE	10.0	U
79-01-6	TRICHLOROETHENE	9.87	J
124-48-1	DIBROMOCHLOROMETHANE	10.0	U
79-00-5	1,1,2-TRICHLOROETHANE	10.0	U
142-28-9	1,3-DICHLOROPROPANE	10.0	U
71-43-2	BENZENE	10.0	U
78-93-3	2-BUTANONE	10.0	U
110-75-8	2-CHLOROETHYLVINYLETHER	10.0	U
75-25-2	BROMOFORM	10.0	U
127-18-4	TETRACHLOROETHENE	10.0	U
106-93-4	1,2-DIBROMOETHANE	10.0	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	10.0	U
108-88-3	TOLUENE	10.0	U
108-10-1	4-METHYL-2-PENTANONE	10.0	U
591-78-6	2-HEXANONE	10.0	U
108-90-7	CHLOROBENZENE	10.0	U

VOLATILE ORGANICS ANALYSIS DATA SHEET

Northeast Analytical Inc.
ELAP ID No.: 11078
Matrix: WATER
Sample wt/vol: 5.00 (mL)
Level: LOW
% Moisture:
GC Column: DB624
Soil Extract Volume: (uL)
Method: SW-846 8260

SDG No.: 020398SSP
CLIENT ID: Q002
LAB SAMPLE ID: AB00492
LAB FILE ID: M1021013
DATE RECEIVED: 02/03/98
DATE ANALYZED: 02/10/98
DILUTION FACTOR: 1
Soil Aliquot Volume: - (uL)

NEA Form ID: S:\FORMS\CAT8\CLP-1A1 WK4
NEA File ID: S:\CERT98\980223\NG SSP

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L)	Q
96-6-6	tert-BUTYLBENZENE	10.0	U
630-20-6	1,1,1,2-TETRACHLOROETHANE	10.0	U
100-41-4	ETHYLBENZENE	10.0	U
541-73-1	1,3-DICHLOROBENZENE	10.0	U
95-50-1	1,2-DICHLOROBENZENE	10.0	U
106-46-7	1,4-DICHLOROBENZENE	10.0	U
108-38-3/106-42-3	M+P-XYLENE	10.0	U
100-42-5	STYRENE	10.0	U
95-47-6	O-XYLENE	10.0	U
98-82-8	ISOPROPYLBENZENE	10.0	U
96-18-4	1,2,3-TRICHLOROPROPANE	10.0	U
103-65-1	n-PROPYLBENZENE	10.0	U
108-86-1	BROMOBENZENE	10.0	U
108-67-8	1,3,5-TRIMETHYLBENZENE	10.0	U
95-49-8	2-CHLOROTOLUENE	10.0	U
106-43-4	4-CHLOROTOLUENE	10.0	U
95-63-6	1,2,4-TRIMETHYLBENZENE	10.0	U
135-98-8	sec-BUTYLBENZENE	10.0	U
99-87-6	4 - ISOPROPYLTOLUENE	10.0	U
104-51-8	n-BUTYLBENZENE	10.0	U
120-82-1	1,2,4-TRICHLOROBENZENE	10.0	U
87-68-3	HEXACHLOROBUTADIENE	10.0	U
91-20-3	NAPHTHALENE	10.0	U
87-61-6	1,2,3-TRICHLOROBENZENE	10.0	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	10.0	U

CONFIDENTIAL
Attorney-Client Work Product

MEMORANDUM

TO: File SSP412
FROM: RJCH
DATE: February 11 to 20, 1998

RE: Analytical results/ SSP412

As part of project SSP412, water and soil samples were collected under Mr. Quintanilla's property (January 31, 1998) and submitted for VOC and selected inorganic parameter analysis to Northeast Analytical Laboratory, Schenectady, New York (NEA).

February 11, 1998, I inquired with NEA as to the status of the analyses. Jim Daly of NEA (laboratory manager) told me that the VOC analyses had been completed for samples Q001 and Q002 and were being processed for reporting. Daly mentioned that all VOCs came out below detection limits (10 ppb). Daly mentioned that sample Q002 might contain trace levels of TCE below the detection limit. Daly also mentioned that he planned to re-run that particular sample to double check. The method of analysis for VOCs was EPA Method 8260 which provides positive identification and reliable quantification for the contaminants of concern, as well as results which can be compared with existing data.

A draft report from NEA was faxed to my office on February 18, 1998. The draft report indicated that water and soil samples from under Mr. Quintanilla's property did not contain any VOCs above the method detection limit. On February 20, 1998, I contacted NEA to follow up on the status of the analytical report. I talked to Mark McTague (VOC analysis supervisor at NEA) and Bill Kotas (QA Officer at NEA) to clarify the units for the nitrate results. NEA personnel informed me that trace levels of TCE and cis-1,2DCE were likely present in sample Q002, at concentrations below the method detection limit. These results will be reported in the final analytical report, and flagged with the symbol "J" to indicate detection at trace levels, below the method detection limits.

In addition to trace levels of TCE and cis-1,2DCE (likely a daughter product from the degradation of TCE), nitrate is elevated, at 18 mg/l, in sample Q002. A geochemical signature consisting of trace levels of TCE, cis-1,2DCE, and nitrate in groundwater is usually indicative of leaky sewer pipes. Residuals from past localized industrial activities at proximity of Mr. Quintanilla's residence could also be responsible for the observation. Contaminated groundwater from the Kelly Air Force Base is most certainly not the source of the TCE, cis-1,2DCE and nitrate found under Mr. Quintanilla's property. Should the Base be the source, TCE would be found together with PCE, VC, and other contaminants which are characteristic of the chemicals present at the Kelly Air Force Base.

ASK FORCE CONSULTANT EXPLANATION.
WHY CONTAMINANTS IN ARMENDARIS
WELL CANNOT HAVE COME FROM KELLY

MEMORANDUM

TO: KAFB RAB TRS **DATE:** April 29, 1998

FROM: M. Damian Sandoval

SUBJECT: 21 April 1998 KAFB RAB TRS Meeting

I. Introduction

The Kelly Air Force Base (KAFB) Restoration Advisory Board (RAB) Technical Review Subcommittee (TRS) met on Tuesday, 21 April 1998 at 6:30 P.M. in Room 217, Garni Hall, St. Mary's University. RAB, TRS members and members of the community in attendance are noted on the TRS Meeting Attendance List, Attachment 1. The meeting agenda is presented as Attachment 2.

Mr. Sandoval commenced the meeting proceedings reviewing the TRS Agenda items and welcoming TRS members and guests. Mr. Sandoval briefly reviewed the following agenda topics; Technical Assistance for Public Participation, the Proposed Work Plan for the off-base monitoring wells east and south of Zone 4, and briefly summarized the Organizational Tasks.

II. Technical Review Subcommittee Topics of Discussion

A. Technical Assistance For Public Participation (TAPP)

Sandoval stated that there has been a delay on the part of the agency responsible for developing and training the KAFB RAB. As was discussed in February 1998, the KAFB RAB was scheduled to obtain training to complete and submit a TAPP application. Cpt. deVenoge and Mr. Dick Walters stated that KAFB was working to resolve this issue as quickly as possible. Mr. Walters also stated that this issue was elevated to Gen. Barnidge's level for resolution.

In addition, Mr. Sandoval summarized several types of assistance that may be required by the RAB to include health risk reviews and decision document reviews critical to the restoration at KAFB.

B. Review of Proposed Plan for Monitoring Wells - Zone 4

Cpt. deVenoge briefly summarized the proposed work plan to install monitoring wells east and south of Zone 4 to identify the outer boundaries of the off-base groundwater solvent plume. Cpt. deVenoge stated that this summary was a follow-up briefing to the 21 Apr 98 TRS and the 7 Apr 98 RAB Meeting. Cpt. deVenoge distributed the proposed work plan (Exhibit A) to the TRS. Cpt. deVenoge stated that the location and rationale for locating the monitoring wells was based upon a groundwater modeling program directed at determining contamination flow and distance off-base.

II. Organizational Tasks

A. The meeting minutes for the 10 March 98 TRS meeting were approved.

B. Cpt. deVenoge identified the next KAFB restoration documents that would be developed and submitted for review: The Zone 4, Remedial Investigation for OU-1, The S-1 Focused Feasibility Study Soil, and the SS-051 Focused Feasibility Study For Soil.

C. Mr. Sandoval stated that the next TRS agenda will summarize all technical issues as "table topics". Sandoval stated that the topics presented at each TRS meeting summarize the issues and the meeting minutes and action items identify the concerns and follow-up actions.

D. Mr. David Johnson did not attend the TRS meeting and subsequently could not update the TRS on any North Kelly Gardens/CEJA issues.

E. Mr. Rice distributed a copy of the response letter from Gen. Childress (Exhibit B).
Mr. Rice also distributed the groundwater analytical results from the monitoring well installed on Mr. Quintania's property. The results indicate that TCE was identified in the groundwater at concentrations just above the Maximum Contaminant Level (MCL) in groundwater. The information Mr. Rice distributed also contained the groundwater results from the laboratory the Department of Justice (DOJ) used for analyses. The DOJ also provided rationale that stated the contamination identified in the monitoring well was probably not from KAFB. This topic will be discussed at a later TRS Meeting.

F1. Cpt. deVenoge previewed a draft copy of detailed program schedule that identifies the restoration processes from site characterization to remedial action to long term monitoring.

F2. Cpt. deVenoge presented the status of the Zone 3 Record of Decision. Cpt. deVenoge stated that this terminology strictly applies to the CERCLA process and not to the restoration at KAFB. However, the ROD terminology would be replaced with a Decision Document (DD). Cpt. deVenoge stated that the DD is a summary of decisions agreed upon by DOD and regulators and included community comments and responses concerning the restoration of a particular Zone. Cpt. deVenoge stated that the Proposed Plan (PP) is the document that provides the community by law an opportunity to review and comment.

Cpt. deVenoge distributed a copy of the Proposed Plan for Zone 3. However, the PP contained a "draft" stamp. In addition, Mr. Rice and Mr. Quintanilla stated that a meeting was conducted with Gen. Childress to discuss the Zone 3 ROD. Mr. Rice and Mr. Quintanilla stated that in this meeting, KAFB personnel would review and assess community comments and that the Zone 3 ROD would be revised to reflect this meeting. However, upon review of the ROD presented at this meeting, both individuals stated that this was never completed.

G. Cpt. deVenoge stated that KAFB continues to modify the KAFB WEB Page. Mr. Sandoval stated that the Sacramento Amy Depot-McCellan Air Force Base was willing to provide KAFB electronic information to develop a similar WEB site. Cpt. deVenoge will inform staff personnel on this option.

H. This topic was covered in item F.

I. Mr. Sandoval reminded the TRS concerning the scheduled RAB Introspection meeting. Mr. Sandoval also stated that Mr. Ashcroft may be available to facilitate this meeting.

J. Mr. Sandoval obtained two additional TRS agenda topics; 1) Discuss the identification of the Dense Non-Aqueous Liquid discovered in Zone 3 and possible remedial strategies, and , 2) Discuss off-base groundwater contamination from other areas including Zone 4.

Mr. Sandoval concluded the meeting by asking each TRS member if they had further questions, comments or suggestions to add to the TRS Meeting. Mr. Sandoval stated that the next TRS Meeting would be held again in Room 217, Garni Hall, St. Mary's University if the Fire Training Academy was not available. Upon receipt of comments that this was a "good meeting", a motion was presented and adopted to end the meeting. The 10 March 1998 meeting was closed at 9:45 P.M.

MEMORANDUM

TO: KAFB Restoration Advisory Board **DATE:** March 26, 1998

FROM: M. Damian Sandoval
KAFB RAB TRS Chairperson

SUBJECT: Formal TRS Comments on the Focus Feasibility Study For SS041 and SS050, March 97.

The KAFB Technical Review Subcommittee (TRS) conducted a meeting on 10 March 1998, to review, discuss and provide formal comments on the aforementioned document. The following comments will be submitted to the KAFB Restoration Advisory Board (RAB) for submission to the Air Force. A copy of the comments will also be provided to both the Environmental Protection Agency, Attention: Ms. Camille Hueni, and the Texas Natural Resource Conservation Commission (TNRCC), Attention: Mr. Gary Beyer.

1. The TNRCC has all along stated that the surficial aquifer would be remediated (cleaned) to Maximum Contaminant Levels (MCLs) for Groundwater. Limits of the surface water discharge may exceed MCLs under the current KAFB NPDES Permit. For example, PCE, has an MCL of 5 parts per billion (ppb) and the NPDES Discharge Permit Limit for PCE is 20 ppb. The UV Oxidation system may be the only proposed treatment system that may remove or eliminate organic contaminants to concentrations below MCLs. Thus, groundwater that is treated still may have levels of organic contaminants above MCLs that are discharged into an open creek.

2. Groundwater treated through a treatment system that still contains concentrations above MCLs should be evaluated in regards to discharging into a open, publicly accessible creek. Please evaluate the possible exposure pathways (i.e. children playing, contacting and incidental ingestion of treated groundwater that may be above MCLs) for this scenario.

3. Please indicate under which regulations, (TNRCC or EPA) allows treated groundwater to be discharged above MCLs into a creek. Indicate how regulations are modified so that different cleanup standards are used for surface discharged as opposed to MCL criteria identified early in the BRAC Cleanup Process.

4. How and when will the resource agencies (i.e. National Park Service) be informed of the proposed action? The proposed discharge rate of upto 500,00 gallons per day (gpd) will change the condition of six mile creek from an intermittent, storm-feed stream to a continuous flowing creek. EPA, TNRCC and/or the Air Force should be required to conduct a downstream impact study prior to treatment operation and discharge.

5. A maximum discharge rate of 500,000 gpd of water may be reviewed as a resource that should be re-used; ether in a recycling or reclamation program. Both the Bexar Metropolitan Water District and/or the San Antonio Water Systems should be contacted to assess the feasibility of reusing this resource. KAFB should also evaluate this option as an alternative to discharging water into Six Mile Creek.

6. Will the extraction of upto 500,000 gpd from the surfical aquifer at KAFB, Zone 4 cause subsidence problems to properties on KAFB or to adjacent properties? Will this affect the existing groundwater gradient or levels on and off KAFB? Will a subsidence study be performed to assess the impact to soils on and off base?

7. If KAFB is committed to treating groundwater on-base, why are plans not immediately implemented to collect and treat groundwater off-base?

cc: Ms. Camille Hueni, EPA

KELLY AIR FORCE BASE

SITE ZONE 3 GROUNDWATER OPERABLE UNIT

PROPOSED PLAN

June 1995

KELLY AIR FORCE BASE ANNOUNCES PLANS FOR GROUNDWATER REMEDIATION IN ZONE 3

The U.S. Air Force as the lead agency, and the Texas Natural Resource Conservation Commission (TNRCC) request public comments on the proposed remediation plan for contaminated shallow groundwater within the Site Zone 3 (Zone 3) Groundwater Operable Unit (OU GW) of Kelly Air Force Base (AFB), San Antonio, Texas. This Proposed Plan summarizes the remedy selection process, the rationale for selecting the preferred alternative from the alternatives evaluated, and a description of the preferred alternative.

The Air Force's preferred alternative to address the groundwater contamination is to use several recovery well systems and a collection trench to capture contaminated groundwater. The planned Quintana Road culvert reroute along McLaughlin Road and Bynum Avenue will act as a groundwater barrier, preventing further migration of contaminated groundwater to the southeast. Recovered groundwater will be treated using an ultraviolet oxidation (UVOX) groundwater treatment system to destroy organic contamination related to chlorinated solvents and jet fuel. Recovered groundwater will also be treated using precipitation (gravity separation) to remove inorganic contamination. The treated water will be sent to the base treatment plant and then discharged into Leon Creek. The Air Force encourages you to review and comment on all alternatives described in this document, and to assist us by attending the community meeting. Community involvement is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The Air Force Installation Restoration Program (IRP) is modeled after CERCLA and provides the mechanism for Kelly AFB to remediate OU GW. The TNRCC's Risk Reduction Standard #3 requirements (30 TAC Subchapter S §§335.561-335.566) were used to determine remediation goals. Subchapter S, Risk Reduction Standard #3 (30 TAC §335.562(b)) also requires that the reduction goals meet other applicable or relevant Texas and Federal environmental laws. This document summarizes information that can be found in greater detail in the Remedial Investigation (RI) Report and Feasibility Study (FS) Report. The public is encouraged to review the RI/FS and other site-related documents in the Administrative Record at the information repositories listed on page 15. The points of contact listed on page 15 are available to answer any of the public's questions.

COMMUNITY INVOLVEMENT

PUBLIC COMMENT PERIOD

July 17 - August 15, 1995

During the public comment period, you are encouraged to comment on the Proposed Plan and the Feasibility Study Report. Comments may be made during the community meeting, or written comments may be sent to Kelly Air Force Base no later than August 15, 1995, at the address listed on page 15.

COMMUNITY MEETING

July 27, 1995

You are invited to attend a general meeting regarding the remedial anternative proposed for OUGW of Zone 3 at Kelly AFB. The meeting will be held at Price Elementary School) San Antonio, Texas 78211 at 7:00 PM on July 27, 1995. At this meeting, Kelly AFB staff will describe the alternatives evaluated and discuss the preferred remediation plan. Residents will also have the opportunity to ask questions and comment on the alternatives.

SITE BACKGROUND

Kelly AFB, located in San Antonio, Texas (Figure 1), was founded in 1917 as the first military air base in Texas and has primarily been involved in aircraft maintenance for the United States Air Force since 1954. The Base consists of approximately 4,660 acres. The Zone 3 on-base area consists primarily of industrial complexes which include aircraft hangars, refueling facilities, engine repair shops, warehouses, and support buildings. The off-base area includes a railroad yard and residential areas.

Zone 3 is located in the southeastern portion of Kelly AFB (Figure 1) and is bounded to the west by the flight line and runway area. Zone 3 extends to the east beyond the base boundary into the Union Pacific Railroad (UPR) yard and the Quintana Road residential area. The OU GW consists of on-base and off-base areas of shallow groundwater that have been affected by contamination primarily from Kelly AFB. Operation and maintenance of aircraft in Zone 3 require the use of solvents, petroleum products, and other chemicals. Leaks or spills of these chemicals have occurred in the past which resulted in contamination of the shallow groundwater. Kelly AFB has since implemented waste handling procedures that eliminate leaks or spills and that comply with environmental regulations.

Environmental investigations began in 1982. The investigation of Zone 3 began with a record search to identify potential problem areas (Table 1). Field investigations in Zone 3 began in 1983 and continue today. As identified in the RI Report, the main contamination sources are the jet fuel distribution system and the on-base industrial lines. The FS process began in 1992 to identify remedial alternatives. This Proposed Plan is a result of those efforts.

The contamination in OU GW is defined by the presence of two jet-fuel plumes and a much larger dissolved-phase chlorinated solvent plume. Kelly AFB has installed interim groundwater recovery systems that are currently recovering, treating, and containing contaminated groundwater at IRP Sites S-4 and S-8 (Figure 2). OU GW is currently estimated to cover 488 acres. The northern portion of the plume extends beneath the UPR yard toward East Kelly AFB. The southern portion of the plume extends beneath the railroad yard into the Quintana Road residential area (Figure 2). Kelly AFB has initiated construction of additional interim groundwater recovery systems to prevent further off-base migration of the groundwater contaminant plume. The Base has also initiated an industrial piping upgrade and storage tank removal project to prevent releases to the groundwater from the industrial lines or jet fuel distribution system. The construction of the Quintana Road culvert reroute is planned for 1996. This culvert will intersect the entire thickness of the shallow groundwater and act as a physical barrier to prevent further migration of contaminated groundwater away from the Base to the southeast.

TABLE 1
TIMELINE OF THE ZONE 3 RI/FS PROCESS AT KELLY AFB

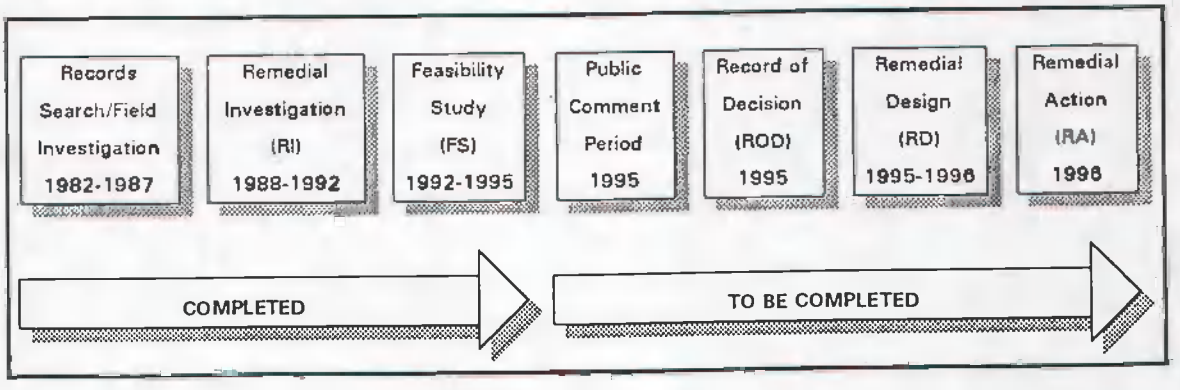


FIGURE 1
REGIONAL LOCATION MAP OF KELLY AIR FORCE BASE AND SITE ZONE 3

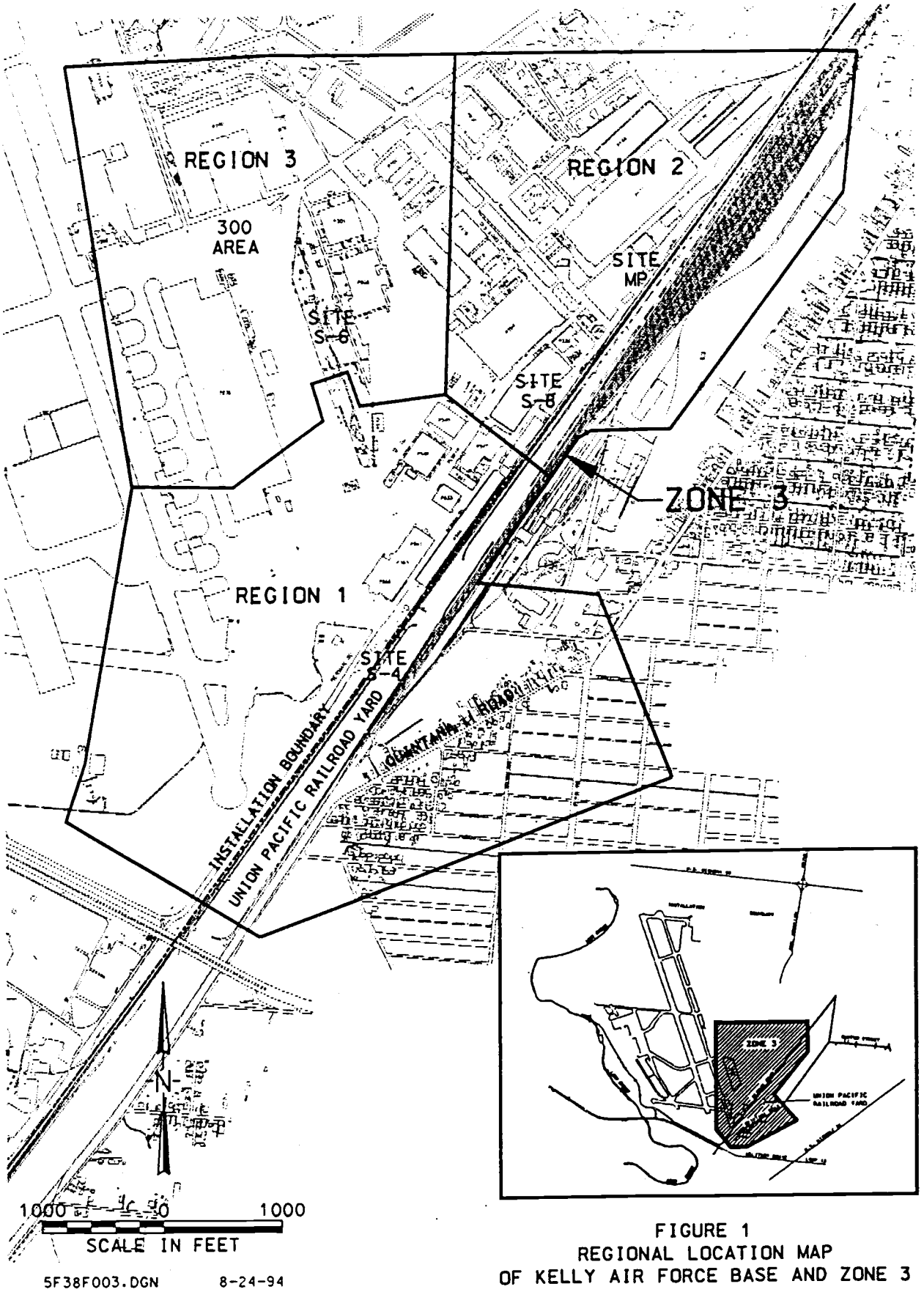


FIGURE 1
REGIONAL LOCATION MAP
OF KELLY AIR FORCE BASE AND ZONE 3

FIGURE 2
ESTIMATED EXTENT OF GROUNDWATER PLUMES IN ZONE 3

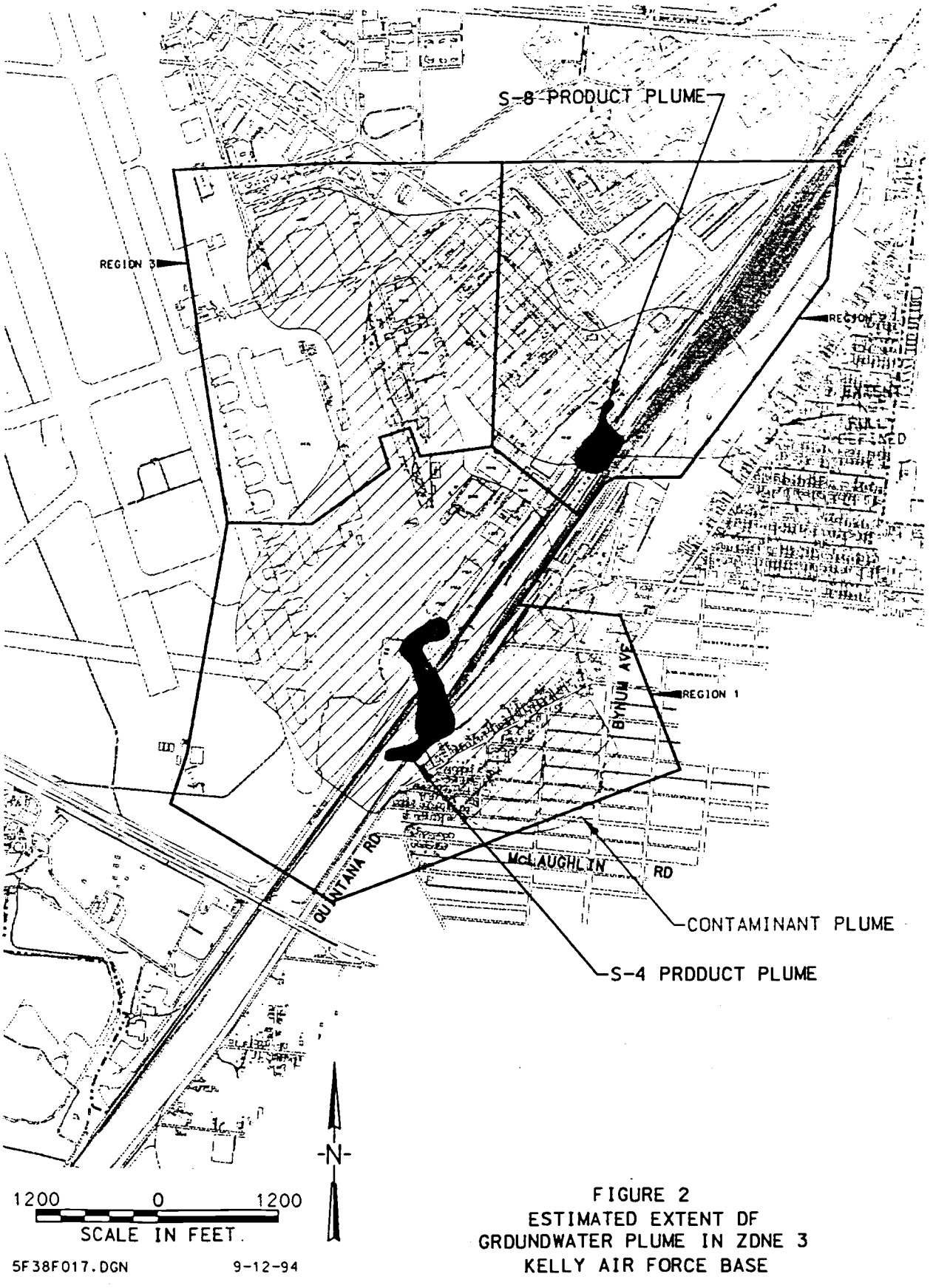


FIGURE 2
ESTIMATED EXTENT DF
GRDUNDWATER PLUME IN ZDNE 3
KELLY AIR FORCE BASE

OU GW primarily contains elevated levels of organic and some inorganic groundwater contaminants. Approximately 75% of the organic chemicals detected in OU GW are one or more of the 10 chemicals listed in Table 2. The Maximum Contaminant Level (MCL) is the amount of a chemical that is allowed in a public drinking water supply. Forty-eight organic and eighteen inorganic contaminants have been detected at levels above MCLs in OU GW.

Remedial alternatives for contaminated soil will be addressed under the Soils Feasibility Study and Proposed Plan which are currently under review by the TNRCC.

SCOPE AND ROLE OF THE OPERABLE UNIT

The OU GW remediation is one important component of the environmental restoration efforts being performed at Kelly AFB. Kelly AFB is leading remediation efforts by complying with Federal and state requirements. Only one groundwater Operable Unit was defined for Zone 3 because the groundwater plumes have commingled and the potential threats are better addressed by the creation of one OU. Contaminated groundwater is a potential threat at this site because the shallow aquifer has been identified as a potential drinking water source by the State of Texas. At the present time no one is using OU GW as a source of drinking water. The objectives for OU GW are to prevent current or future exposure to the contaminated groundwater.

SUMMARY OF SITE RISK

A baseline risk assessment was performed using United States Environmental Protection Agency (EPA) guidance to determine if concentrations in the shallow groundwater can be a risk to human health. A risk assessment is a scientific procedure that uses facts and assumptions to evaluate the potential adverse effects on human health when exposed to chemicals. Sampling data are used to estimate potential exposure to chemicals found in drinking water. These exposures are then compared to amounts of the chemicals known to cause harm. To ensure protection of human health, conservative assumptions that tend to overestimate the risk are used. These assumptions determine the potential for adverse effects on human health from exposure to chemicals, assuming no clean-up occurs. As an example, one exposure scenario evaluates the potential risk for adults drinking 2 liters of untreated groundwater per day for 350 days out of every year over a period of 30 years. The exposure is compared to the probability of increased cancer risk. A risk level of 1 in 1,000,000 means that one additional person out of 1 million people exposed could develop cancer as a result of the exposure. To be considered protective of human health, according to EPA, the additional cancer risk should be within 1 in 10,000 and 1 in 1,000,000.

The Zone 3 baseline risk assessment determined that the greatest risks to humans were caused from potential ingestion or skin (dermal) contact with groundwater containing tetrachloroethene, trichloroethene, 1,1-dichloroethene, 1,2-dichloroethene, vinyl chloride, chlorobenzene, and

TABLE 2
INDICATOR CHEMICALS IN OU GW GROUNDWATER

Chemical	MCL (µg/L)	Maximum Concentration (µg/L)
Benzene	5	15,000
Bis-2 (ethyl hexyl) phthalate	6	1,800
Chlorobenzene	100	490
Ethylbenzene	700	1,900
Naphthalene	57[1]	21,000
Tetrachloroethene (PCE)	5	44,000
total-1,2-Dichloroethene (1,2-DCE)	70	14,000
total Xylenes	10,000	5,700
Trichloroethene (TCE)	5	7,100
Vinyl Chloride	2	1,800

[1] Risk-based value, MCL not available.

thallium. The maximum potential increase in cancer calculated by the risk assessment is 180 additional cases of cancer in 10,000 adult residents exposed. A Hazard Index is an indicator of systematic (non-carcinogenic) health effects. A value greater than 1.0 indicates expected adverse health effects. The maximum Hazard Index for an adult resident is 49 for adverse non-carcinogenic health effects. As shown in Table 3, the Zone 3 risks for non-carcinogens and carcinogens (cancer causing chemicals) exceed EPA's target risk ranges. The shallow groundwater in OU GW has been classified by the TNRCC as a potential drinking water source for local residents or industry. The use of untreated shallow groundwater from OU GW could result in an unacceptable health risk. As previously stated, no one is using OUGW as a source of drinking water. **However, the shallow groundwater is used by several residents in the area for irrigation, and the risk is within the acceptable range.**

Actual or threatened releases of hazardous substances from OU GW, may present a potential threat to human health if left untreated or if not addressed by the preferred alternative or one of the other active measures considered.

DESCRIPTION OF ALTERNATIVES

The alternatives to remediate the contaminated groundwater are presented in the following sections. Except for the "No Action" alternative, all of the alternatives considered share some common components. Administrative controls, groundwater recovery systems, groundwater treatment, and long-term groundwater monitoring are common components to Alternatives 2 through 5 (Table 4). Figure 3 shows the locations of the groundwater recovery and treatment systems (labeled A-H). The base's central UVOX treatment unit is labeled "I".

Alternatives 4 & 5 include the Quintana Road culvert reroute (J) that will act as a groundwater barrier. Construction of the Quintana Road culvert reroute along McLaughlin Road and Bynum Avenue will prevent further migration of contamination to the southeast. The total estimated capital cost of this project is $5.6 million. Construction of the culvert will cost $2.9 million. Another $2.7 million has been programmed for the handling and disposal of contaminated soils and groundwater. The culvert reroute project is a combined effort by the City of San Antonio and Kelly AFB. Costs associated with each alternative are summarized in Table 4.

Estimated capital and operation and maintenance (O&M) costs for the alternatives were calculated on a present worth basis at a projected rate of 10% over the project life (30 years). Implementation times were estimated based on conceptual designs and experience.

Alternative 1

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and CERCLA guidance require that the "No Action" alternative be evaluated to establish a baseline for comparison with other alternatives. In this alternative, existing interim groundwater recovery systems would be turned off, and the contaminant plume would continue to migrate off base. There is no monitoring of conditions or implementation time associated with this alternative.

TABLE 3
SUMMARY OF POTENTIAL RISK FROM CHEMICALS IN OU GW

IRP Site	Hazard Index [1]			Cancer Risk [2]	
	Adult Resident	Child Resident	Adult Base Worker	Adult Resident	Adult Base Worker
IRP Site S-4 Area					
Ingestion/Dermal Contact	3.0	7.1	1.1	15 in 10 thousand	3.7 in 10 thousand
Inhalation while showering	0.036	-	-	1.6 in 10 thousand	-
IWCS Area					
Ingestion/Dermal Contact	1.3	3.1	0.47	5 in 10 thousand	1.2 in 10 thousand
Inhalation while showering	0	-	-	0.34 in 10 thousand	-
IRP Site MP Area					
Ingestion/Dermal Contact	47.0	110	17.0	180 in 10 thousand	42 in 10 thousand
Inhalation while showering	0.019	-	-	11 in 10 thousand	-
IRP Site S-8 Area					
Ingestion/Dermal Contact	49.0	120	18.0	81 in 10 thousand	19 in 10 thousand
Inhalation while showering	0.51	-	-	10 in 10 thousand	-
IRP Site S-6 Area					
Ingestion/Dermal Contact	5.9	14.0	2.1	14 in 10 thousand	3.3 in 10 thousand
Inhalation while showering	0.017	-	-	1.1 in 10 thousand	-

[1] A Hazard Index value greater than 1 indicates expected adverse non-carcinogenic health effects.
[2] 1 in 1 million to 1 in 10 thousand additional cancer cases is EPA's target risk reduction range for carcinogens.

FIGURE 3

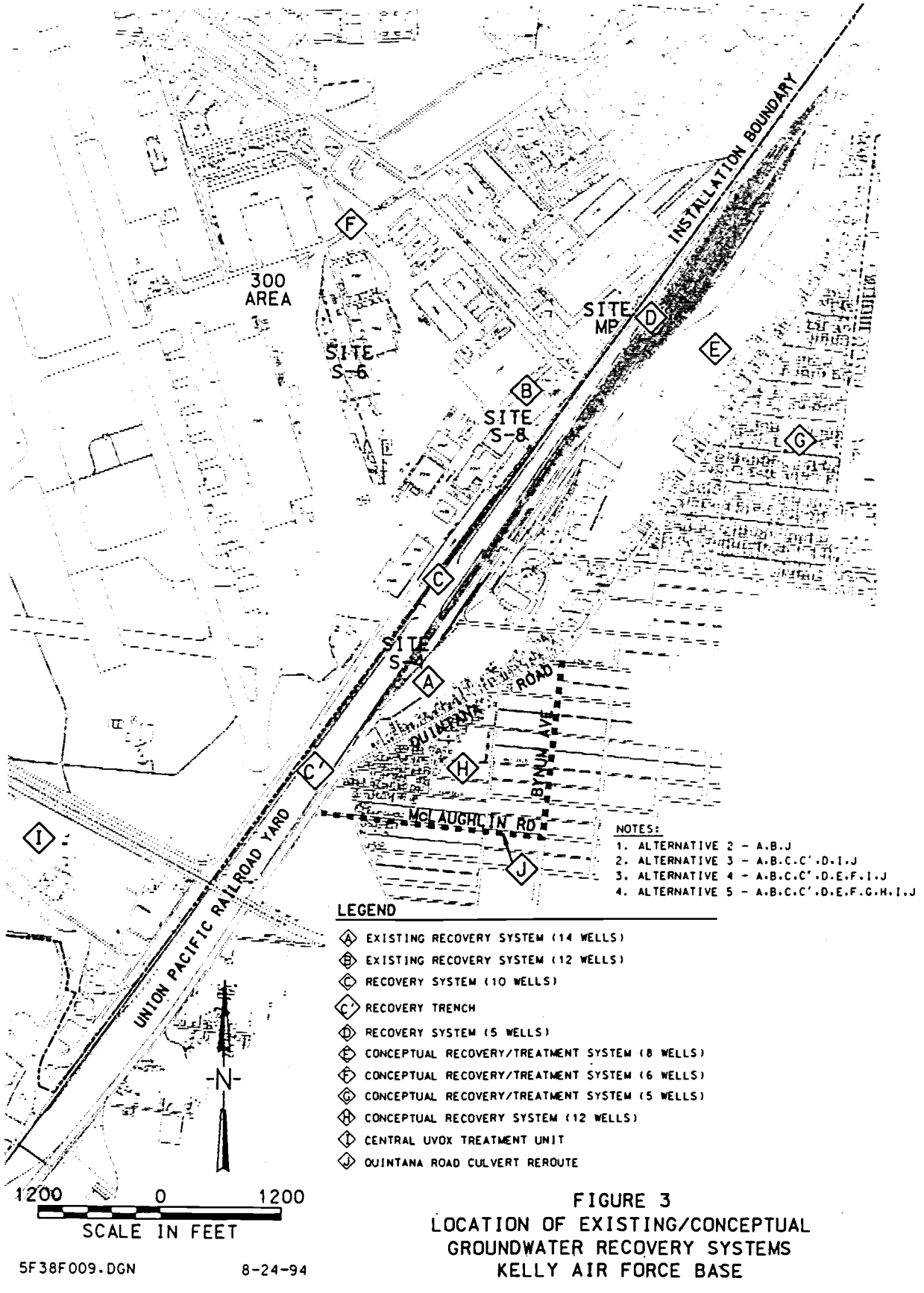


FIGURE 3
LOCATION OF EXISTING/CONCEPTUAL
GROUNDWATER RECOVERY SYSTEMS
KELLY AIR FORCE BASE

TABLE 4
SUMMARY OF ALTERNATIVES

Alternative No.	Components	Costs		Implementation Time (months)
		Capital (million $)	O & M (million $)	
1	No Action	0	0	None
2	**Administrative control**, recovery well systems, long-term groundwater monitoring, base treatment plant, and Leon Creek,	0	2.9	None
3	**Administrative control**, recovery well systems, one recovery trench, long-term groundwater monitoring, central UVOX and base treatment plant/Leon Creek	6.4	23.4	9
4	**Administrative control**, recovery well systems, long-term groundwater monitoring, one stand-alone UVOX and discharge into industrial waste collection system, one stand-alone UVOX and discharge into industrial waste collection system, and central UVOX and base treatment plant, Quintana Road culvert	10.8	31.2	12
5	**Administrative control**, recovery well systems, one stand-alone UVOX and discharge into permitted outfall, one stand-alone UVOX , industrial waste collection system, and central UVOX and base treatment plant, Quintana Road culvert	12.3	34.0	12

Alternative 2

This alternative includes **administrative controls** and operation of the two existing interim groundwater recovery systems at Sites S-4 and S-8 (letters A and B on Figure 3). Administrative controls include measures taken on-base by Kelly AFB and off-base by state and local authorities that restricts, where appropriate, groundwater and land use.

Groundwater monitoring consists of periodic sampling of monitoring wells to assess the groundwater plume over time. The wells chosen will include existing monitoring wells whenever possible to reduce additional capital costs. The interim groundwater recovery systems would fully contain the jet fuel plumes and partially contain the most concentrated portions of the dissolved-phase chlorinated solvent plume. Recovered groundwater would be sent to the base waste water treatment plant for treatment of contaminants and then discharged to Leon Creek.

Alternative 2 would allow the further migration of contaminated groundwater off base. Alternative 2 would satisfy RCRA groundwater monitoring requirements at IRP Site S-8.

Alternative 3

Alternative 3 includes **administrative controls,** groundwater monitoring, and groundwater recovery and treatment systems A and B as described in Alternative 2. In addition, the following systems are being installed in FY95: 1) ten recovery wells (system C) would be installed in the UPR yard just north of system A, 2) a groundwater collection trench (system C') is presently being installed in the UPR yard southwest of system A, and 3) 5 groundwater recovery wells would be installed along the Kelly AFB boundary near Site MP (system D). These systems are to prevent any further off-base migration of contaminants as well as reduce contaminant concentrations in these areas. These additional systems are expected to be installed as interim measures. Recovered groundwater with organic contaminants would be treated with a UVOX treatment unit located near the base treatment plant (system I). Inorganic contaminants would be treated by chemical precipitation. Treated groundwater would then be sent to the base treatment plant and discharged to Leon Creek as appropriate.

Alternative 3 would contain, capture, and treat, contaminated groundwater along the base boundary and would satisfy RCRA groundwater monitoring requirements.

Alternative 4

Alternative 4 includes **administrative controls,** ground-water monitoring, and systems A, B, C, C' and D as described in Alternatives 2 and 3. In addition to these interim groundwater recovery systems the culvert reroute (J) will act as a groundwater barrier reducing contaminated groundwater flow to the southeast. In the UPR yard, eight recovery wells (system E) would be located to recover contaminated groundwater originating from The IRP Site MP area. Recovered groundwater from this system would be treated using a UVOX groundwater treatment system. Six recovery wells would be located in the Building 300 Area (system F) to recover groundwater with elevated concentrations of contaminants. Recovered groundwater from the 300 Area would be treated using another UVOX groundwater treatment system, located in the 300 Area, then discharged into the industrial lines, sent to

the base treatment plant if required, and discharged to Leon Creek after treatment.

Alternative 4 would: 1) contain and remediate contaminated groundwater along the base boundary; 2) satisfy RCRA groundwater monitoring requirements; and 3) satisfy the NCP by providing for an efficient, coordinated, and effective response to address the contamination in OU GW.

Alternative 5

Alternative 5 includes **administrative controls**, groundwater monitoring, culvert reroute (J), and systems A, B, C, C', D, E, and F, as described in Alternatives 2, 3, and 4. In addition, 5 recovery wells (system G) would be located in the off-base area west of East Kelly AFB. Actual placement of this system would depend upon additional information obtained to define the extent of this portion of the groundwater plume. Recovered groundwater from system G would be treated using a UVOX groundwater treatment system and subsequently discharged to the base treatment plant. Additionally, nine recovery wells would be located in the Quintana Road residential area (system H) to attempt recovery of groundwater contaminated with lower levels of contaminants. Recovered groundwater from the Quintana Road residential area would be sent to the on-base UVOX system (system I) and subsequently sent to the base treatment plant if required and discharged to Leon Creek after treatment.

Alternative 5 would: 1) contain and remediate contaminated groundwater along the base boundary; 2) satisfy RCRA groundwater monitoring requirements; and 3) satisfy the NCP by providing for an efficient, coordinated, and effective response to address the contamination in OU GW.

EVALUATION OF ALTERNATIVES

The preferred alternative for remedial action of OU GW is Alternative 4. On the basis of current information, this alternative is expected to provide the best balance among the alternatives with respect to the nine criteria that EPA uses to evaluate alternatives. These nine criteria are described on page 10.

The following sections provide a comparative summary with respect to the nine EPA criteria. The purpose of the comparisons is to provide the means of ranking various alternatives to reveal their strengths and weaknesses. The comparative analyses focus on the key differences between the alternatives and attempts to highlight critical issues of concern that will be important when selecting the final alternative.

Overall Protection of Human Health and the Environment

Alternatives 2, 3, 4, and 5 provide protection of human health and the environment by restricting access to the groundwater through **administrative controls**. Alternatives 4 and 5 provide the highest degree of overall protection by meeting remedial action objectives within the shortest time. Alternatives 4 and 5 also meet the remedial action objective of protecting human health and the environment by remediating contaminated groundwater on base and off base. Relative reduction in risk is provided by **administrative controls** in Alternatives 2, 3, 4 and 5. Complete containment of the contaminant plume along the base boundary is provided by Alternatives 3, 4, and 5. Alternative 1 is not protective of human health and the environment because access to contaminated groundwater is still possible. As a result, Alternative 1 is not considered further in this analysis and is not an option for OU GW.

Compliance with ARARs

Alternatives 3, 4, and 5 would meet their respective Federal and state ARARs. Alternatives 3, 4 and 5 control exposures to the contaminated groundwater through enforcement of **administrative controls** until clean-up goals are met. No waiver from ARARs is necessary to implement Alternatives 3, 4, and 5.

Alternative 2 would satisfy RCRA groundwater monitoring requirements. Because Alternative 2 does not control contaminated groundwater to moving off base, it is not considered further in this analysis and is not an option for OU GW. Alternative 3 would contain, capture, and treat contaminated groundwater along the base boundary and would satisfy RCRA groundwater monitoring requirements. Alternatives 4 and 5 would contain, capture, and treat contaminated groundwater along the base boundary, satisfying RCRA groundwater monitoring requirements, and the NCP.

Long-Term Effectiveness and Permanence

Alternatives 3, 4, and 5 provide reduction of risk by eliminating access to contaminated groundwater through adoption and enforcement of **administrative controls**.

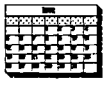
Alternatives 3, 4, and 5 provide a high degree of long-term effectiveness and permanence by providing

SUMMARY OF EVALUATION CRITERIA

In order to select an alternative that would address the groundwater contamination in OU GW, Kelly AFB first considered a preliminary range of alternatives. The alternatives consist of different process options that could reduce the risks to the public and the environment. Some of the alternatives evaluated during initial screening were eliminated due to implementability concerns, lack of effectiveness, or excessive costs. A detailed presentation of the screening process is presented in the Zone 3 Groundwater FS Report. Alternatives were then evaluated using seven of EPA's nine criteria (see below) in order to select a preferred alternative.

Overall Protection of Human Health and the Environment addresses how an alternative provides adequate protection of human health and the environment and addresses how risks posed due to exposure to the contaminant are eliminated, reduced, or controlled through treatment or institutional controls.

Compliance with Applicable and Relevant or Appropriate Requirements (ARARs) addresses whether an alternative will meet Federal and state ARARs.



Long-Term Effectiveness and Permanence addresses the effectiveness of an alternative to maintain protection of human health and the environment after remedial objectives have been achieved.

Reduction of Toxicity, Mobility or Volume Through Treatment addresses the expected performance of the alternative or technology to permanently and significantly treat the hazardous substances.

Short-Term Effectiveness addresses the time frame to complete the remedial action and any adverse impacts to human health and the environment that may occur during the implementation period.

Implementability refers to the technical and administrative feasibility of implementing an alternative.

Cost includes capital costs and operation and maintenance costs associated with an alternative.

State Acceptance indicates the concerns the state has regarding the preferred alternative. This criterion is assessed following comment by state regulatory agencies on the RI/FS and the Proposed Plan.

Community Acceptance indicates the concerns the public may have regarding each of the alternatives. This criterion is assessed following public comment on the RI/FS and the Proposed Plan.

capture and treatment of contaminated groundwater. Alternative 3 provides total containment along the base boundary and partial recovery of the off-base contaminant plume. Alternatives 4 and 5 provide complete containment along the base boundary and recovery of large portions of the off-base contaminant plume through the use of extensive recovery well systems and a groundwater barrier. Alternative 3 allows a portion of the off-base groundwater plume to migrate further off base.

Alternatives 3, 4 and 5 will measure the effectiveness of the groundwater recovery systems through groundwater monitoring. Treatment included in Alternatives 3, 4, and 5 consists of proven technologies currently in use at Kelly AFB. UVOX and chemical precipitation are considered irreversible treatment for organic and inorganic contaminants in groundwater. The treatment system components are reliable but require routine maintenance. Organic and inorganic contamination in the recovered groundwater will be treated by UVOX and chemical precipitation that have destruction and removal efficiencies of 99%. All alternatives require long-term management for at least 30 years. The time required to meet remedial response objectives for each alternative is listed below:

1) Alternative 3 > 30 years;
2) Alternative 4 approximately 30 years;
3) Alternative 5 approximately 30 years.

The time required to meet clean-up goals was estimated for each alternative using a computer groundwater model.

Reduction of Mobility, Toxicity or Volume Through Treatment

Alternatives 4 and 5 provide the greatest reduction in contaminant mobility and volume over time. In Alternatives 3, 4 and 5, UVOX provides a reduction in organic contamination through treatment with a high destruction efficiency (99%). Chemical precipitation converts soluble inorganic constituents into insoluble forms. Recovery wells and a recovery trench provide for containment and reduction of contaminant mobility in Alternatives 3, 4, and 5. The groundwater flow barrier in Alternatives 4 and 5 will prevent the further migration of contaminants to the southeast. The more extensive groundwater recovery systems included in Alternatives 4 and 5 have the capacity to capture a larger portion of the contaminant plume. Alternative 3 does not capture the off base portion of the contaminant plume.

Short-Term Effectiveness

Alternatives 3, 4, and 5 use existing recovery systems, or portions of existing systems, to the maximum extent possible thereby reducing a portion of the risk associated with system installation. Some of the more complex alternatives, such as Alternatives 4 and 5 take progressively longer and involve potential human health risk due to the time needed to construct and install treatment equipment.

Alternatives 3, 4, and 5 create possible short-term risks due to worker exposure to organic vapors and the potential release of fugitive dust during trenching, drilling, and system installation. Alternative 4 produces fewer short-term risks in the off base residential neighborhoods than Alternative 5 because fewer recovery wells are installed, thereby reducing potential exposure to organic vapors and possible fugitive dust from these activities. These risks would be managed by continuous air monitoring using appropriate engineering and construction management controls when required. The anticipated environmental impacts during construction of Alternatives 3, 4, and 5 would be from the continued migration of groundwater contamination beyond the base boundary.

Implementability

UVOX and chemical precipitation are proven technologies employed in groundwater treatment systems that are currently in use at Kelly AFB. Alternatives 3, 4, and 5 use UVOX and chemical precipitation to treat groundwater to reduce contaminant levels in OU GW. These treatment systems have proven effective and reliable at Kelly AFB. If required, additional remedial action could be easily implemented and the treatment capacity of systems listed in Alternatives 3, 4, and 5 could be easily increased. Alternative 4 is more readily implementable than Alternative 5 because fewer recovery wells would be needed in the off base residential area than in Alternative 4.

Groundwater monitoring is included in Alternatives 3, 4, and 5 to assess the effectiveness of the recovery wells and the treatment systems. In addition, all systems would require that periodic O&M be performed to ensure that each component is operating at its anticipated capacity. Alternatives 3, 4, and 5 require Federal, state, and local permits to discharge treated groundwater into Leon Creek. Alternatives 3, 4, and 5 require disposal of sludge and other treatment residuals that are created as a by-product of chemical precipitation. Treatment, storage, and disposal (TSD) facilities are available to dispose of these materials in accordance with Federal and state regulations. The treatment systems listed in Alternatives 3, 4, and 5 have the capacity, and potential capacities, to treat groundwater that is currently being recovered or anticipated to be recovered.

Cost

The initial capital costs, O&M costs, and the total project costs for Alternatives 3, 4, and 5 are summarized in Table 5. The costs listed below are presented in detail in Appendix E of the FS Report.

State Acceptance

The preferred alternative is has been accepted by the State of Texas. A Provisional Notice of Report Approval Letter (Appendix K) has been included in the Public Draft Feasibility Study.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record of Decision (ROD) for the site.

THE PREFERRED ALTERNATIVE

Alternative 4 (Figure 4) would address the principal threats posed by contaminants in OU GW by protecting human health and the environment both on and off base and comply with ARARs. The alternative would recover and remediate a large portion of the contaminated groundwater plume off base and contain groundwater along the base boundary, preventing further off-base migration of contaminants.

Alternative 4 achieves risk reduction as quickly and at less cost than any of the other treatment options and provides the best balance among alternatives with respect to the EPA criteria. On the basis of the information available at this time, the Air Force and the TNRCC believe the preferred alternative would also be cost effective, utilize permanent solutions, and use alternative treatment technologies to the maximum extent practicable. Because the remedy would destroy the organics and treat inorganics in the groundwater, it would also meet the statutory preference for the use of a remedy that involves treatment as a principal element. Alternative 4 would consist of the following components:

- **administrative controls** to prevent access to groundwater as a drinking water within OU GW;
- groundwater monitoring to evaluate the effectiveness of the remediation system and assess the groundwater plume on and off base;
- installation of recovery wells and a recovery trench that contain and recover contaminated groundwater;
- installation of UVOX and chemical precipitation groundwater treatment systems to treat the groundwater to clean-up goals;
- discharge of treated groundwater to a permitted outfall; and
- incorporation of existing interim action groundwater remediation systems.

TABLE 5
COST SUMMARY

Alternative	Initial Capital Cost (million $)	O&M Cost (million $)	Total Project Cost (million $)
Alternative 3	$6.4	$23.4	$29.8
Alternative 4	$10.8	$31.2	$42.0
Alternative 5	$12.3	$34.0	$46.3

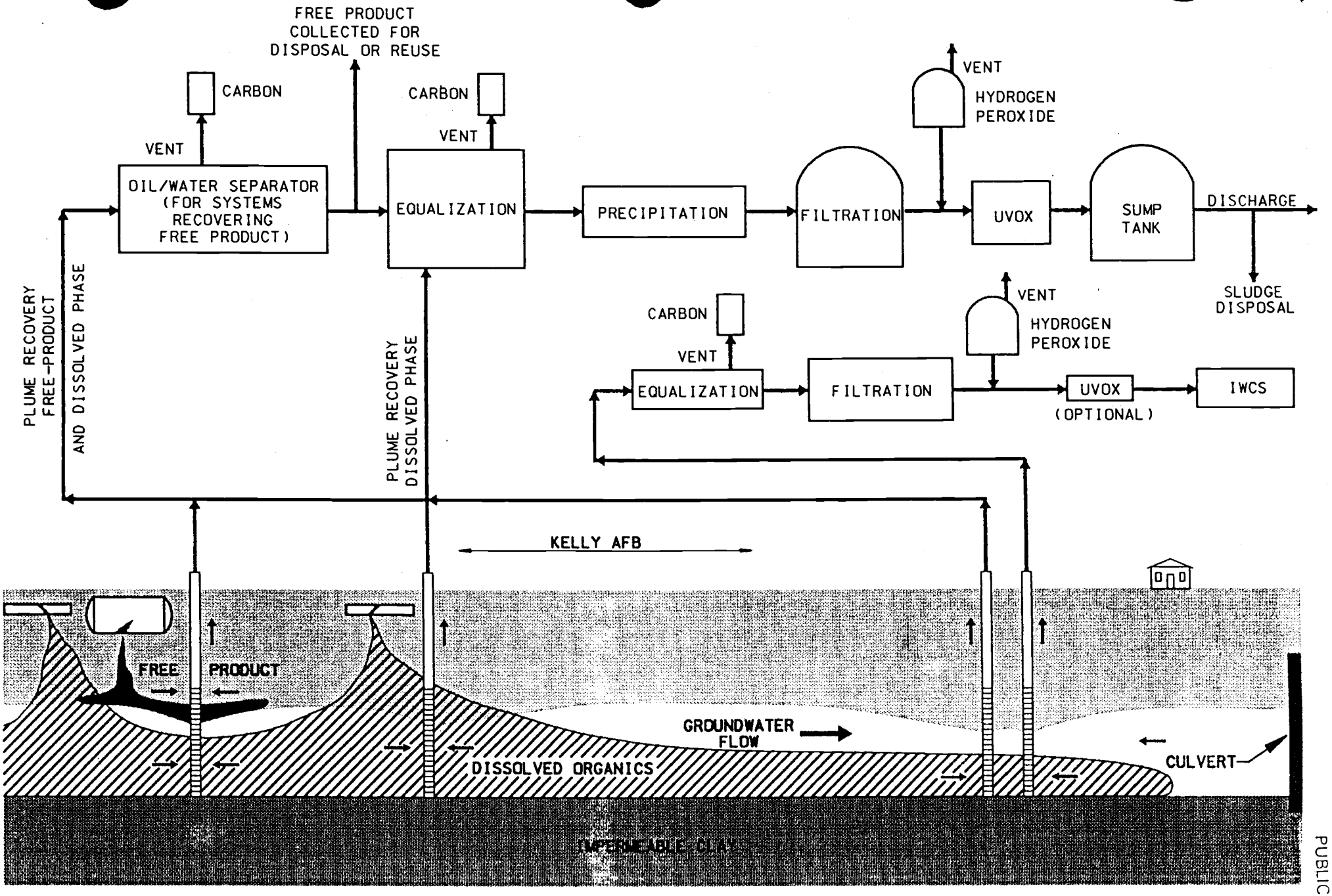


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FIGURE 4
CONCEPTUAL DIAGRAM
OF PREFERRED ALTERNATIVE: NUMBER 4

GLOSSARY OF TERMS

Applicable or Relevant and Appropriate Requirements (ARARs) - ARARs are state and Federal Environmental laws and regulations that must be complied with during the implementation and completion of a remedy.

Aquifer - a geologic formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs.

Carcinogens - chemicals that cause cancer.

Chemical Precipitation - a process in which ions are separated from water by gravity through use of a chemical additive.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - commonly referred to as "Superfund", this law addresses inactive hazardous waste disposal sites that endanger public health and safety and the environment.

Contaminant Plume - a volume of groundwater that contains contaminants.

Dissolved-Phase Chlorinated Solvents - chlorine containing organic compounds dissolved in water.

Feasibility Study (FS) - a study undertaken by the lead agency to develop and evaluate options for remedial action.

GW - groundwater.

Indicator Chemical - commonly detected chemical that indicate contamination.

Inorganics - chemicals such as lead, arsenic, aluminum, etc.

Installation Restoration Program (IRP) - the Air Force's program for identification and clean up of waste sites at Air Force bases.

National Priorities List (NPL) - the list compiled by EPA of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial evaluation and response.

Operable Unit (OU) - a discrete action that comprises an incremental step toward comprehensively addressing site problems.

Organics - chemicals generally consisting of carbon, oxygen, and hydrogen.

Remedial Investigation (RI) - a process undertaken to determine the nature and extent of the contamination. The RI emphasizes data collection and site characterization.

Record of Decision (ROD) - documents the remedial action plan for a site or operable unit.

Resource Conservation and Recovery Act (RCRA) - Federal law that imposes specific requirements for those who generate, transport, treat, store, or dispose of hazardous waste.

Texas Natural Resource Conservation Commission (TNRCC) - the state organization responsible for overseeing cleanup of petroleum contaminated sites, industrial soil waste sites, and municipal hazardous waste sites.

Ultraviolet Oxidation (UVOX) - treatment method that uses ultraviolet light in conjunction with hydrogen peroxide to break down and destroy organic chemicals.

Whom do I call if I have a question or concern?

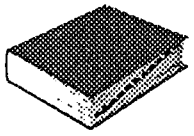
Michael Estrada
Environmental Coordinator
SA-ALC/PAE
807 Buckner, Suite 1
Kelly AFB, TX 78241-5842
(210) 925-7951

Ron Catchings
Zone 3 Team Leader
SA-ALC/EMRO
305 Tinker Dr., Ste. 2, Bldg. 305
Kelly AFB, TX 78241-5915
(210) 925-1812

Mark Arthur
Federal Facilities Unit
Industrial and Hazardous
Waste Division
TNRCC
P.O. Box 13087
Austin, TX 78711-3087
(512) 239-2362

Where can I review the RI/FS Reports?

There are two information repositories for Soil Operable Unit 5 where you can review the RI/FS and other documents.



Kelly AFB Library
76 SVS/SVRL
250 Goodrich Drive
Building 1650, Room 138
Kelly AFB, Texas 78241-5823
(210) 925-4116

San Antonio Public Library
Main Branch
Business, Science, and
Technology Section
203 S. St. Mary's Street
San Antonio, Texas 78205
(210) 299-7800

Mailing List Coupon

If you would like to receive information about environmental activities at Kelly Air Force Base, please complete this form, clip, and mail to:

Michael Estrada
Environmental Coordinator
SA-ALC/PAE
807 Buckner, Suite 1
Kelly AFB, TX 78241-5842
(210) 925-7951

Name _____ Affiliation _____

Address _____

City _____ State _____ Zip Code _____

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS SAN ANTONIO AIR LOGISTICS CENTER (AFMC)
KELLY AIR FORCE BASE, TEXAS

1 Apr 98

SA-ALC/EMRO
305 Tinker Ave, Bldg 305
Kelly AFB TX 78241

Mr Allan Posnick
Federal Facilities Unit
Industrial and Hazardous Waste Div.
Texas Natural Resource Conservation Commission
12100 Park 35 Circle (MC 127)
Austin, TX 78753

Subject: Proposed Approach for Remedial Investigation at Operable Unit 2, Off-Base Areas IRP Zone 4, Kelly AFB, Texas

This letter describes our proposed approach for the planned remedial investigation of Zone 4, Operable Unit 2, Off-Base Areas. We have described the field decision making process used to locate the proposed soil borings and monitoring wells. We have also included the field progress schedule to investigate the extent of impacted groundwater located in the areas east and south of East Kelly.

Introduction

This approach is based on data included in the draft "Remedial Investigation, Installation Restoration Program Zone 4, Sites SS051 and SS052 dated February 98. The boring locations were selected in the field during windshield surveys conducted on 23, 24 February and 13 March 98. These locations are also based on discussions at a clarification meeting held at Kelly AFB on 23 February 98.

The impacted groundwater in the study area may be the result of the spread of chlorinated solvents originating from sources on Kelly AFB and from unidentified sources outside of the base. The goal of this fieldwork is to evaluate the extent of contamination from IRP sites SS051 and SS040. The extent of contamination is defined here to be the distance to the point in the aquifer where concentrations are at or below the maximum contaminant level (MCL) as defined by the Safe Drinking Water Act. We will attempt to locate the distance to where the constituents of potential concern are not detectable.

Overall Field Approach

Based on the Zone 4 RI, four indicator compounds have been established for the Off-Base plumes: trichloroethene (TCE), tetrachloroethene (PCE), 1,2-dichloroethene (DCE), and vinyl chloride. The distance to the edge of each plume has been estimated by using contaminant-decay curves (See Attachment 1). The longest predicted distance to the MCL-line (10,800 feet) was calculated for TCE at SS051. PCE at SS040 was predicted to reach the MCL line at about 5,600 feet. Therefore, soil borings will be drilled on a series of lines oriented parallel to the longitudinal axes of the two plumes extending from the edge of the existing monitoring well network to the anticipated edge of the plumes (between 5,000 and 10,000 feet). The furthest proposed location (green star) is at the maximum estimated distance to the MCL line.

Groundwater grab samples will be collected from the borings and screened for chlorinated solvents and fuel components. The screening-level analyses will be subcontracted to a local laboratory for a 7-day turnaround. The screening-level data will be used to select locations of monitoring wells.

The fieldwork will be conducted in the following order:

1. Acquire utility maps
2. Mark 18 soil boring locations (hold 2 in reserve)
3. Clear utilities on 18 soil borings
4. Drill 18 soil borings and collect 18 groundwater samples
5. Mark 2 reserved soil boring locations
6. Clear utilities on 2 reserved soil boring locations
7. Drill 2 reserved soil boring locations and collect 2 groundwater samples
8. Review analytical data from groundwater samples collected in the 20 soil borings
9. Install 20 monitoring wells based on the results of the groundwater samples from the 20 soil borings. It is possible that some of the monitoring wells will be placed at locations other than the soil boring locations. All new locations will require additional utility clearances.
10. Complete 20 monitoring well pads
11. Develop 20 monitoring wells
12. Sample 20 monitoring wells
13. Conduct Horizontal/vertical survey of 20 monitoring wells
14. Install identification plates on 20 monitoring wells

Drilling and Sampling

Twenty soil borings and 20 monitoring wells will be drilled/installed. Five lines of soil borings will be drilled with between 3 and 4 borings per line. The purpose of these borings is to evaluate the location of the MCL concentration lines for the constituents of potential concern. These lines are located as shown on Figure 2 through 5 and consist of the following:

- 4 soil borings aligned east to west along the northeastern edge of the plume (Gladstone Road Area);
- 3 soil borings aligned east to west along the eastern edge of the plume (Harlan Road Area);
- 4 soil borings aligned east to west along the southeastern edge of the plume (Pyron Road Area);
- 4 soil borings aligned northeast to southwest along the southeastern edge of the plume (McCullom High School Area);
- 3 soil borings aligned northeast to southwest along the southern edge of the plume (Hutchins School Area); and
- 2 soil borings (held in reserve), to extend any of the above lines based on the results of field monitoring for vapors during drilling.

The lines of proposed wells are shown with existing PCE, TCE, DCE and vinyl chloride plume data on Figures 2 through 5.

Each boring well will be drilled to the base of the alluvial aquifer, which may be either the top of the Navarro Group or top of the Midway Group. One soil sample will be collected by split-spoon sampler in each 5-foot interval. Organic vapors will be analyzed in the field with an OVM and these relative measurements will be used to evaluate if an additional downgradient boring is needed. Two borings have been held in reserve to investigate anomalous levels of organic vapors or to further evaluate the MCL. One groundwater grab sample will be collected from each hollow-stem auger boring and submitted to a fixed-base laboratory for a 7-day turnaround analyses of chlorinated solvents and gasoline components (BTEX).

Based on the results of these groundwater samples, 20 wells will be placed Each monitoring well will be completed at the base of the alluvial aquifer with 15 feet of stainless steel screen. One groundwater sample will be collected from each monitoring well after completion and development. In order to evaluate the entire plume the sampling will be coordinated with the basewide sampling event in May and June. The groundwater samples will be analyzed in the fixed-base laboratory for VOCs by method 8260.

Progress Schedule

Based on these planned activities the following progress schedule is presented in the attached Gantt Chart.

If you have any questions, please contact Joe Ebert at 210-925-1815/1817

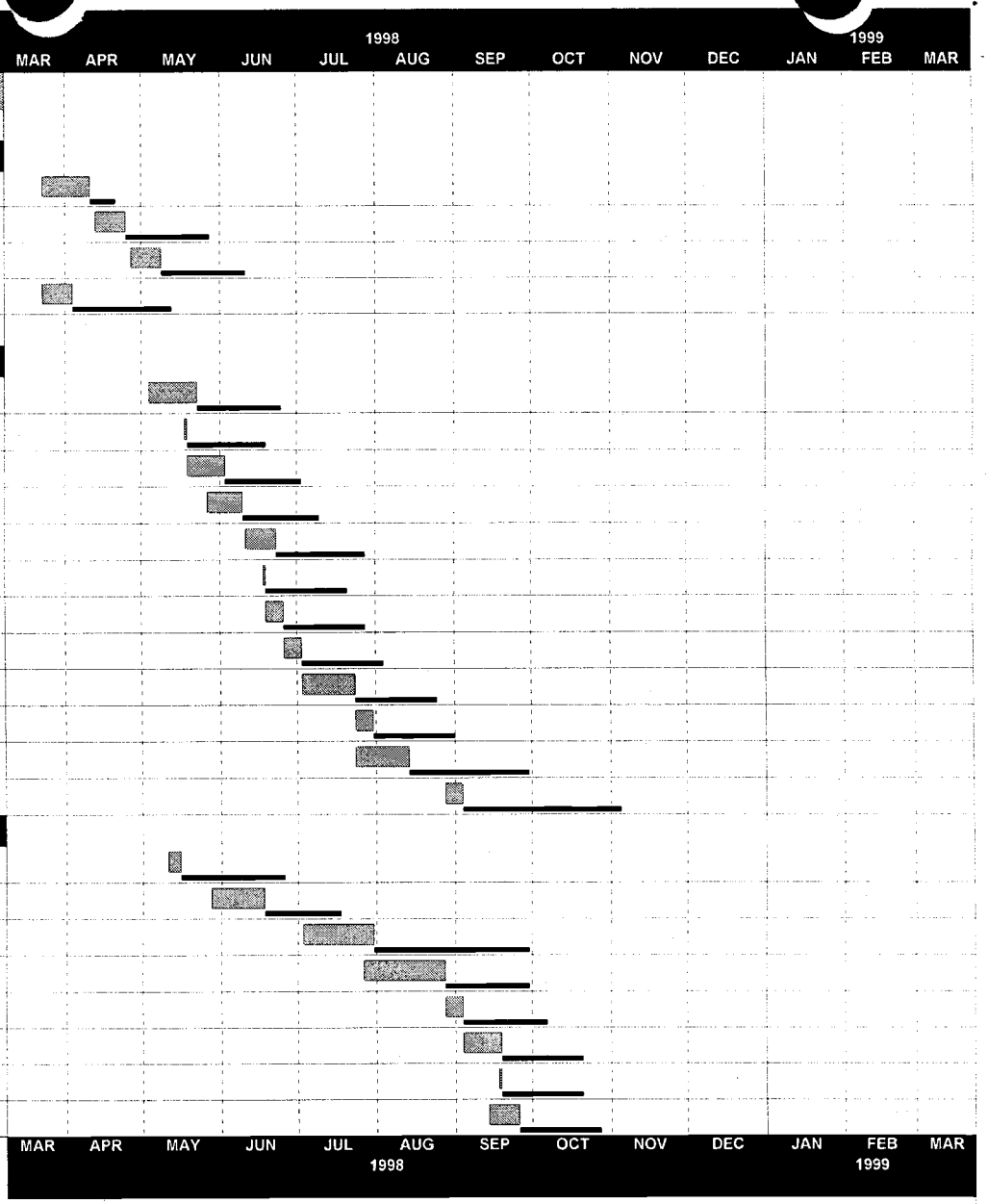
Sincerely,

WILLIAM RYAN
Chief, Restoration Operations Branch

Atch (3)
1. Gantt Chart
2. Plume Decay Curves (PCE, TCE, DCE)
3. Proposed Location Maps (PCE, TCE, DCE, VC)

cc:
Ms Camille Hueni, USEPA Region 6, w/ atchs
Mr Damian Sandoval, Co-Chair Restoration Advisory Board, w/ atchs

Act ID	Description	Orig Dur	Early Start	Early Finish
A0 - Zone 4 OU-2 Remedial Investigation				
01 - Quality Program Plan				
1010	Revise existing plans	15	23MAR98	10APR98
1020	Air Force review of QPP	10	13APR98	24APR98
1030	Incorporate Air Force comments	10	27APR98	08MAY98
1040	Update predictive contaminant decay curves	10	23MAR98	03APR98
02 - Delineation of Plume Extent				
FW - Field Work				
2105	Acquire utility maps	15	04MAY98	22MAY98
2110	Mark 20 PE soil boring locations	1	18MAY98	18MAY98
2115	Clear utilities on 20 PE soil borings	10	19MAY98	02JUN98
2120	Drill 20 PE soil borings	10	27MAY98	09JUN98
2125	Convert 15 SBs to monitoring wells	8	11JUN98	22JUN98
2130	Mark 5 PE monitoring wells	1	18JUN98	18JUN98
2135	Clear utilities on 5 PE monitoring wells	5	19JUN98	25JUN98
2140	Install 5 MWs at new locations	5	26JUN98	02JUL98
2145	Complete PE pads & well development	15	03JUL98	23JUL98
2150	Sample 20 PE monitoring wells	5	24JUL98	30JUL98
2160	Horizontal/vertical survey, PE	15	24JUL98	13AUG98
2165	Install plates on PE wells	5	28AUG98	03SEP98
LAB - Laboratory, DV, DM				
2200	Setup database	5	11MAY98	15MAY98
2205	Screening-level GW analyses, PE	15	28MAY98	17JUN98
2210	Fixed-base soil analyses, PE	20	03JUL98	30JUL98
2215	Fixed-base GW analyses, PE	24	27JUL98	27AUG98
2220	Load & integrate lab data, PE	5	28AUG98	03SEP98
2225	Data validation, PE	10	04SEP98	18SEP98
2230	Incorporate DV flags, PE	1	18SEP98	18SEP98
2235	QC database, PE	10	14SEP98	25SEP98

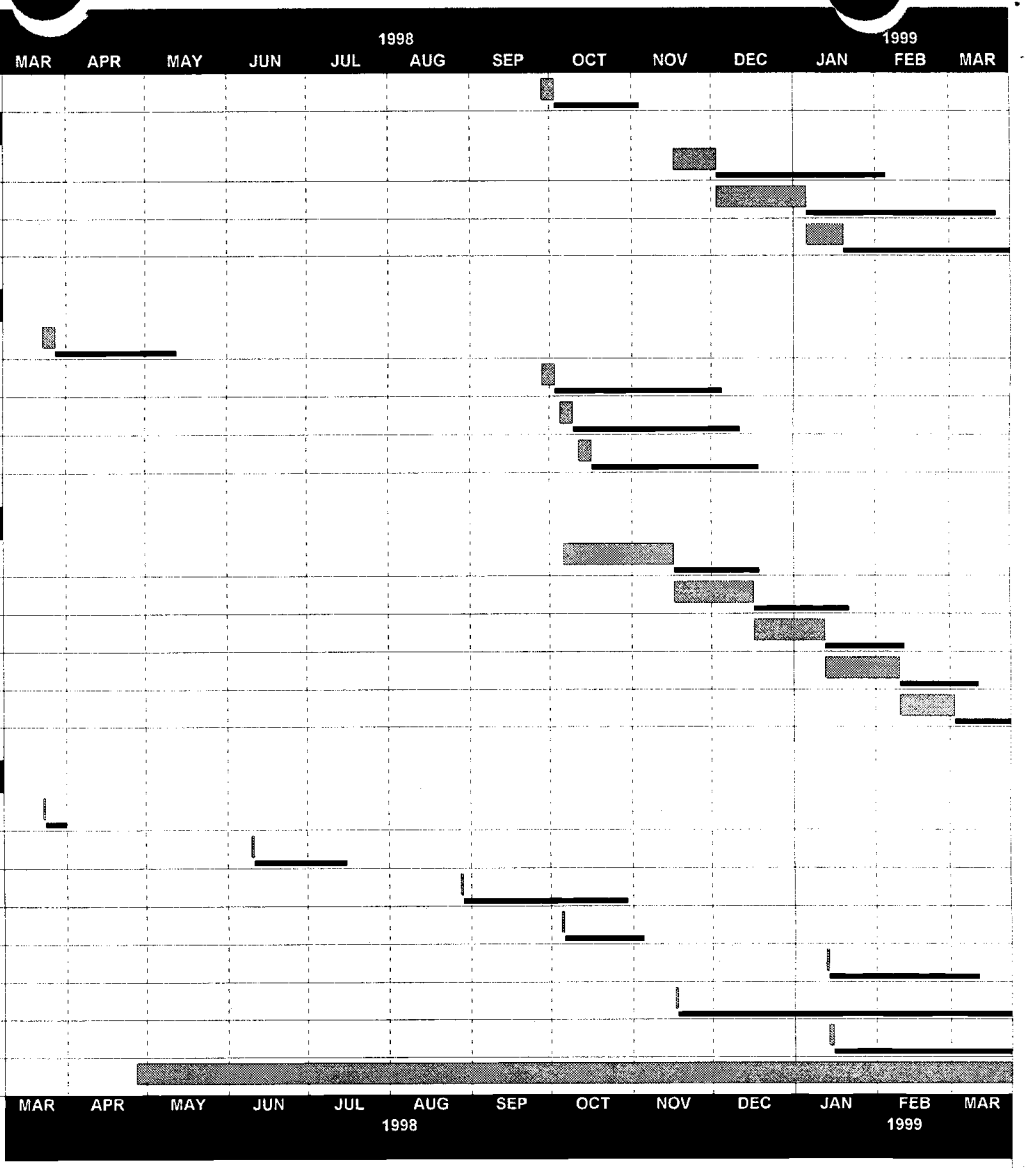


Start date	23MAR98
Finish date	24MAR99
Data date	23MAR98
Run date	31MAR98
Page number	1A

KAFB Zone 4 OU2 RI
Kelly Air Force Base, Texas

Early bar
Total float bar
Progress bar
Critical bar
Summary bar
Start milestone point
Finish milestone point

Act ID	Description	Orig Dur	Early Start	Early Finish
2240	Data summary tables, PE	5	28SEP98	02OCT98
IRP - IRPIMS Deliverables				
2300	IRPIMS first submission, PE	10	17NOV98	02DEC98
2310	Air Force review of first submission, PE	20	03DEC98	05JAN99
2320	IRPIMS final submission, PE	10	06JAN99	19JAN99
04 - Risk Assessment				
4010	Evaluate Exposure Scenarios	5	23MAR98	27MAR98
4020	Evaluate Exposure Point Concentrations	5	28SEP98	02OCT98
4030	Quantitative Estimate of Risk	5	05OCT98	09OCT98
4040	Evaluate Uncertainties	5	12OCT98	16OCT98
05 - RI Addendum Report				
5010	Prepare Draft RI Report	30	06OCT98	16NOV98
5020	Air Force Review of Draft Report	20	17NOV98	16DEC98
5030	Prepare Draft Final RI Report	15	17DEC98	12JAN99
5040	Regulatory Agency Review	20	13JAN99	09FEB99
5050	Prepare Final RI Report	15	10FEB99	02MAR99
06 - Meetings and Status Reports				
6010	Post-Award Meeting	1	23MAR98	23MAR98
6020	First Status Meeting	1	10JUN98	10JUN98
6030	Second Status Meeting	1	28AUG98	28AUG98
6040	Third Status Meeting	1	05OCT98	05OCT98
6050	Fourth Status Meeting	1	13JAN99	13JAN99
6060	First Public Meeting	1	17NOV98	17NOV98
6070	Second Public Meeting	2	14JAN99	15JAN99
6080	Monthly Status Reports	230	27APR98	24MAR99



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KAFB Zone 4 OU2 RI
Kelly Air Force Base, Texas

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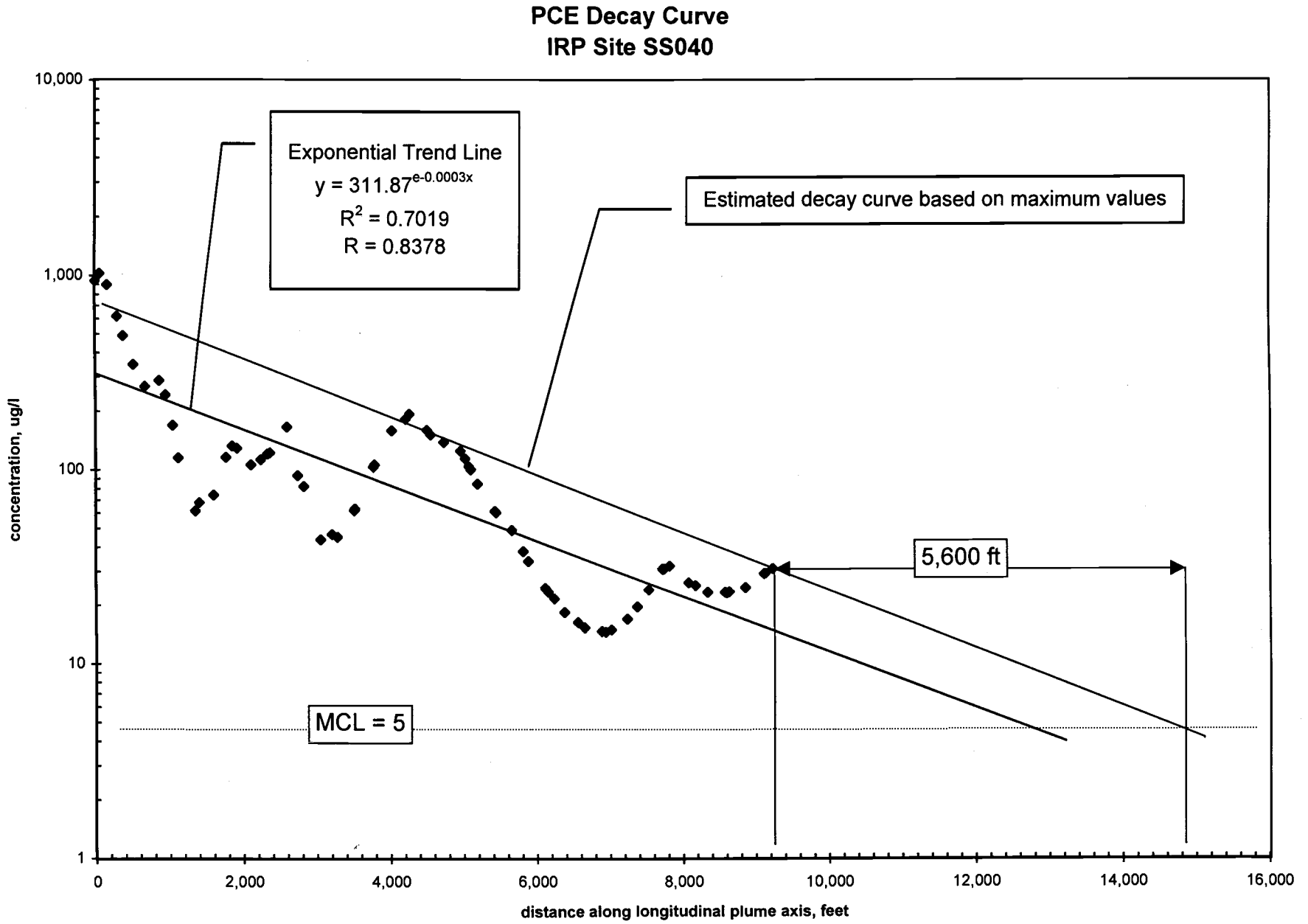
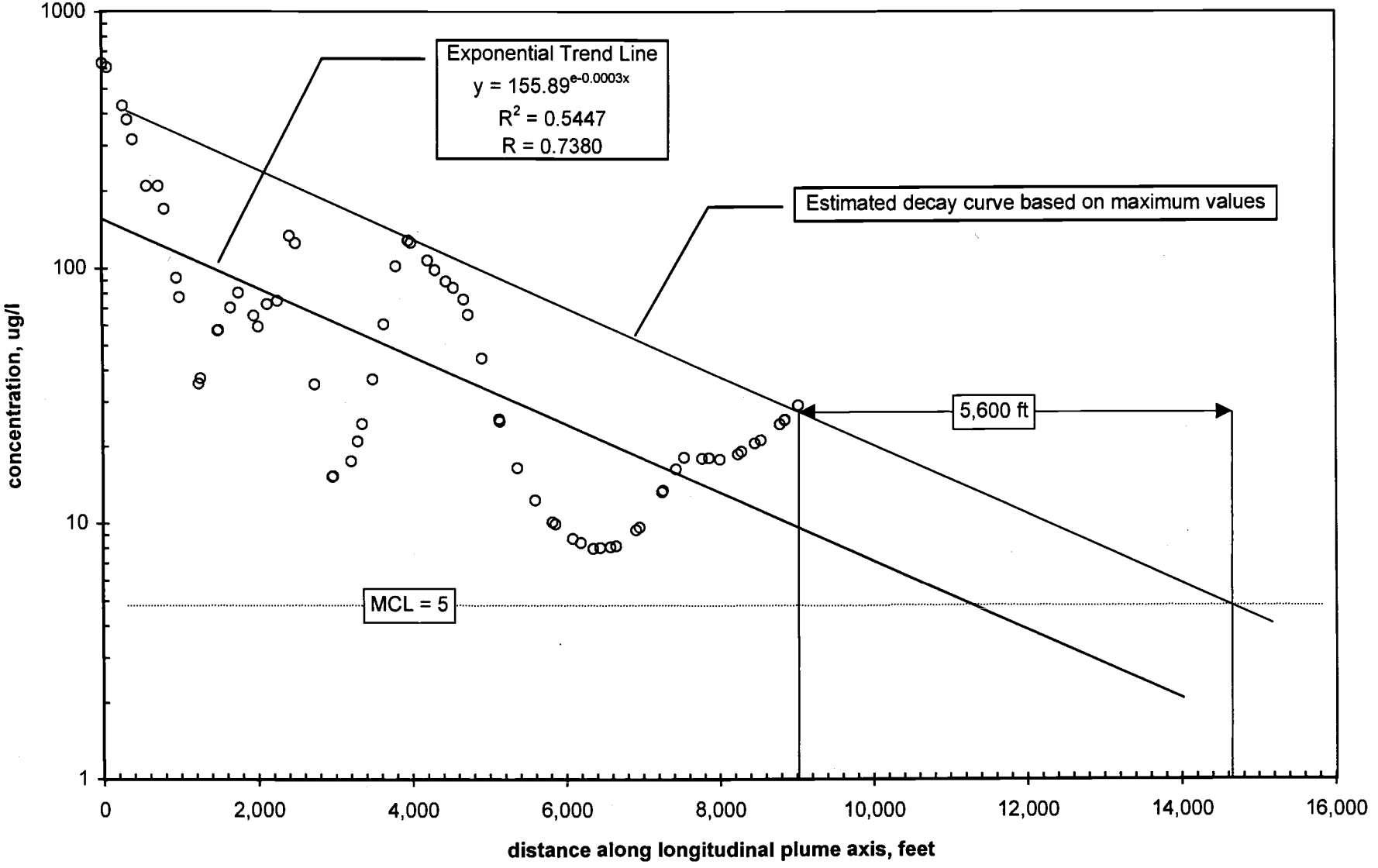
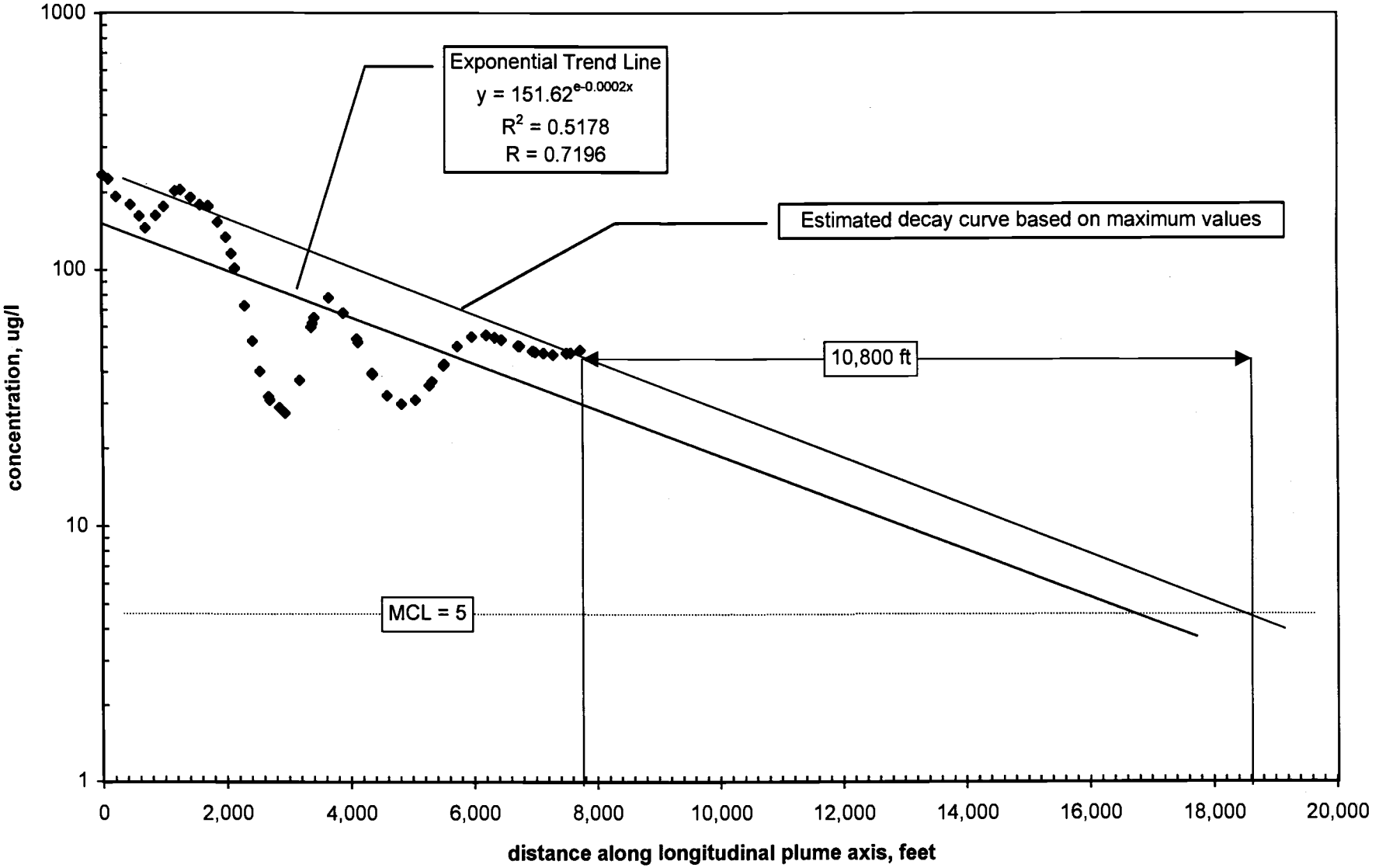
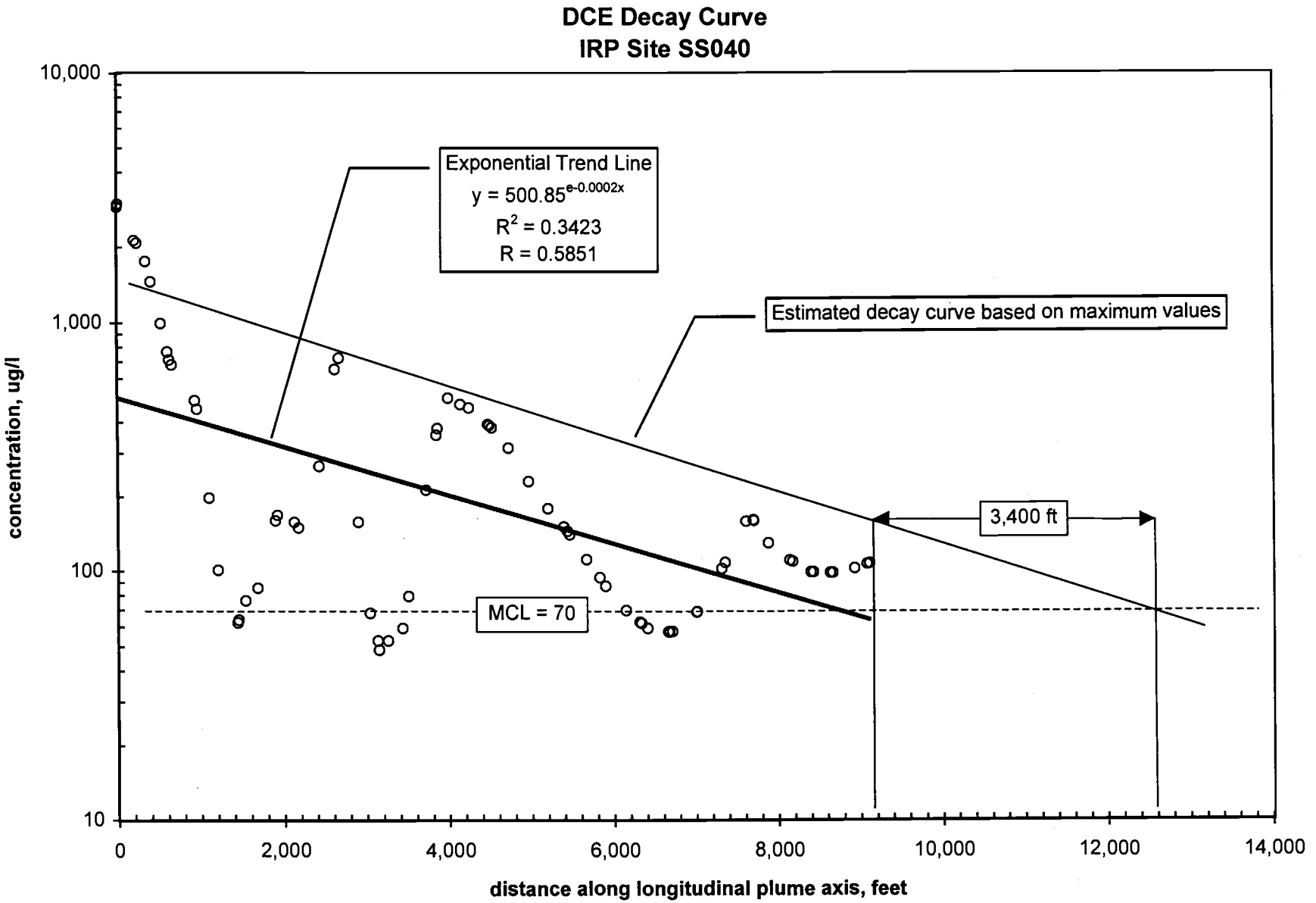

PCE Decay Curve
IRP Site SS040
Exponential Trend Line
y = 311.87e-0.0003x
R2 = 0.7019
R = 0.8378
Estimated decay curve based on maximum values
5,600 ft
MCL = 5
concentration, ug/l
10,000
1,000
100
10
1
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
distance along longitudinal plume axis, feet

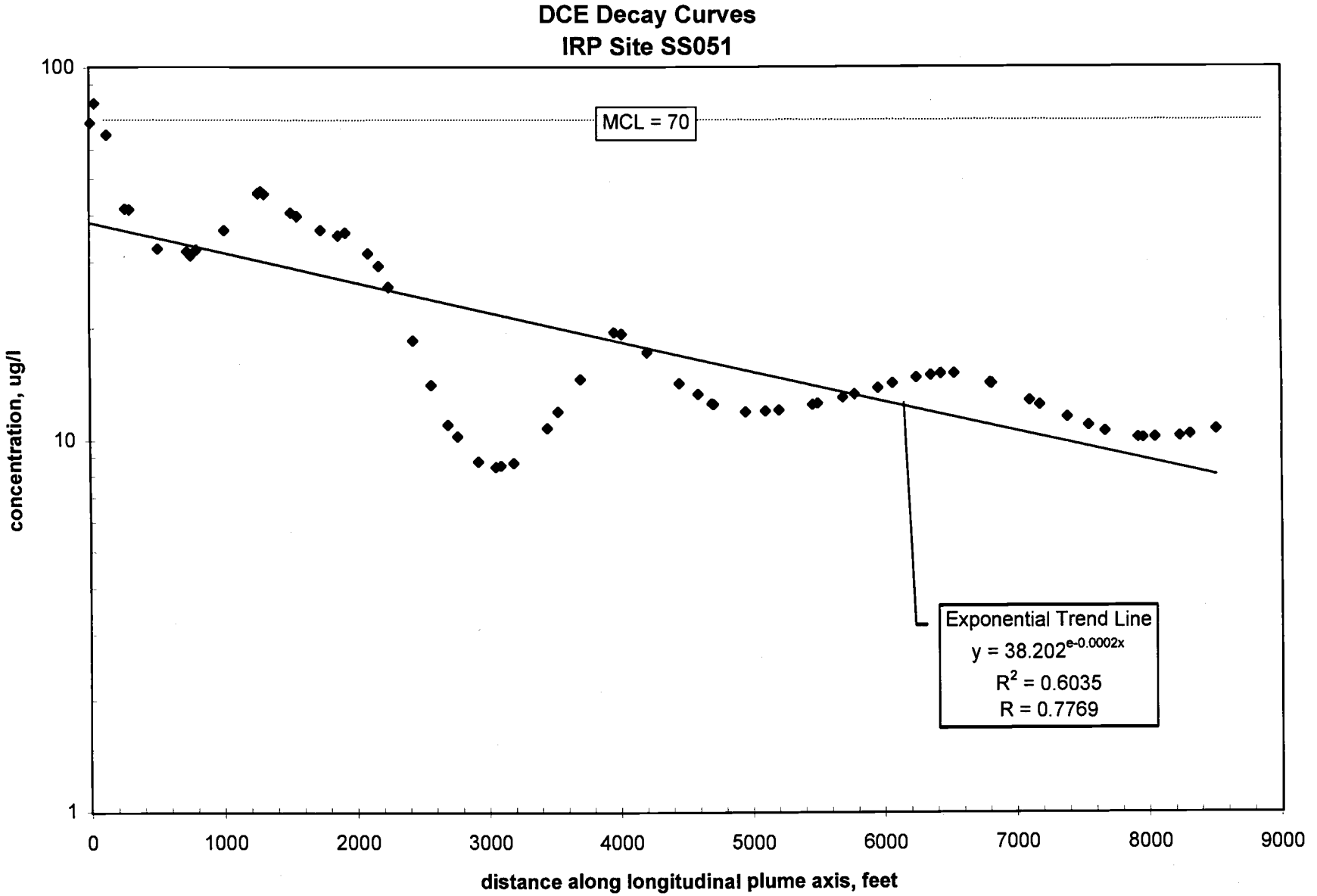
TCE Decay Curves
IRP Site SS040



TCE Decay Curves
IRP Site SS051




DCE Decay Curve
IRP Site SS040
10,000
1,000
100
10
concentration, ug/l
Exponential Trend Line
y = 500.85e-0.0002x
R2 = 0.3423
R = 0.5851
Estimated decay curve based on maximum values
3,400 ft
MCL = 70
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
distance along longitudinal plume axis, feet


DCE Decay Curves
IRP Site SS051
100
10
1
MCL = 70
concentration, ug/l
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
distance along longitudinal plume axis, feet
Exponential Trend Line
y = 38.202e-0.0002x
R2 = 0.6035
R = 0.7769

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE