Marine Corps Air Station El Toro
Installation Restoration Program

Public Information Materials

9/25/96
Restoration Advisory Board Meeting
held at Irvine City Hall
Irvine, CA

Materials/Handouts Include:

- RAB meeting agenda.*
- Public notice announcing RAB meeting.
- Draft RAB meeting minutes from 7/31/96 RAB meeting*
- Sign-in sheets 7/31/96 RAB meeting.
- "Blue Sheet" - Revised MCAS El Toro RAB Major Document Release and Review Dates, revised for 9/25/96 meeting.*
- RAB Community Co-Chair comments on "Draft Final Operable Unit 1 Remedial Investigation/Feasibility Study Report.*
- Presentation Handouts - Environmental Program Update, 1) Tank 398 Recovery System and Tank Farm 2 Soil Cleanup; 2) VOC Source Area and Regional Groundwater, Andy Piszkin, U.S. Navy, Southwest Division Naval Facilities Engineering Command.*
- Handout - Natural Attenuation: "Introductory Talk- Where Are We Now With Public and Regulatory Acceptance? (Resource Conservation and Recovery Act [RCRA] and Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA], U.S. Enviornmental Protection Agency.*
- Handout - Natural Attenuation Fact Sheet: "Commonly Asked Questions Regarding The Use Of Natural Attenuation For Chlorinated Solvent Spills At Federal Facilities" produced by U.S. EPA, Air Force, Army Navy, and Coast Guard.*

* denotes handed out at meeting

P U B L I C N O T I C E

MARINE CORPS AIR STATION EL TORO

Restoration Advisory Board Meeting

♦ ♦ ♦

Participate in the environmental restoration and cleanup program underway at MCAS El Toro. Your input is welcome!

Wednesday, September 25, 1996
6:30 - 9:00 p.m.

Irvine City Hall
Conference and Training Center
One Civic Center Plaza, Irvine

This meeting will feature presentations on:

- ***Draft Feasibility Studies aimed at controlling groundwater contamination***
- ***Update on Station Landfill Initial Improvements***
- ***Update on Jet Fuel and Contaminated Soil Cleanup***

♦ ♦ ♦

For more information about this meeting and the Installation Restoration Program at MCAS El Toro, please contact:

Commanding General, AC/S, Environmental (1AU),
Attn: Ms. Charly Wiemert, MCAS El Toro,
P.O. Box 95001, Santa Ana, CA 92709-5001
(714) 726-2840

MCAS El Toro
Restoration Advisory Board
Meeting

25 September 1996 6:30-9:00 PM
Irvine City Hall
Conference and Training Center
One Civic Center Plaza
Irvine

DRAFT AGENDA

Welcome/Introductions/Agenda Review	Joseph Joyce
Old Business	Marcia Rudolph
Approval of 7/31/96 Minutes	
August 28 Subcommittee Meeting Report	
New Business	
Environmental Program Updates	
• Early Actions at Station Landfills (Sites 2 & 7)	Bernie Lindsey U.S. Navy/Southwest Division
• Tank 398 Fuel Recovery System and Tank Farm 2 Soil Cleanup	Andy Piszkin U.S. Navy/Southwest Division
Draft Feasibility Study Report Presentations • Operable Unit 1 (OU-1) Final Draft Interim Action Feasibility Study Report and Addendum--Regional Groundwater • Operable Unit 2A (OU-2A) Draft Feasibility Study Report—VOC Source Area	Andy Piszkin U.S. Navy/Southwest Division
Regulatory Agency Comment Update	Bonnie Arthur U.S. Environmental Protection Agency Tayseer Mahmoud Cal-EPA, Dept. of Toxic Substances Control
Meeting Summary	Joseph Joyce/Marcia Rudolph
Meeting Evaluation	
Future Topics and Meetings	
Closing	Joseph Joyce

"BLUE SHEET"

REVISED for 9/25/96 RAB Meeting

MCAS EL TORO RAB

MAJOR DOCUMENT RELEASE & REVIEW DATES

Upcoming Major Documents	*Anticipated Release Date*	*Review Comments Due*	*Subcommittee*
BRAC CLEANUP PLAN (BCP)			BCP
- Final BCP	3/1/96		
GENERAL ENVIRONMENTAL			General Environmental
• **Tank 398 Free Product Removal**			
~~Draft Report~~	~~1/11/95~~	~~2/10/95~~	
~~Response to Comments~~		~~4/95~~	
- Quarterly Groundwater Monitoring Report	6/96 & 9/96		
RCRA FACILITY ASSESSMENT (RFA) ADDENDUM			Compliance/RFA
- Draft Final Addendum Report	12/95	1/96	
- Final Addendum Report	4/96		
CERFA/ENVIRONMENTAL BASELINE SURVEY (EBS)			CERFA/EBS
~~Draft Report~~	~~11/94~~	~~2/10/95~~	
- Final	4/1/95		
OPERABLE UNIT 1 (OU1) - GROUNDWATER			OU1
~~Revised Draft Interim Action Feasibility Study~~	~~10/16/95~~	~~12/14/95~~	
- Remedial Investigation/Interim Action Feasibility Study (RI/IAFS) and Addendum	8/9/96	10/8/96	
OPERABLE UNIT 2 (OU2)			OU2
• Volatile Organic Compounds (VOCs) Source Area - OU-2A			
~~Draft Remedial Investigation (RI) Report~~	~~2/20/96~~	~~4/22/96~~	
- Draft Feasibility Study (FS) Report	8/9/96	10/8/96	
• Landfills - Sites 2 and 17 - OU-2B			
~~Draft Remedial Investigation (RI) Report~~	~~3/20/96~~	~~5/20/96~~	
- Draft Feasibility Study (FS) Report	9/6/96	11/5/96	
• Landfills - Sites 3 and 5 - OU-2C			
~~Draft Remedial Investigation (RI) Report~~	~~4/19/96~~	~~6/19/96~~	
- Draft Feasibility Study (FS) Report	10/8/96	12/9/96	
OPERABLE UNIT 3 (OU3) - SOILS ONLY SITES			OU3
- Draft Remedial Investigation (RI) Report	11/19/96	1/20/97	
- Draft Feasibility Study (FS) Report	3/20/97	5/20/97	
COMMUNITY RELATIONS PLAN (Revised)			Community Relations
~~Draft Revised CRP~~	~~12/95~~	~~1/96~~	
- Final Revised CRP	3/96		

MARINE CORPS AIR STATION EL TORO

RESTORATION ADVISORY BOARD MEETING

JULY 31, 1996

DRAFT MEETING MINUTES

A Restoration Advisory Board (RAB) meeting for Marine Corps Air Station (MCAS) El Toro was held Wednesday, July 31, 1996 at the Irvine City Hall. The meeting began at 6:30 p.m. and concluded at 7:10 p.m. The El Toro meeting was followed by a joint MCAS El Toro and MCAS Tustin RAB meeting and presentation from 7:30 to 9 p.m. (see attachment for joint meeting presentation summary).

WELCOME/INTRODUCTIONS

Joseph Joyce, Base Realignment and Closure (BRAC) Environmental Coordinator (BEC) and Marine Corps/Navy RAB Co-Chair, opened the meeting and welcomed members and guests. Mr. Joyce reminded everyone to sign in on the sheets provided. RAB Community Co-Chair Marcia Rudolph led the Pledge of Allegiance.

OLD BUSINESS

Review and Approval of Minutes of May 29, 1996 Meeting

The RAB approved the minutes without amendment.

NEW BUSINESS

June 26, 1996 RAB Subcommittee Meeting Report - Marcia Rudolph

Ms. Rudolph stated that the RAB Subcommittee members agreed to enforce RAB member attendance and subcommittee participation requirements called for in the RAB Mission Statement and Operating Procedures. Letters will be drafted by the Co-Chairs and sent to RAB members who have missed three or more meetings and have not contacted either Co-Chair on why they did not attend. This is needed to determine the dedication of these individuals regarding RAB membership and to purge those members who are no longer interested in participating. This would open up slots for others who have expressed interest in becoming RAB members.

Ms. Rudolph reported that some subcommittees are active while others that have completed their work are inactive. She said the RAB is looking at ways to reorganize or reestablish the focus of inactive subcommittees. One possible role was identified: tracking and monitoring of parcels from cleanup through property transfer. Ms. Rudolph also said that some RAB subcommittee members are not providing document review comments on time. Part of this was attributed to the overwhelming amount of documentation provided to RAB subcommittee members. To better accommodate subcommittee members, Ms. Rudolph will query members each time a report is completed and ready for release to the RAB. They will be provided with only specific report volumes they are interested in (for example, key report volumes, executive summaries, or appendices). This procedure will be ongoing and it is expected to cut down on document printing and mailing costs.

Ms. Rudolph informed RAB members that the Conference and Training Center, City of Irvine, is reserved from 6:30 to 9 p.m., the last Wednesday of each month for RAB meetings or subcommittee activities. Since regular RAB meetings are now held every other month she encouraged the subcommittees to use the facility when regular RAB meetings are not scheduled. During the remainder of 1996, the facility is available for subcommittee meetings on August 28 and October 30.

Regulatory Agencies Comment Update - Bonnie Arthur, U.S. Environmental Protection Agency (U.S. EPA) and Tayseer Mahmoud, California Environmental Protection Agency (Cal-EPA), Department of Toxic Substances Control

Ms. Arthur and Mr. Mahmoud informed RAB members that both U.S. EPA and Cal-EPA recently reviewed and provided comments on various technical documents (*see handouts section Cal-EPA DTSC comments and U.S. EPA comments at the end of the minutes*). Copies of agency comments were provided at the meeting. Ms. Arthur pointed out that draft feasibility study reports are being released for RAB review in early August for Operable Unit 1 (Draft Final Interim Action Feasibility Study) and Operable Unit 2A (Draft Feasibility Study). These will present cleanup alternatives evaluated for on-site and off-site areas. Ms. Arthur and Mr. Mahmoud offered to provide technical assistance either in person or on the phone to the RAB subcommittees that will be reviewing these reports.

Environmental Update - Joseph Joyce

Mr. Joyce informed the RAB that the BRAC Cleanup Team revised the Federal Facilities Agreement schedule to better coordinate completion of Feasibility Studies, Proposed Plans, and Records of Decisions for Operable Units 1, 2A, 2B, and 2C. The handout (Appendix A, Federal Facilities Agreement Extension MCAS El Toro, Operable Units 1, 2A, 2B, and 2C) provides new completion dates for these activities. Also, a revised "blue

sheet" handout was provided to RAB members that lists Agency and RAB comment periods for the Draft Feasibility Study Reports for these operable units.

RAB Survey - Marsha Mingay, Public Participation Specialist, Cal-EPA, Department of Toxic Substances Control (DTSC)

Ms. Mingay informed the RAB that DTSC's Public Participation Section has prepared a RAB survey questionnaire to help monitor, oversee, and evaluate how the MCAS El Toro RAB is functioning. The survey will be distributed to RAB members by mail to assess: the organization and management of the RAB; the working relationship between the regulatory agencies and the RAB; access to information; agency oversight, cooperation and credibility; and communication with and responsiveness to RAB members. She encouraged RAB members to complete the survey and to contact her with any questions.

FUTURE TOPICS AND MEETING DATES

Topics of interest for future meetings include presentations on: the Operable Unit 1 Draft Final Interim Action Feasibility Study (regional groundwater); Operable Unit 2A Draft Feasibility Study (VOC source area, on-site groundwater); soil vapor extraction pilot tests; overview of Operable Unit 3 Remedial Investigation; early actions at Site 2 (Magazine Road Landfill) and Site 17 (Communication Station Landfill); cleanup efforts at Tank 398 and Tank Farm 2; and removal actions at Sites 4, 7, 11, 13, 14, 19, and 20.

The next regular RAB meeting is scheduled for 6:30 to 9 p.m., Wednesday, September 25, 1996 at the City of Irvine, Conference and Training Center. Mr. Joyce reminded the RAB that the Conference and Training Center is reserved from 6:30 to 9 p.m., Wednesday, August 28, 1996 for the subcommittees to meet. It was suggested that subcommittees focus on discussing the Operable Unit 1 Draft Final Interim Action Feasibility Study and the Operable Unit 2A Draft Feasibility Study Reports that are being released for RAB review on August 9, 1996. He offered to participate at subcommittee meetings to provide technical support to RAB members.

Attachments:
- *Sign-in sheets.*
- *Summary of Joint MCAS El Toro and MCAS Tustin RAB Presentations.*

Handouts provided at the meeting and available at the Information Repository:
- *RAB meeting agenda.*
- *Draft RAB meeting minutes - May 29, 1996 meeting.*
- *MCAS El Toro Installation Restoration Program RAB Mission Statement and Operating Procedures (Revised), dated July 31, 1996.*
- *"Blue Sheet" - MCAS El Toro Major Document Release and Review, Revised for 7/31/96 RAB Meeting*
- *MCAS El Toro Schedule, Operable Units 1, 2A, 2B & 2C (Appendix A - Federal Facilities Agreement Extension, July 16, 1996).*

- *Regulatory Agency Comments - Cal-EPA, DTSC:*

Draft Phase II Remedial Investigation Report for Original Landfill, Site 3, Operable Unit 2C, includes attachment comments from: DTSC, Geological Services Unit; DTSC Office of Scientific Affairs; California Integrated Waste Management Board.

Draft Phase II Remedial Investigation Report for Communication Station Landfill, Site 5, Operable Unit 2C, includes attachment comments from: DTSC, Geological Services Unit; DTSC Office of Scientific Affairs.

- *Regulatory Agency Comments - Cal-EPA, Regional Water Quality Control Board:*

Draft Phase II Remedial Investigation Reports for Original Landfill, Site 3 and Communication Station Landfill, Site 5, Operable Unit 2C.

- *Regulatory Agency Comments - U.S. EPA:*

Draft Final Phase II Remedial Investigation Report, Operable Unit 2A, Site 24.

- *Joint Meeting Presentation Handouts - "Transfer and Cleanup of Contaminated Property in the Private Sector" and "Course Correction: Making the Shift From Contaminated Property to Productive Use" Diane Smith and Robert J. Gibson, Snell and Wilmer, Irvine, CA.*

- *Joint Meeting Presentation Handouts - "Making Real Estate Transactions Happen Despite Environmental Issues: A Strategic Approach" John P. Monahan, Advantage Real Estate Services, Inc., Irvine, CA.*

ATTACHMENT A

MCAS EL TORO and MCAS TUSTIN

RESTORATION ADVISORY BOARD JOINT MEETING
July 31, 1996 ◆ 7:30 to 9 p.m.

DRAFT MEETING MINUTES

INTRODUCTION

Ms. Desire Chandler, MCAS Tustin BRAC Environmental Coordinator (BEC) and Tustin RAB Co-Chair, and Mr. Joseph Joyce, MCAS El Toro BEC and El Toro RAB Co-Chair, welcomed all in attendance to the first joint RAB meeting. The purpose of this meeting was to present information on property cleanup and transfer in the private sector, which shares similar issues with the future transfer of property at closing military installations. The two guest speakers provided insight into issues, solutions, recent developments, and the viability of transfer of property with a variety of environmental concerns. Handouts provided by the speakers provided further information on the topics covered in the presentations.

FIRST PRESENTATION

***"Transfer and Cleanup of Contaminated Property in the Private Sector"*—Robert "Hoot" Gibson, Snell & Wilmer, Irvine, California**

Mr. Gibson's presentation focused on four key subject areas: issues raised by prospective purchasers and lessees; financial issues; health and safety concerns; and solutions and innovative ways to transfer property and get it back into use. He explained that the biggest obstacle to successful transfer is the perception by the public and others that cleaned up and transferred properties are not completely clean and are bound to have problems in the future. This stigma underlies nearly all transactions; however, Mr. Gibson stressed there are numerous methods for overcoming these concerns.

His presentation was summarized in handouts available at the meeting.

The federal government has recently developed various methods to assist with property transfer and revitalization. Purchasers of "Brownfields" (a term for describing contaminated properties) will not be held liable for contamination. U.S. Environmental Protection Agency instituted a policy of non-liability for non-contributing parties for properties with underlying groundwater contamination. Specifically, owners of property that did not contribute to the contamination of the groundwater under their property will not be held liable if it is not their fault. This also covers instances where contaminated groundwater has migrated beyond property liness. The federal government [U.S. EPA] also allows de minimis settlements for property owners that protect them from third party lawsuits if contamination is no fault of their own. The federal government [U.S. EPA] has also initiated various new policies with specific criteria that protect lending institutions from liability and allow new property owners to be protected from litigation brought on by the government.

The State of California has developed similar initiatives including a revised approach to underground storage tanks. Other approaches include use of containment zones, rational deed restrictions, risk based

cleanups with consideration of appropriate property reuse, and State-expedited remedial action programs.

Private or Responsible Party initiatives were also discussed, including special testing programs by owners (i.e., interior air); indemnities where expense for cleanup and monitoring is born by the seller, not the purchaser; site access agreements; and employee information and tenant information programs.

SECOND PRESENTATION

***"Making Real Estate Transactions Happen Despite Environmental Issues: A Strategic Approach"*— John P. Monahan, Advantage Real Estate Services, Inc., Irvine, California**

Mr. Monahan's shared four success stories of property transfer while overcoming environmental problems. He explained that many of the problems that historically seemed insurmountable are now being approached with realism and greater sophistication. These properties, once thought of as irretrievable, are being brought back to productive use in greater numbers. This is starting to happen, in part, because of political change, maturation (and increasing efficiency) of the environmental industry, and because recovering real estate markets have thrust new light on properties with environmental issues.

Mr. Monahan explained that in the real estate business, it is thought that the greatest value can be achieved by bringing the property to its "highest and best use." The key to these success stories is that when environmental issues are introduced, sometimes the "next highest and best use" may be preferred as the successful route for transfer and reuse of property. Also, if it is possible to negotiate a reduced cleanup level with a regulatory agency, in return for restricting the land use to something less than the highest use, the reduction in remediation costs and environmental liability may well exceed the reduced return.

QUESTIONS AND ANSWERS

Questions were mainly addressed toward the handling of disclosures when property is transferred and if property could be used for other purposes in the future. Mr. Monahan said that it is the duty of the seller/owner to disclose all information on the contamination present to agencies and prospective buyers. Seller/owners are liable for anything that is not disclosed. If a property becomes less contaminated over time, then the situation needs to be reevaluated to determine if there is less to disclose. Regarding military property, Mr. Ron Okuda, from the California Environmental Protection Agency, Department of Toxic Substances Control, said that property needs to be cleaned up to the level appropriate for community reuse. If necessary, deed restrictions are applied and registered with the county; these restrictions carry over whenever a property is sold. If a change of property use is desired at a later date, sampling, analysis and testing is needed to determine if the property can be used for other purposes.

MEETING EVALUATION

RAB members expressed appreciation for a timely and informative presentation and welcome future joint meetings when topics are relevant to both RABs. Maintaining the level of RAB member interest is very important as well as the cost-savings benefit from holding a joint meeting.

MCAS EL TORO
RESTORATION ADVISORY BOARD MEETING
July 31, 1996

RAB MEMBER SIGN-IN SHEET

Name	Signature	Name	Signature
Arthur, Bonnie		Lamourex, Susan	
Allen, Bob		Landis, Lorrie	
Barney, Col. Joseph P. (ret)	PRESENT*	Mahmoud, Tayseer	
Bennett, Dr. Charles		Matheis, Mary Aileen	
Boehringer, Roger		Mathews, Thomas	
Brady Jr., Paul		McVicker, Robert R.	Robert R. McVicker
Britton, George		Meier, Fred J.	
Cohn, Enid		Merryman, Robert	
Cooper, Frank		Mountford, Dan	
Crompton, Chris		Murphy, Don	
DaCorte, George F.		Olquin, A. Richard	A. Richard D. Olquin
Halbert, Gary J.		Ritchie, Col. E.J.	for P.F. Cinla
Hayes, Finola	PRESENT*	Rudolph, Marcia - Co-chair	Marcia Rudolph
Herndon, Roy		Shayegan, Maria	
Huang, Chi		Sievers, Larry	
Hurley, Gregory		Sipp, Jr., Myron L.	
Hersh, Peter		Vasquez, Barbara	
Hurt, Dr. Paul R.		Vitale, Larry	
James, Novel B.		Werner, Jerry B.	
Joyce, Joseph - Co-chair		Westermeier, John F.	
Kalwani, Rita		Woodings, Bob	
Koenigsberg, Dr. Stephen S.		Zweifel, Donald E.	

* PRESENT = at Meeting signed other sign-in sheet

Attachment B

MCAS EL TORO
RESTORATION ADVISORY BOARD MEETING
July 31, 1996

NON-RAB MEMBER SIGN-IN SHEET
Other Attendees, Guests

NAME	AFFILIATION	MAILING ADDRESS	PHONE FAX	INTERESTED IN RAB MEMBERSHIP?
RONALD OKUDA	Cal/EPA DTSC	LONG BEACH	310-590-4885 310-590-4901	
Charly Wiemert	MCAS El Toro		(714) 726-2840 Fax 6586	
Lynn Hornecker	Navy		(619) 532-3737 Fax 6195322469	
Scott Kehe	NAVY		(714) 726-2504 (714) 726-2255	
Scott A. Funk	CA. Fish & Game		(408) 684-7195 (916) 684-7977	
Mike Whipple		30896 Rivèra Pl Laguna Niguel CA 92677	714 495-2606 714 495-5068	
Farooq Khan	GeoMat Engineering	1700 E. Garry Ave., Suite 218 Santa Ana, CA. 92705	(714) 756-8926	
TOM Young	Citizen employed at Irvine, CA	MORRISON KNUDSEN 17300 RED HILL AVE #150 IRVINE CA 92614	714-752-8360 714-752-8361	

Attachment B

MCAS EL TORO
RESTORATION ADVISORY BOARD MEETING
July 31, 1996

NON-RAB MEMBER SIGN-IN SHEET
Other Attendees, Guests

NAME	*AFFILIATION*	*MAILING ADDRESS*	*PHONE FAX*	*INTERESTED IN RAB MEMBERSHIP?*
Paul Yaroschak	Office of Asst Sec Navy		703 614-1282	no
Cindy Turlington	Chief of Naval operations		703 602-5330	
MARIANNA Potacka	HQMC		(703) 696-2141	
BERNIE LINDSEY	NAVY		619-532-1164	
F.C. Bayard	BRAC, MCAS, El Toro		(714) 726-3381	
[redacted]	[redacted]		[redacted]	

Attachment B

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MCAS EL TORO
RESTORATION ADVISORY BOARD MEETING
July 31, 1996

NON-RAB MEMBER SIGN-IN SHEET
Other Attendees, Guests

NAME	AFFILIATION	MAILING ADDRESS	PHONE FAX	INTERESTED IN RAB MEMBERSHIP?
Ed Rumsey	MCAS El Toro	12 Aloysia R.S.M. CA 92688	714 726-2270 2639	NO
M Mingay	OTSC	245 W Broadway #350 90802 L Beh	310 590-4881 4932	
John Monahan	ARES	18712 MacArthur Blvd Suite 200 Irvine 92715	714 622-8880 622-8888	
Bill Sedlak	OHM	2031 Main St Irvine CA	263-1146	NO
Mary L. Norby		14512 Emerywood Tustin, CA	714) 832-4628	yes

Attachment B

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MCAS EL TORO and MCAS TUSTIN
JOINT RESTORATION ADVISORY BOARD MEETING
July 31, 1996

RAB MEMBER SIGN-IN SHEET
Other Attendees, Guests

NAME	AFFILIATION	MAILING ADDRESS	PHONE FAX	INTERESTED IN RAB MEMBERSHIP?
~~Fred J. Meier~~	~~ASCE~~	~~1517 E. Beechwood St. Santa Ana 92705~~	~~714/550-2551~~	
Paul McDaniel	Naval Facilities Engr Service Center			
Amy Greyson	self	322 Prospect Park Tustin CA 92780	(714) 731-2115 (909) 889-8301	fax (909) 388-1889
Jerry Kindigerman	MVA	3486 EBOE ST Irvine CA	(714) 552-3548	
Joe Barney	El Toro	2217 T Timberline Lake Forest 92630	714 8576937	AM Member
Dana Ogden	City of Tustin	—	573-3116	

Attachment B

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MCAS EL TORO and MCAS TUSTIN
JOINT RESTORATION ADVISORY BOARD MEETING
July 31, 1996

NON-RAB MEMBER SIGN-IN SHEET
Other Attendees, Guests

NAME	AFFILIATION	MAILING ADDRESS	PHONE FAX	INTERESTED IN RAB MEMBERSHIP?
FINDLA HAYES	APS	4580 CAMPUS DR. #625C NEWPORT BEACH, CA 92660	714 222 0455 714 222 0456.	
VIJAY REDDI	BROWN & CALDWELL	9040 [illegible] ROAD, #220 SAN DIEGO, CA 92108	619-528-9090 619-528-9199	
LUCREATRIA Holloway	Navy	1220 Pacific Hwy San Diego, CA 92132	(619) 532-2289	
Ed Sirota	RAC	505 North Tustin Suite 210 Santa Ana, CA 92705	714-571-1800 571-1811	
Robert A. Flint	CA DFG		(408) 649-7195	
Dhiru Patel	Brown & Caldwell	16735 Von Karman & Irvine CA 92714	714-660-1070	
1st Lt. George Opria	BRAC MCAS Tustin			

Attachment B

September 7,1996.

Southwest Division, Naval Facilities
Engineering Command
1220 Pacific Highway
San Diego, California 92132-5190

Re; Marine Corps Air Station El Toro, California-CTO 0145
Draft Final Operable Unit 1
Interim Remedial Investigation/Feasibility Report

Att; John Dolegowski

Dear Sir;

The purpose of this letter is to transmit my comments on the OU1 RI/FS Report.

Assumptions are made in the document that attempt to absolve the DOD from any responsibility for the nitrates and total dissolved solids existing in the aquafer. The presence of these materials is totally blamed on "...geology and agricultural practices...". The DOD does have some responsibility for these pollutants due to the years of on-site agriculture allowed to lease-holders. For this reason alone, the DOD has an obligation to be a funding participant in the IDP.

The decision regarding the OU1 documentation and a ROD should be delayed until the completion of OU-2a RI/FS. The two issues are inextricably intertwined and should be considered and decided upon as a single entity.

The study does admit that "Individuals may be exposed to chemicals in surface water through inhalation of volatilized chemicals or through ingestion of contaminated fish." This admission underscores the urgent need for resolution to the clean-up process. Also, the down-gradient movement of the plume is of great concern to the general public and the discussion of cost in this equation seems trivial to the elimination of the risk to the principal aquafer. The need is for the BEST solution, not the cheapest.

Finally, there needs to be great care in the area to NOT impact the deep aquafer and allow for pathways for the pollution to migrate. The ultimate goal should be to clean up the pollution, but, at all costs DO NO HARM.

Sincerely,

Marcia Rudolph

Marcia Rudolph
MCAS-ET RAB Community Co-Chair
24922 #139 Muirlands
Lake Forest, Ca. 92630

Marine Corps Air Station - El Toro

Environmental Program Update

Installation Restoration (IR)
Landfill Sites 2 & 17

September 25, 1996

Bernie Lindsey
Southwest Division

FFA Schedule

- Draft Final Remedial Investigation (RI) - September 6, 1996
- Draft Feasibility Study (FS) - September 6, 1996
- Draft Proposed Plan - January 13, 1997
  - Start Public Review - June 18, 1997

FFA Schedule (cont.)

- Draft Record Of Decision
  - July 21, 1997
- Start Remedial Design -
  - January 1998

Early Actions at Station Landfills

- Site 2

  Magazine Road Landfill
- Site 17

  Communication Station Landfill

What Early Actions?

- Secure the Landfill Sites
- Mitigate the Erosion of Areas Within the Landfills
- Remove Landfill Debris Washed Out During Erosion
- Improve Access Routes In/Around Sites 2 & 17

Why Early Actions?

- Protect Human Health and the Environment
- Minimize Exposure to Potential Hazardous Substances
- Reduce Potential Migration Of Hazardous Substances During Storm Events

Site 2 History

- Former Gravel Borrow Pit
- Solid Waste Disposal From Late 1950'S to 1980 (Including MCAS Tustin during 1970's)
- General Basewide Disposal of Municipal, Industrial and Construction Wastes

Site 17 History

- MCAS El Toro Disposal Facility From Approximately 1981 to 1983
- General Basewide Disposal of Municipal, Industrial and Construction Wastes

Regulatory Basis

- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 - "Superfund"

- National Oil and Hazardous Substances Pollution Contingency Plan (NCP) - 40 cfr 300.415

Regulatory Basis (cont.)

- Applicable Relevant and Appropriate Requirements (ARARs)
  - Various Federal, State and Local Regulations and Executive Orders

CERCLA Actions

- Removal Actions
  - Typically Based on Results of Investigation
  - Prior to Final Remedial Decision
  - Usually A Subset Of The Final Action
- Remedial Actions
  - Post-Investigation Phase

Removal Actions

- Interim or "Early" Measures
- Occur During CERCLA Process
- Actions at Sites 2 & 17 Started Prior to Final Remedial Action (Record of Decision)

Security

- Installation of Fences to Prevent Public Access

Mitigate Erosion

- Repair Existing Rip-Rap Slopes That Have Been Undermined
- Construct New Rip-Rap Slopes To Provide Bank Stabilization
- Construct Drainage Improvements To Divert Surface Runoff From Landfill

Debris Removal

- Remove Landfill Debris Washed Into Channel - Relocate Onto Main Body
- Remove Debris Derived During Slope Stabilization Activities
- Remove Debris Derived During Channel Excavating/Access Repairs

Improve Access Routes

- Improve Roads Into and Through The Sites
  - Allows Construction Traffic To Move Efficiently Through Area
  - Minimizes Impact On Habitat By Establishing Defined Routes
- Improvements Include Grading And Placement of Road Base Material and Gravel

Endangered Species

- Sagebrush Habitat For California Gnatcatcher - Minimize Impact
- U.S. Fish & Wildlife Service (USFWS) Concurrence With Removal Actions
  - USFWS Concurred With Proposed Fence Alignment Prior To Construction

Schedule

- Commenced Field Activities June 1996
- Security Fencing Near Completion
- Targeted Completion December 1997

MCAS El Toro

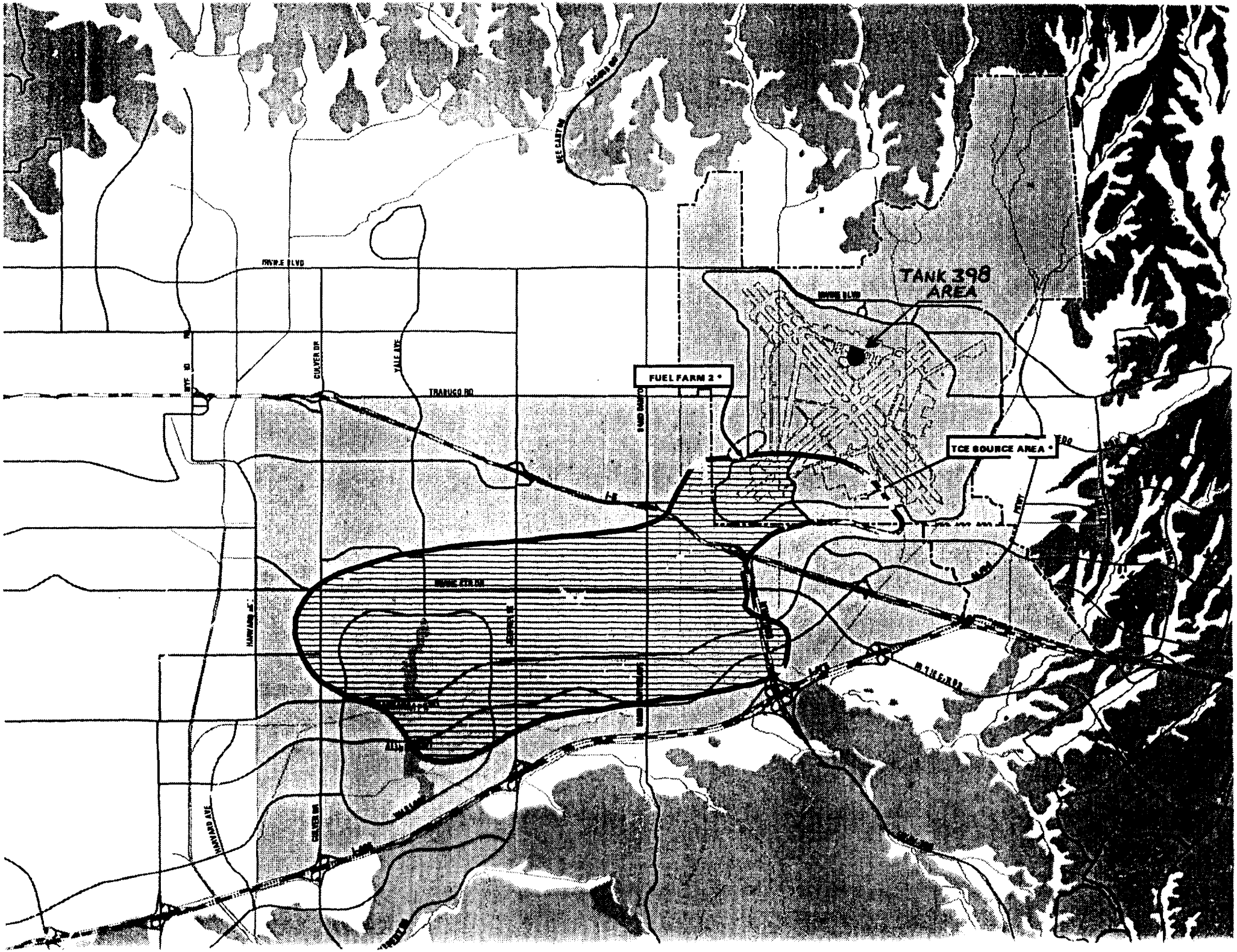
Tank 398 Recovery System
Tank Farm 2 Soil Cleanup

Program Update

25 September 1996

RAB Meeting

(rabt398.ppt)


TANK 398
AREA
FUEL FARM 2 *
TCE SOURCE AREA *
IRVINE BLVD
TRABUCO RD
CULVER DR
YALE AVE
HARVARD AVE

Tank 398 Area Conditions

- Tank 398 Used for Refueling Jet Aircraft
- First Investigation - 1988
- Groundwater at 200 feet
- 24 Monitoring Wells Constructed
- Fuel Contamination
  - Free Product (floating on groundwater)
  - Vadose Zone
  - Difused in Groundwater

Tank 398 Area
Free Product Recovery

- Pilot Study - 1993
- Recovery System Constructed 1995
  - 4,000 gal double walled storage tank
  - 3 recovery wells and skimming pumps
  - 4 recovery wells manually bailed
  - piping and control systems
- Start-up Activities early 1996

Tank 398 Area Progress

- Approx. 6,000 gal Recovered (to date)
- Free Product (fuel) is Recycled
- 2 Additional Recovery Wells Installed
- Soil Vapor Extraction System Installed
  - 7 SVE wells
  - SVE Treatment Began August 1996
  - Thermal Oxidation Treatment System

Tank Farm 2
Soil Cleanup

- 8 Large Tanks Removed October 1995
- Tanks had Leaked - Soil & Groundwater
- Groundwater at 120 feet
- Soil Vapor Extraction System Installed
  - 15 SVE Wells (vary between 40 - 120 feet)
  - Screened in Highest Fuel Concentractions
  - SVE Treatment Began August 1996
  - Soil Cleanup Will Take Several Months

MCAS El Toro

VOC Source Area and Regional Groundwater

Program Update

25 September 1996

RAB Meeting

(rab1_996.ppt)

Agenda

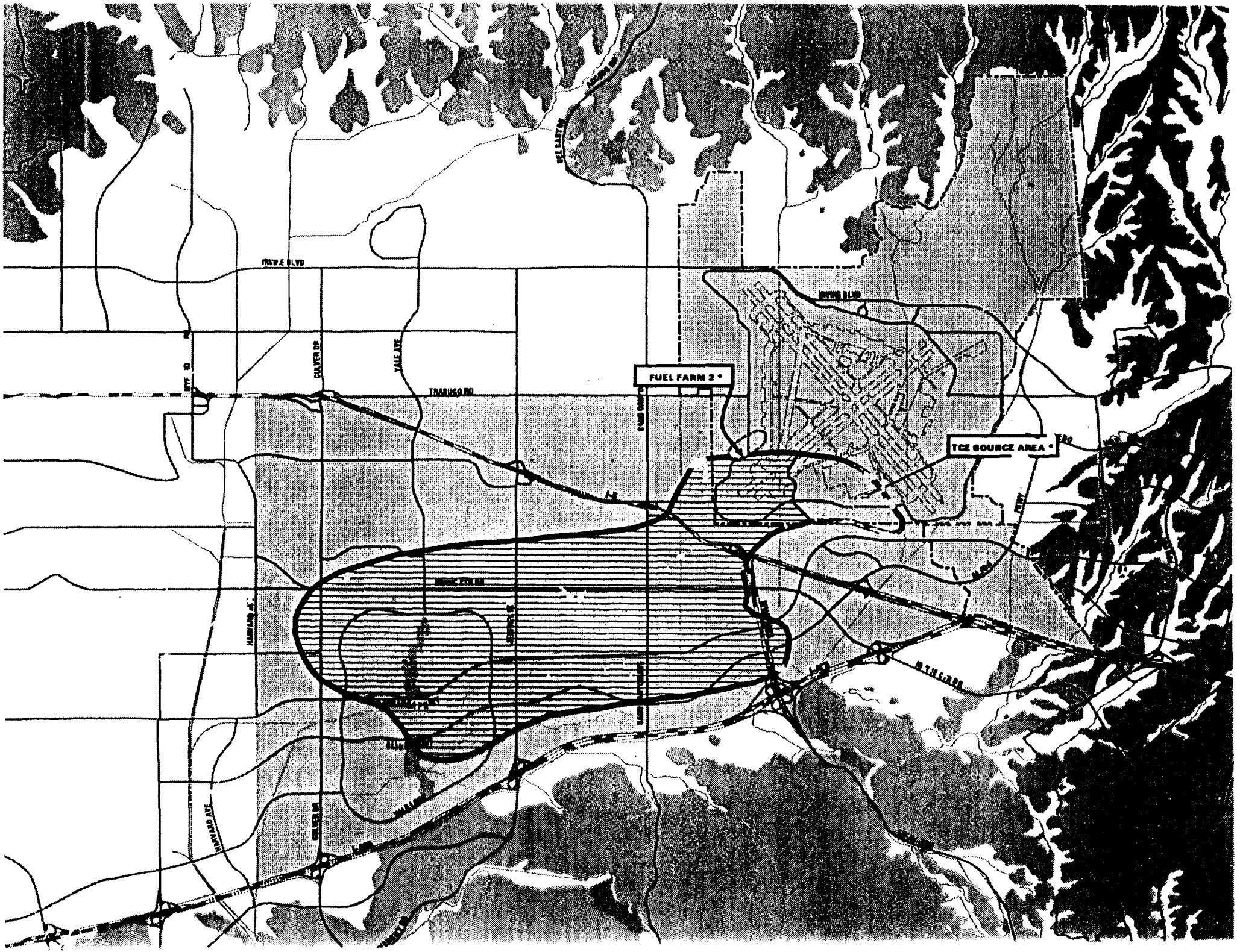
- Process Logic
- Current Groundwater Conditions
- Impacts
- Feasibility Study Results
  - VOC Source Area (Operable Unit 2A)
  - Regional VOC Groundwater (Operable Unit 1)
- Future Actions

Process Logic

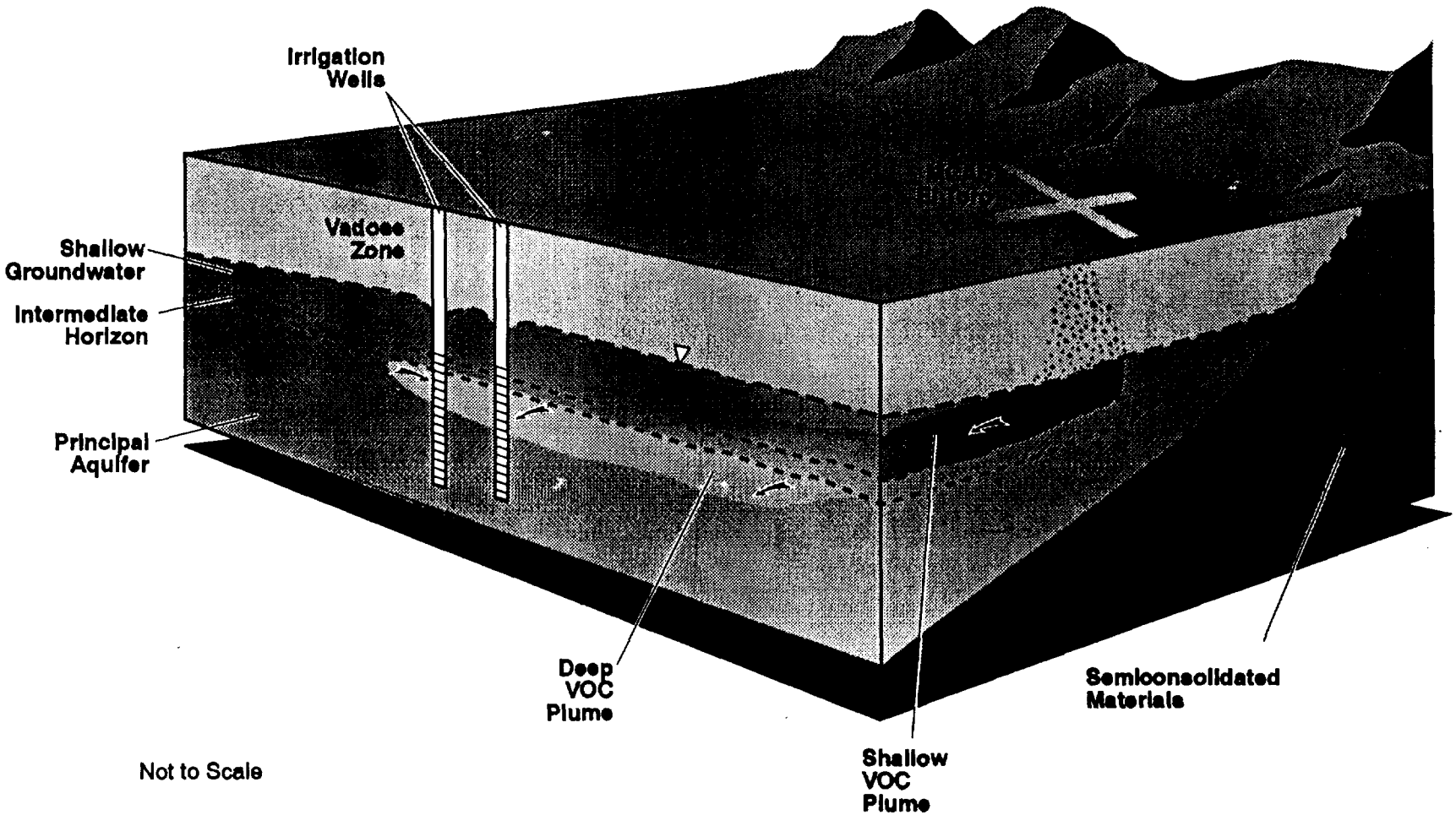
- Remedial Investigation
  - What is the current situation?
- Risk Assessment
  - What are the impacts?
- Feasibility Study
  - What can/should be done?

Current Conditions

- Shallow Groundwater Unit (on-station)
- Principal Aquifer (off-station)
- Network of Monitoring/Production Wells
  - Sampling: 1988 to Present (183 ports)
  - Different Screen Intervals
- Extent of VOC Contamination
  - X-Section of Irvine Subbasin
  - Influence/Capture from Irrigation Wells


FUEL FARM 2 *
TCE SOURCE AREA *
TRABUCO RD
CULVER DR
YALE AVE
HARVARD AVE

MCAS El Toro
Regional Groundwater



Not to Scale

m108663.PU.63.20 TCEcontam 8/96

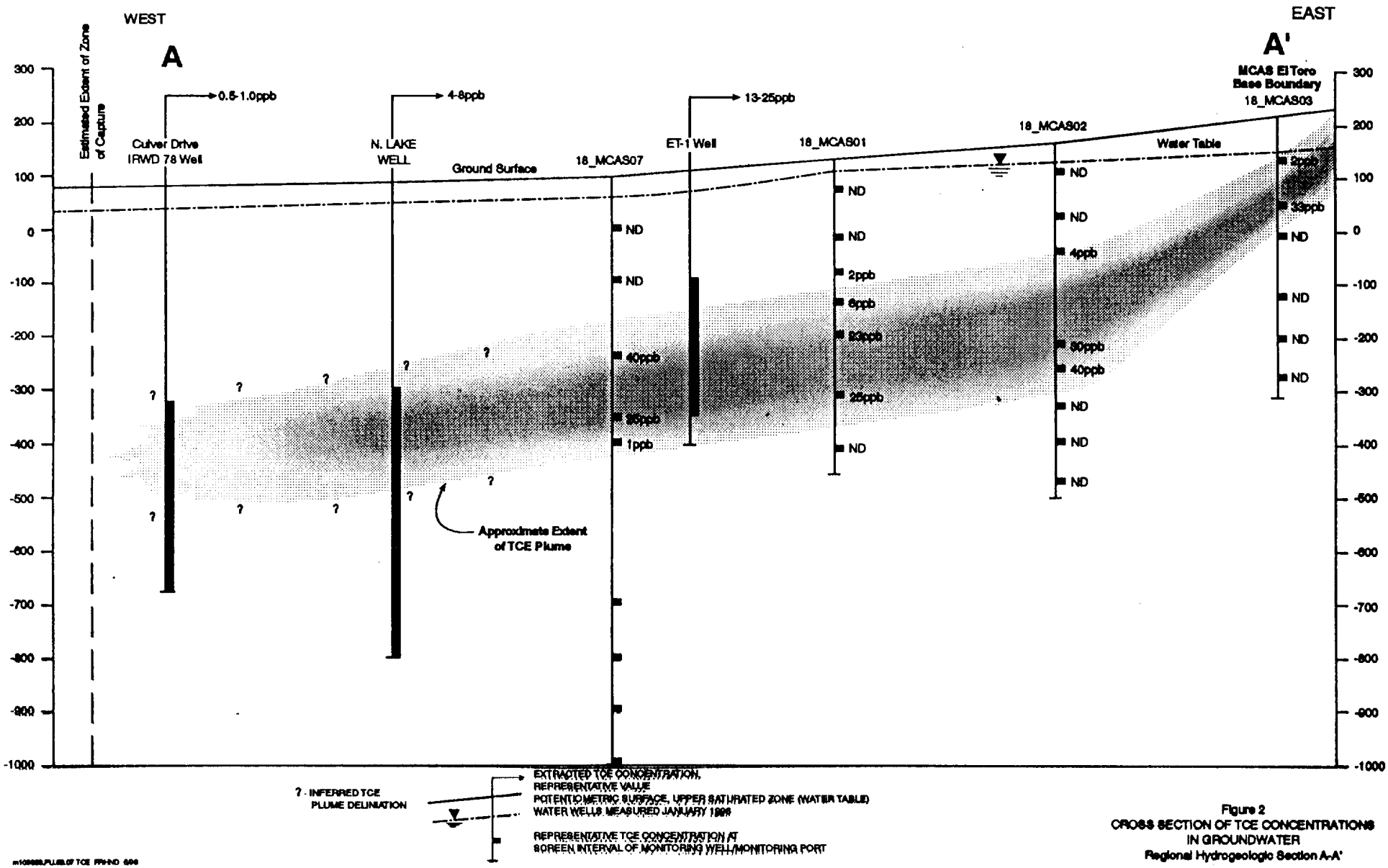


Figure 2
CROSS SECTION OF TCE CONCENTRATIONS IN GROUNDWATER
Regional Hydrogeologic Section A-A'

Impacts

- "The off-base principal aquifer plume does not present a significant threat to human health nor degrade the principal aquifer as a resource." -- USEPA
- Irrigation Risk Study
- No Wells Impacted by VOCs
  - No Drinking Water Wells Affected
  - No Irrigation Wells Closed
- No Impact on Reuse Options

Feasibility Studies

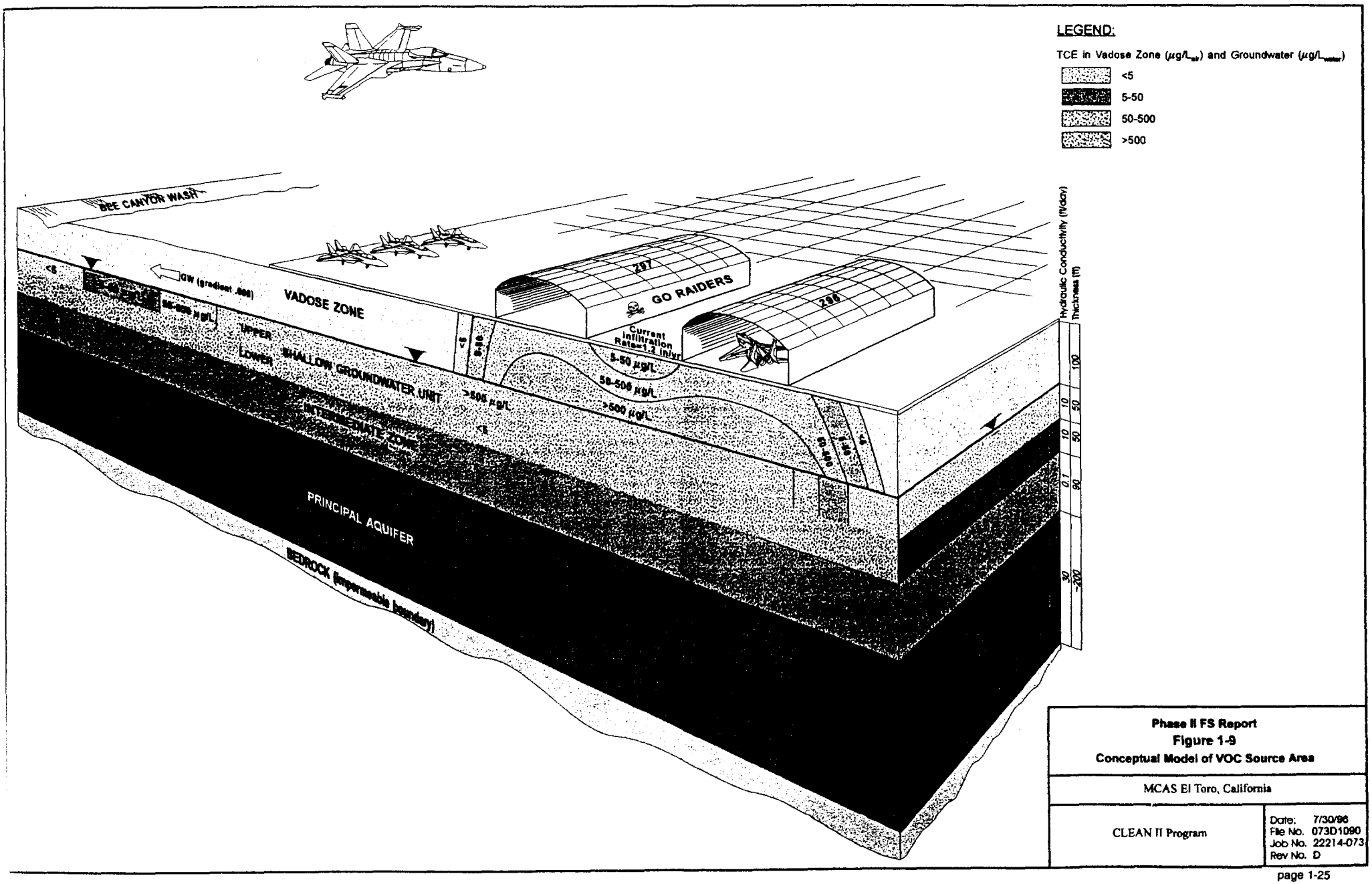
- Given the Conditions and Impacts, What can/should be done?
- Evaluate Potential Remedial Alternatives
- Support a Risk Management Decision
- Not Possible to Remove <u>all</u> Uncertainty
- Details are Developed in Remedial Design

EPA Evaluation Criteria

- Threshold Criteria
  - Overall Protectiveness
  - Compliance with Laws and Regulations
- Balancing Criteria
  - Long-tern Effectiveness
  - Reduction of Toxicity, Mobility, and Volume
  - Short-term Effectiveness
  - Implementability
  - Cost
- Modifying Criteria
  - State Acceptance
  - Community Acceptance

Goals and Objectives

- Prevent Risk of Exposure to VOCs
- Minimize migration of VOCs
- Reduce Levels of VOCs

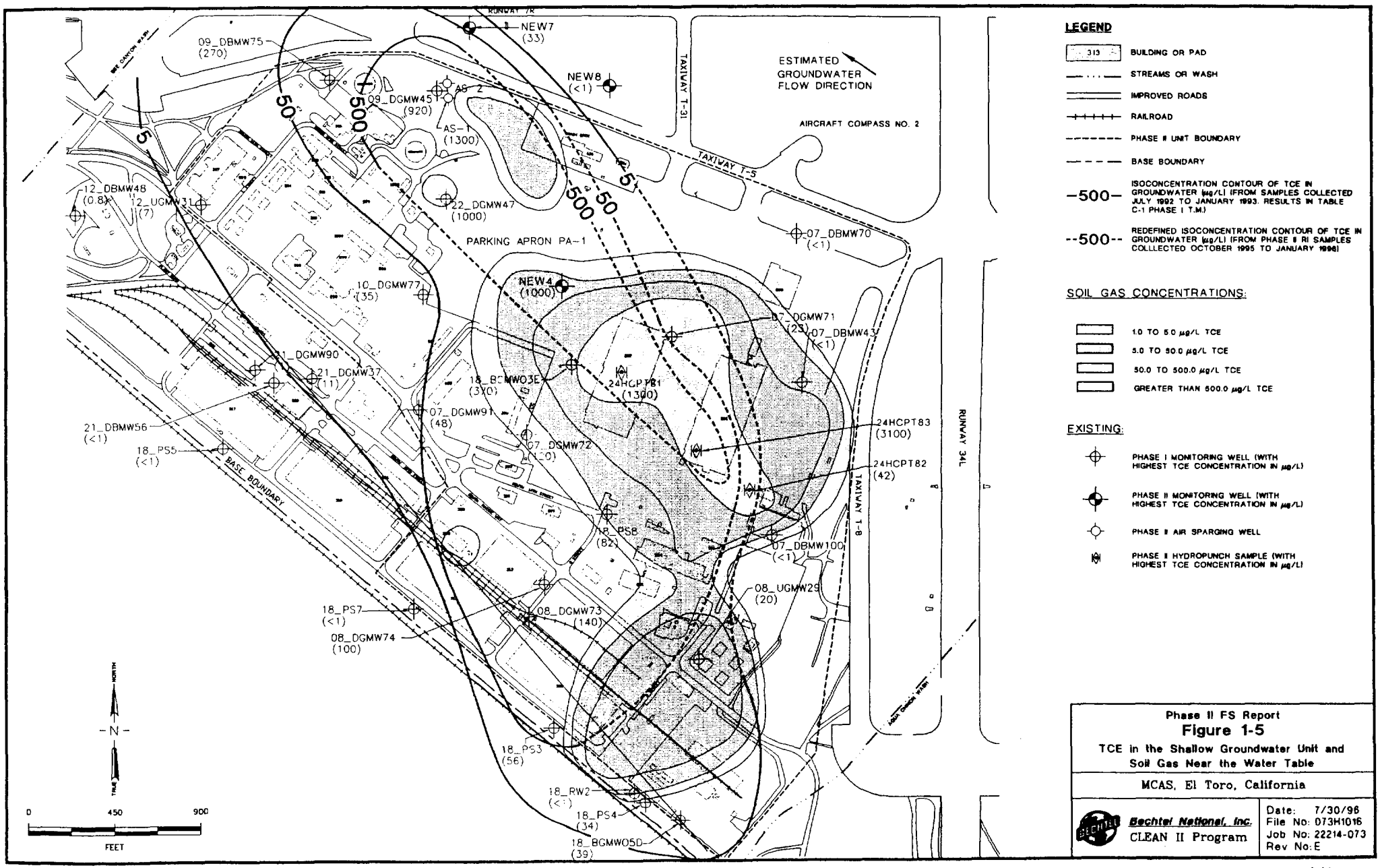


Phase II FS Report
Figure 1-9
Conceptual Model of VOC Source Area

MCAS El Toro, California

CLEAN II Program

Date: 7/30/96
File No. 073D1090
Job No. 22214-073
Rev No. D



Phase II FS Report

Figure 1-5

TCE in the Shallow Groundwater Unit and Soil Gas Near the Water Table

MCAS, El Toro, California

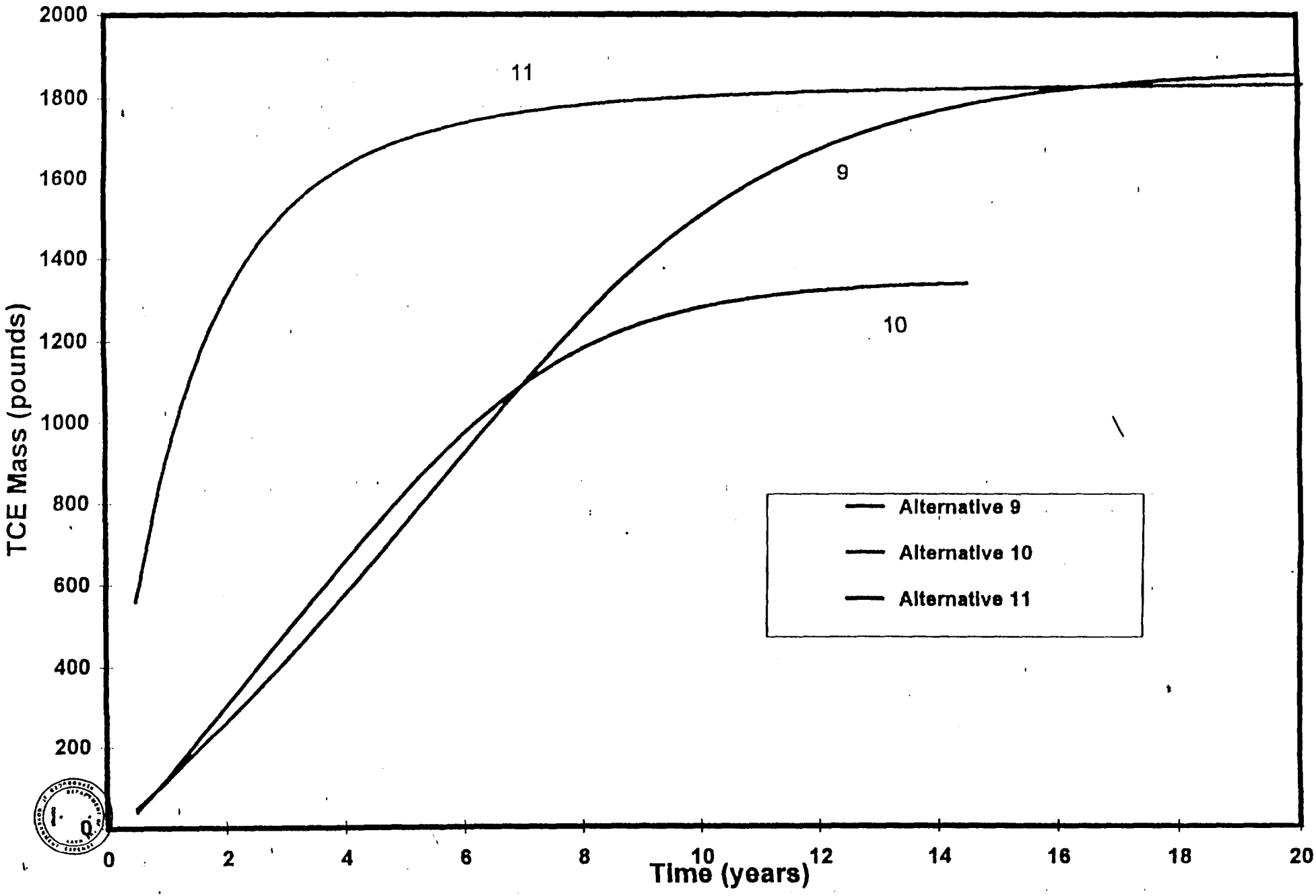
Bechtel National, Inc.
CLEAN II Program

Date: 7/30/96
File No: 073H1016
Job No: 22214-073
Rev No: E

VOC Source Area Alternatives (OU-2A)

- Alternative 9
  - Incorporates DON Stand Alone project (OU-1)
  - Source removal with soil vapor extraction
- Alternative 10
  - Incorporates Joint DON/OCWD project (OU-1)
  - Source removal with soil vapor extraction
- Alternative 11
  - No OU-1 on-station project implemented
  - Focus on source removal with containment

Cumulative Mass Removed from Shallow Groundwater Unit at Site 24



COMPARISON OF ALTERNATIVES FOR SHALLOW GROUNDWATER UNIT

Shallow Groundwater Unit	Alternative 1 No Action	Alternative 9	Alternative 10	Alternative 11
Area of plume in 20 years (10^3 ft^2)	10,400	209	2,200	8
Volume of water treated (10^6 ft^3)	0	1,124	955	1,124
Time to reach MCL (years)	>80	44	>80	38
Pounds of TCE removed after 10 and 20 years	0	1,500 / 1,860	1,280 / 1,340	1,800 / 1,830
Net present worth cost for 10 and 20 years (millions)	$0 / $0	$26 / $29	$14 / $16	$24 / $27

VOC Source Area Summary (OU-2A)

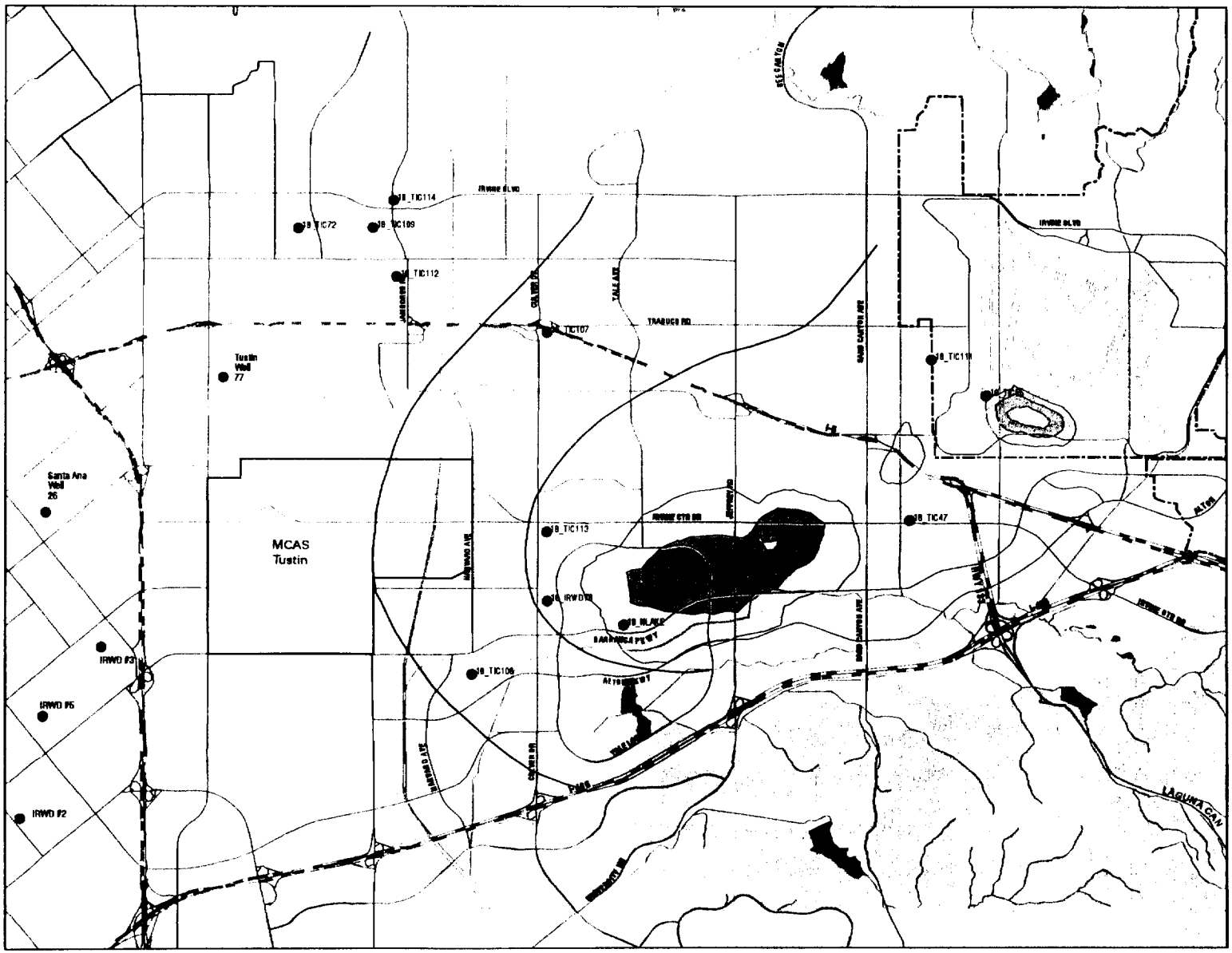
- High Priority
- VOCs Concentrations
  - Vadose Zone
  - Top 50 ft of Groundwater
- Focus on Aggressive Removal Actions
- Major Mass Removal in First 10 Years
- Soil Vapor Extraction is Key to Success
- No Impact on Reuse Options

Regional VOC Groundwater (OU-1)

- Natural Attenuation
- Descriptions
  - Table of Key Alternatives (and No-Action)
  - Schematic of a Joint DON/OCWD Project
- Costs
- Results
  - Cleanup Time and Mass Removal (similar)
  - 20 year Simulations (similar)
  - Cost Effectiveness of Plume/Risk Reduction

Natural Attenuation

- A process that "will effectively reduce contaminants in the ground water" to concentrations "protective of human health and sensitive ecological environments in a reasonable timeframe." -- NCP preample
  - Biodegradation
  - Dilution
  - Dispersion
  - Adsorption
- Large, Dilute Contaminant Plumes



Simulated TCE in the Principal Aquifer After 20 Years
Alternative 1 (Existing Conditions)
MCAS El Toro
OU-1 IAFS Addendum

Plot date: 25 Sep 96 08:35:38 Wednesday /GIS2/ELTORO/PLOTS/TRANSPRT/navy.aml

Summary Description of Six Remedial Alternatives Evaluated in OU-1 IAFS Addendum

Remedial Alternative	VOC Treatment	Shallow Groundwater Unit (SGU)		Principal Aquifer (PA)		
		Extraction Rate (gpm)	Discharge Option	Extraction Rate (gpm)		Discharge Option
				DON	IDP	
1 - No Action	No	NA	NA	NA	NA	NA
2A - MCAS El Toro Project Without 18_ET1	Yes	1,260	Injection	2,000	0	Injection
6A - MCAS El Toro Project and Partial IDP	Yes	1,260	To IDP	2,000	2,440	To IDP
7A - MCAS El Toro Shallow Groundwater Project	Yes	1,260	Injection	0	0	NA
7B - MCAS El Toro Shallow Groundwater Project With PA Contingency Wells (*after 10 years)	Yes	1,260	Injection	2,000*	0*	Injection*
8 - MCAS El Toro Shallow Groundwater Project and Modified Partial IDP	Yes	1,260	To IDP	0	4,440	To IDP

LAYOUT MAP OF ALTERNATIVE 6A FACILITIES

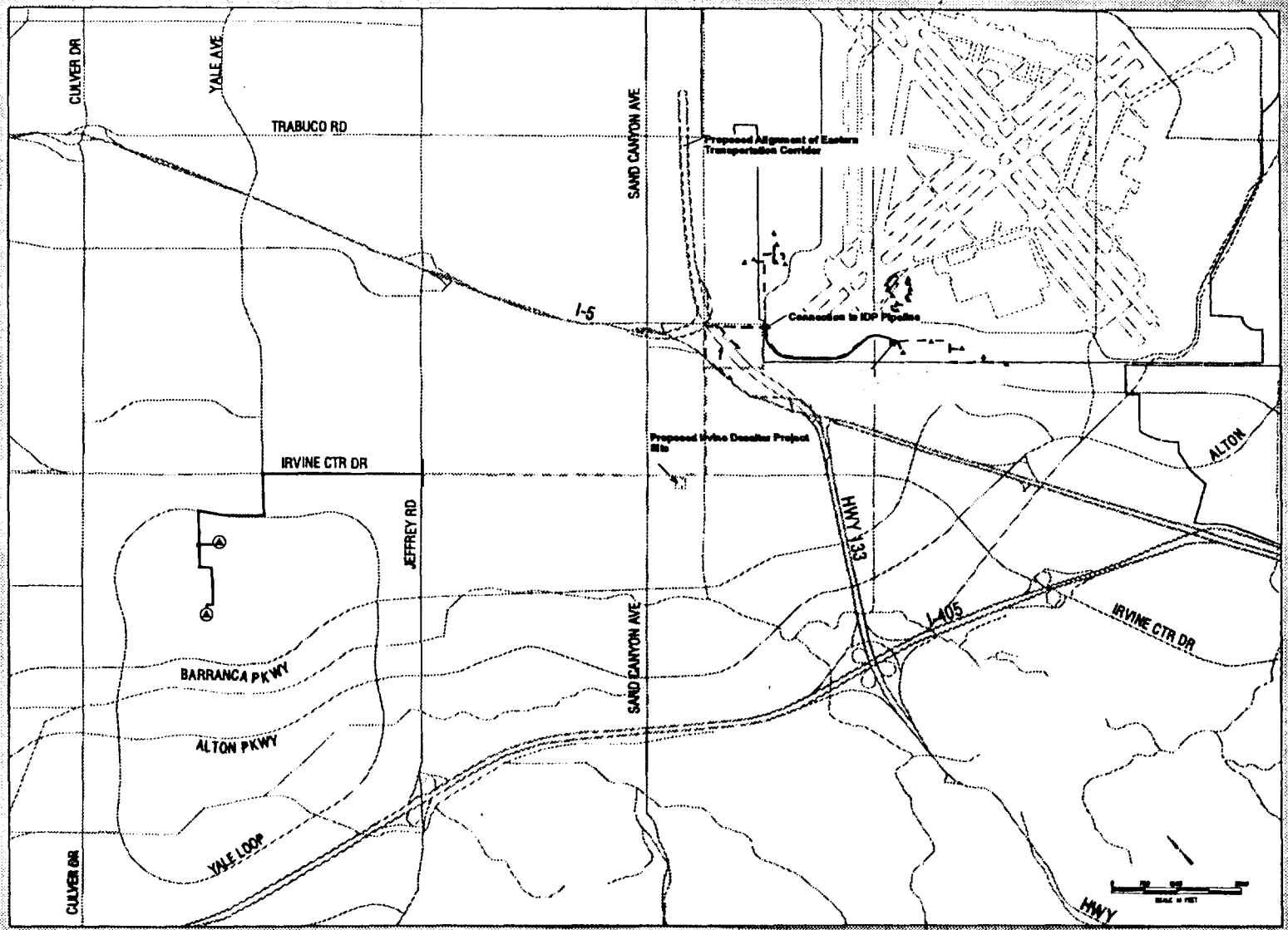


Table 1
Summary of 40 year Present Worth Cost
MCAS El Toro OU-1 IAFS - Addendum
(cost in $ millions)

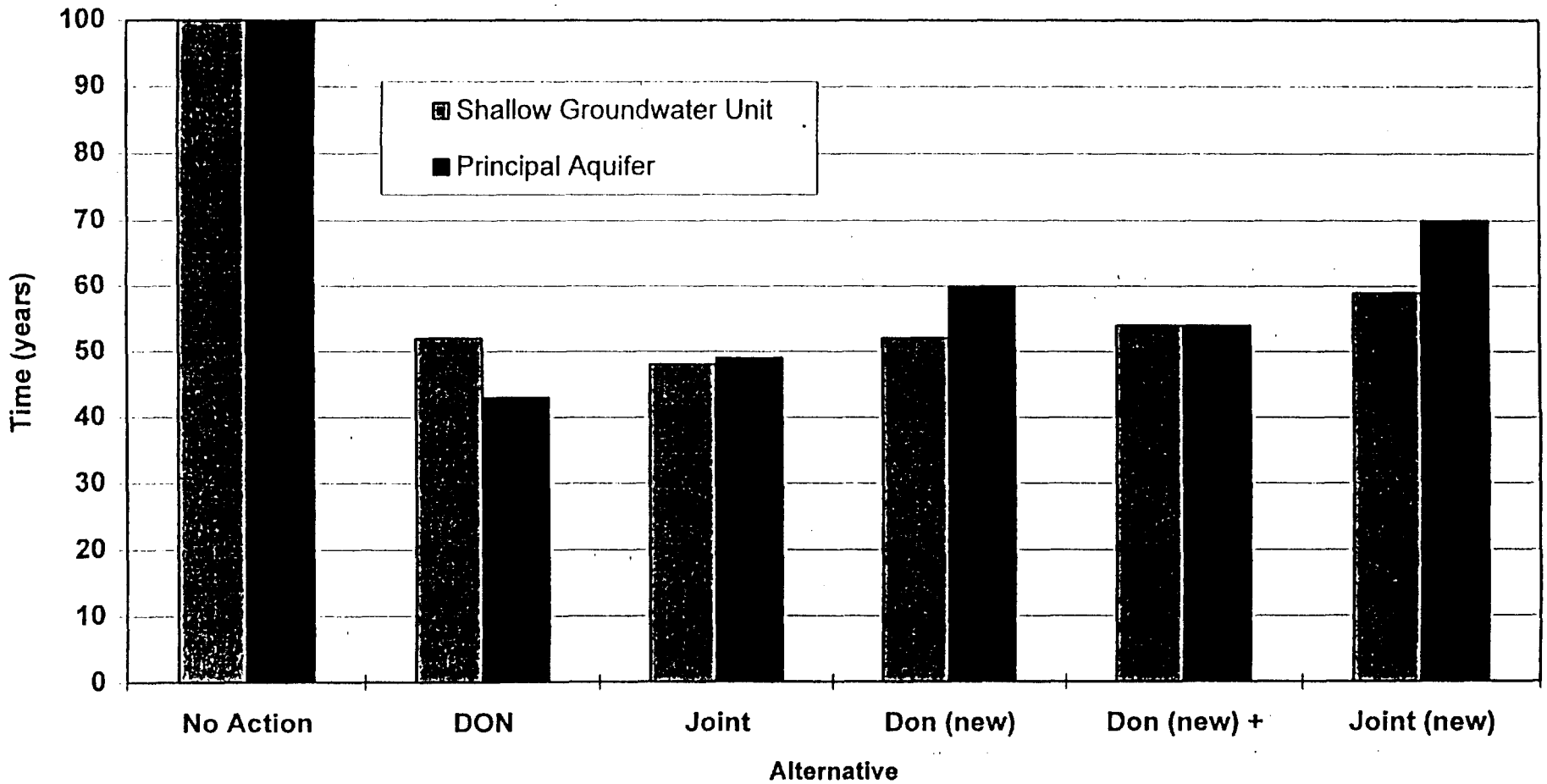
Alternative	Shallow Ground Water Unit	Principal Aquifer	Monitoring	Total
2A - DON	$28	$23	$5	$56
6A - Joint	$10	$18 - $26	$5	$33 - $41
7A - DON (new)	$28	$0	$6	$34
7B - DON (new)+	$28	$14	$6	$48
8 - Joint (new)	$10	$8 - $17	$6	$24- $33

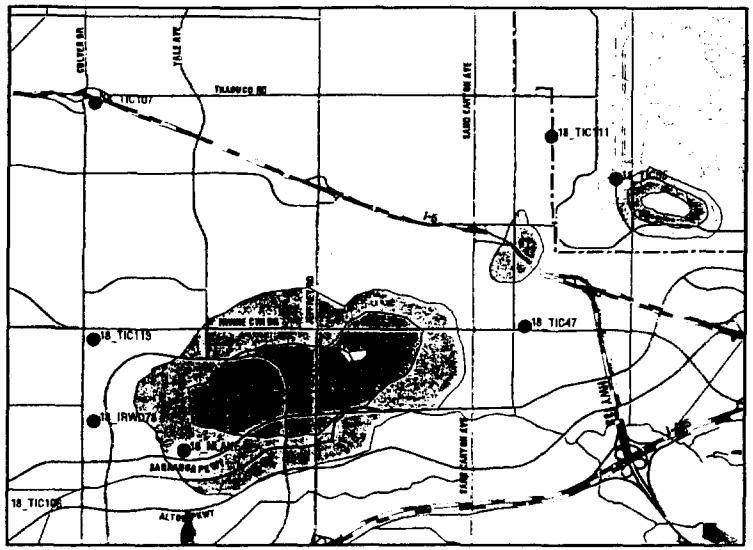
Note: 1) Central VOC treatment for Joint DON/OCWD Projects (Alt 6A & 8) is approximately $7 million and is included within the Principal Aquifer cost.

2) VOC treatment for shallow groundwater for DON Stand Alone Projects (Alt 2A, 7A, and 7B) is approximately $12 million is included within the Shallow Groundwater Unit cost.

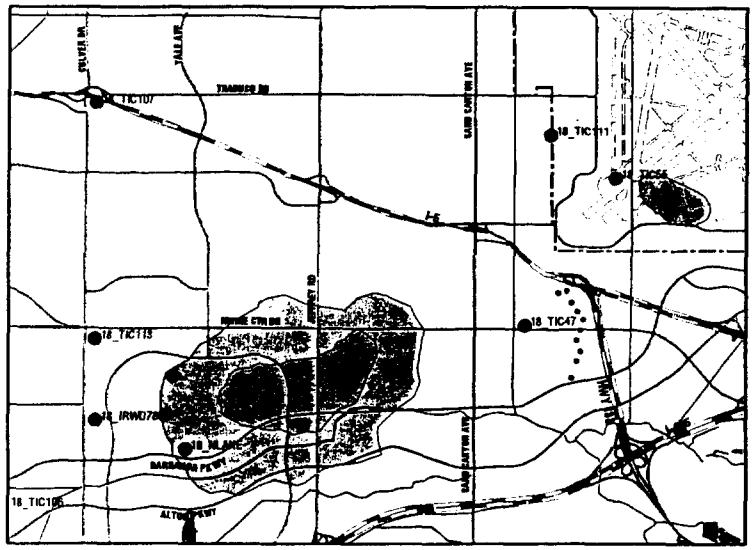
3) All DON Stand Alone Alternatives (2A, 7A, and 7B) include a contingency plan. If VOC contaminated groundwater were to be used now or at some later date, the actions required to protect such beneficial uses (i.e. wellhead treatment) are CERCLA related cost. Contingency cost are <u>not</u> included in the cost of these alternatives.

Cleanup Time to TCE MCL (5µg/L)

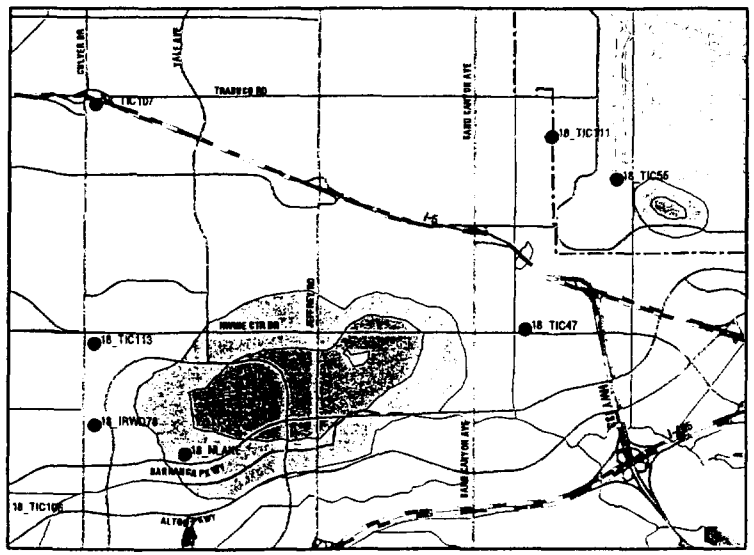




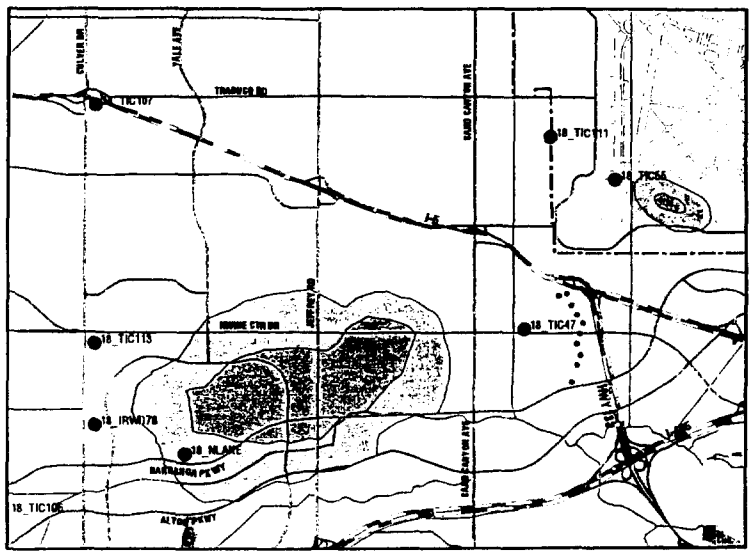
Alternative 1



Alternative 2A



Alternative 7A



Alternative 7B

FEATURES:

- BEDROCK
- LAKE OR RESERVOIR
- FREEWAY
- ROAD
- MCAS EL TORO BOUNDARY
- WASH OR STREAM
- MCAS EL TORO PROJECT EXTRACTION WELL
- MCAS EL TORO PROJECT INJECTION WELL
- OCWD / IRRIGATION WELL

TCE CONCENTRATION RANGES (ug/L):

- 5 to < 10
- 10 to < 15
- 15 to < 25
- 25 to < 50
- 50 to < 200
- 200 to < 500
- 500 or greater

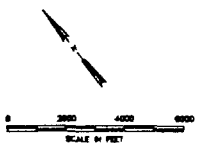
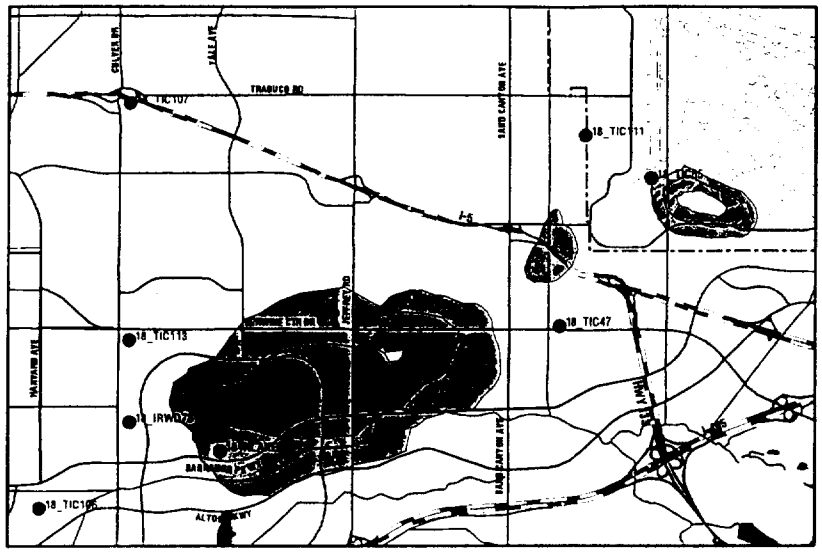
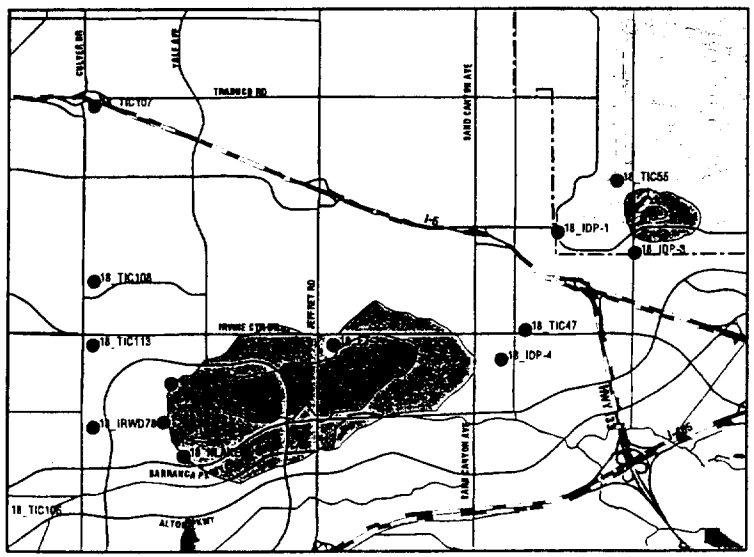


Figure 7-3

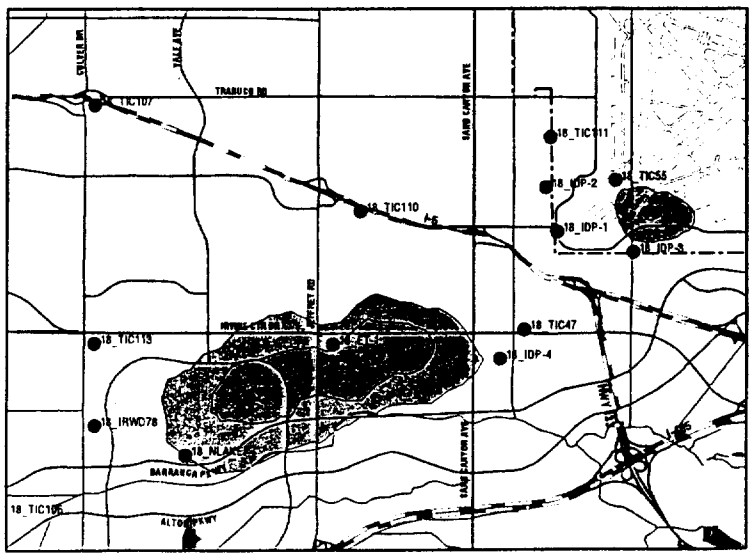
Simulated TCE in the Principal Aquifer After 20 Years Alternatives 1,2A,7A, and 7B MCAS El Toro OU-1 IAFS Addendum



Alternative 1



Alternative 6A



Alternative 8

FEATURES:

- BEDROCK
- LAKE OR RESERVOIR
- FREEWAY
- ROAD
- MCAS EL TORO BOUNDARY
- WASH OR STREAM
- MCAS EL TORO PROJECT EXTRACTION WELL
- OCWD / IRRIGATION WELL

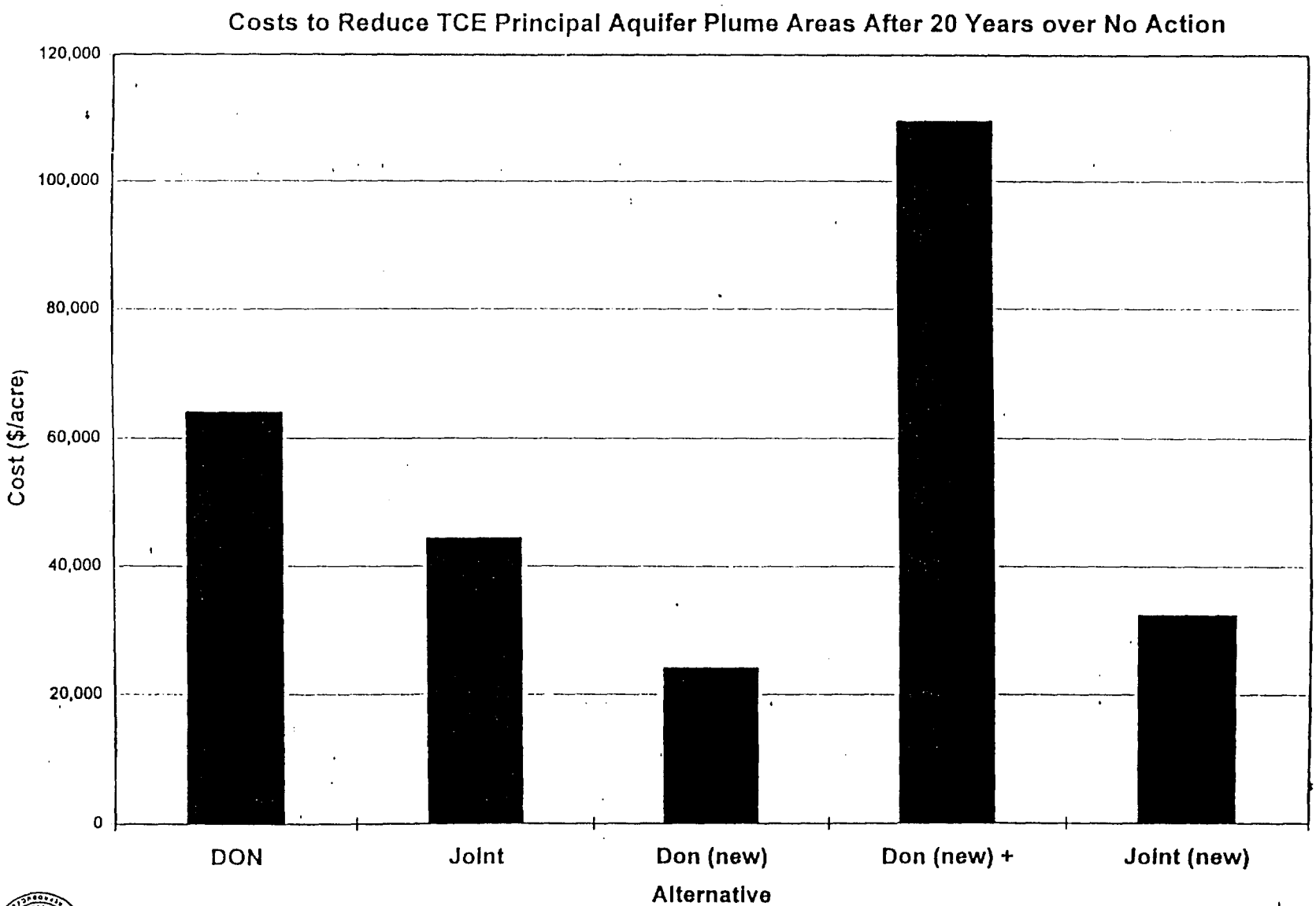
TCE CONCENTRATION RANGES (ug/L):

- 5 to < 10
- 10 to < 15
- 15 to < 25
- 25 to < 50
- 50 to < 200
- 200 to < 500
- 500 or greater

0 2000 4000 6000
SCALE IN FEET

Figure 7-4

Simulated TCE in the Principal Aquifer After 20 Years Alternatives 1, 6A, and 8 MCAS El Toro OU-1 IAFS Addendum


Costs to Reduce TCE Principal Aquifer Plume Areas After 20 Years over No Action
120,000
100,000
80,000
60,000
40,000
20,000
0
Cost ($/acre)
DON
Joint
Don (new)
Don (new) +
Joint (new)
Alternative

Regional Groundwater Summary (OU-1)

- Assess Cost Effectiveness (EPA comment)
- Combining Natural Attenuation with Other Methods (Aggressive Source Control)
- Exposure Prevention Measures
- Performance Monitoring
- Contingency Measures

Combined VOC Remediation Options

- DON Stand-Alone Source Removal Alts.
  - with Pump & Treat ($52M - $55M)
  - with Nat'l Attenuation ($30M - $33M)
- Joint DON/OCWD Source Removal Alts.
  - with Pump & Treat ($38M - $46M)
  - with Nat'l Attenuation ($29M - $38M)
- Options have Similar Results

Future Actions

- Evaluate the Combined FS Results
  - VOC Source Area (OU-2A)
  - Regional Groundwater (OU-1)
- Submit draft Proposed Plans
  - November 1996 (to Agencies/RAB)
  - March 1997 (to Public)
- Submit Records of Decision
  - May 1997 (drafts to Agencies/RAB)
  - September 1997 (finals to Agencies)

Introductory Talk: Where Are We Now With Public and Regulatory Acceptance? (Resource Conservation and Recovery Act [RCRA] and Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA])

Kenneth Lovelace and Peter Feldman
U.S. Environmental Protection Agency, Office of Emergency and Remedial Response (Superfund), Washington, DC

Introduction

The U.S. Environmental Protection Agency (EPA) remains committed to the goal of restoring contaminated ground waters to their beneficial uses. The Agency also continues to support the use of natural attenuation as a restoration method. EPA recognizes that, in certain circumstances, remedies using natural attenuation can be more cost-effective than "active" remediation approaches in achieving cleanup objectives equally protective of human health and the environment. The Agency also recognizes that many technical questions remain to be answered regarding the efficacy of this approach, which underscores the importance of continued scientific research as well as the need to employ remedies using natural attenuation in a consistent and responsible manner.

What Is Natural Attenuation?

Natural attenuation is discussed in the preamble of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), which is the regulatory framework for the Superfund program (1). In the NCP, natural attenuation is described as a process that "will effectively reduce contaminants in the ground water" to concentrations "protective of human health and sensitive ecological environments in a reasonable timeframe." The NCP goes on to recognize that natural attenuation may include any or all of the following processes:

- Biodegradation
- Dilution
- Dispersion
- Adsorption

Thus, the NCP definition includes biodegradation, which alters or destroys the contamination, as well as physical processes that lower contamination concentrations and availability without necessarily altering the chemistry. Other processes not mentioned in the NCP are not necessarily excluded from the definition (e.g., volatilization). Other EPA remediation programs also recognize this definition, including the Corrective Action program under the Resource Conservation and Recovery Act (RCRA) and Underground Storage Tank (UST) programs.

Some terms, such as "intrinsic remediation" or "passive remediation," are essentially equivalent to the NCP's definition of natural attenuation. Other terms used in recent literature, including "intrinsic bioremediation" or "in situ bioremediation," appear to be more restrictive in scope than "natural attenuation." In addition, natural attenuation is the term used in existing EPA guidance (e.g., U.S. EPA [2]).

Regulatory Framework

Natural attenuation is recognized as a legitimate remedial approach for ground-water cleanup under the Superfund, RCRA Corrective Action, and UST remediation programs. A directive clarifying EPA's policy regarding the use of natural attenuation for remediation of sites regulated under these programs is currently under development (3). Remedies selected for contaminated ground water (and for other media) under these programs must protect human health and the environment, regardless of the particular remediation technology or approach selected. Remedies may achieve protection through a mix of treatment, which reduces or destroys contaminants; containment and other engineering controls, which limit exposure; and other means identified as part of the remedy selection process. Each EPA program has guidance suggesting when specific methods of protection may be more appropriate than others.

EPA recognizes that natural attenuation may be an appropriate remediation method for contaminated ground water under the right circumstances. Natural attenuation should continue to be carefully evaluated along with other viable remedial approaches or technologies within the existing remedy selection framework. *Natural attenuation is not to be considered a default or presumptive remedy for a given site under any of these EPA programs.*

Cleanup policies for Superfund have addressed the use of natural attenuation in some detail; most of the relevant discussion can be found in the NCP preamble. The following NCP language specifies the definition and cleanup expectation for remedies using natural attenuation:

> "[S]election of natural attenuation by EPA does not mean that the ground water has been written off and not cleaned up but rather that biodegradation, dispersion, dilution, and adsorption will effectively reduce contaminants in the ground water to concentrations protective of human health in a timeframe comparable to that which could be achieved through active restoration . . ." (1).

Thus, the NCP expects that a remedy employing natural attenuation will be fully protective and attain the required cleanup levels for the aquifer in a timeframe that is not unreasonably long. Since the other EPA remediation programs have similar expectations, use of natural attenuation as a remedy does not reduce EPA's responsibility to protect human health and the environment, and to satisfy the cleanup levels and other remediation objectives selected for a given site. *In short, use of natural attenuation does not imply that EPA has agreed to a "no action" remedy or that EPA or responsible parties may "walk away" from their remedial obligations at a site.*

When Is Natural Attenuation Appropriate?

Because of the longer timeframes needed for remedies using natural attenuation, such an approach is best suited for sites where there is no demand for the ground water in the near future. For example, where adequate alternate water sources are available, future demand for the contaminated ground water is likely to be low. Also, the timeframe required for natural attenuation should be reasonable compared with more active alternatives. Other site conditions that favor the use of natural attenuation as a remediation approach are discussed below.

Large, Dilute Contaminant Plumes

The types of contaminants, their concentrations, and hydrogeologic conditions should indicate that natural attenuation is a viable remediation approach for a given site. Natural attenuation is more likely to be an appropriate remediation approach at sites with large plumes and relatively low contaminant concentrations. For these types of sites, natural attenuation may be able to attain the required cleanup levels in a reasonable timeframe and at a much lower cost than other alternatives.

Sources Controlled or Controllable

Natural attenuation will not be effectively used to reach desired cleanup levels if the rate of contamination entering ground water exceeds the rate of the natural attenuation processes. Therefore, contaminant sources should have been controlled by previous actions or site characterization data should indicate that contaminant sources are no longer present. Otherwise, remedies using natural attenuation should include measures for controlling sources, such as removal, treatment, or containment of source materials. Sources of contaminants to ground water could include surface facilities, landfill wastes, contaminated soils, or nonaqueous-phase liquids (NAPLs) in the subsurface.

Protected Drinking Water or Environmental Resources

Cross contamination of other aquifers or discharge of contamination to surface waters or sensitive ecological environments is more likely if contamination is left in the subsurface for long periods. Site conditions should indicate a low potential for migration of contaminants into uncontaminated media, or measures for controlling plume migration should be included in remedies using natural attenuation. In addition, the issue of whether daughter products of natural attenuation will pose a significant risk must be addressed.

Combining Natural Attenuation With Other Methods

For sites where natural attenuation alone is not capable of achieving desired cleanup levels in a reasonable timeframe, natural attenuation combined with more active remediation methods may prove to be effective. Some areas of the plume may require a much longer time to attenuate naturally than others, such as areas with relatively high contaminant levels ("hot spots"). In this situation, natural attenuation of dilute plume areas combined with extraction and treatment to control source areas and remediate plume hot spots may be an effective remediation approach, especially for sites where dilute portions of the plume cover a relatively large area.

In some cases, it may be appropriate for natural attenuation to be used as a followup to active remediation. In this approach, active measures are used to reduce contaminant concentrations, followed by natural attenuation as the final stage of remediation.

Promoting Regulatory and Public Acceptance

In general, promoting acceptance of natural attenuation will require detailed site characterization and analysis to demonstrate that this approach will achieve remediation goals, careful monitoring of remediation progress, and identification of contingency measures. These provisions are necessary to convince regulatory agencies and the public that natural attenuation is a valid remediation approach rather than a "walkaway" and will be sufficiently protective.

Building confidence in the approach can also be promoted by involving the responsible regulatory agencies as early in the process as possible. For example, upfront agreement on the type of characterization data needed to demonstrate the efficacy of natural attenuation can save considerable effort later in the remedy selection process.

Detailed Site Characterization

Convincing regulatory officials and local citizens that natural attenuation will be effective starts with a detailed site characterization and a clear conceptual model of site conditions. A conceptual model of how natural attenuation will perform at a given site is essential to show that natural attenuation will be effective and that potential adverse impacts to human health and the environment can be prevented over the long period required for cleanup. The burden of proof of the viability of natural attenuation is on the proponent, not the regulator.

Site-specific data should be used to demonstrate that the required cleanup levels can be attained in a reasonable timeframe compared with other remedial alternatives. Such a demonstration can be supported by the following types of site data:

- Contaminant concentrations have decreased over time.
- Geochemical or microbiological parameters are characterized to the extent needed to support predictive models.
- Predictive models show required cleanup levels will be attained in a timeframe that is reasonable for the site.

Exposure Prevention Measures

Prevention of exposure to contaminated ground water over the long period required for cleanup is critical to ensure protectiveness. Remedies using natural attenuation should include effective measures for ensuring that contaminated ground water does not reach public or private wells, or for providing effective treatment prior to use.

Performance Monitoring

A thorough monitoring network and plan are necessary to evaluate the progress of natural attenuation. Remedies using natural attenuation should include a monitoring plan to ensure that remedy performance matches predictions, there are no adverse impacts, and unanticipated events can be detected in time to develop an appropriate response.

Contingency Measures

Contingencies for initiating active remediation measures should be incorporated into remedies using natural attenuation. Such contingencies provide assurance that remedy protectiveness will be maintained should natural attenuation not progress as expected. The trigger(s) for implementing such contingencies should be clearly spelled out in site decision documents.

Summary

EPA believes that natural attenuation should continue to play an important role in the cleanup of sites with contaminated ground water. Furthering the technical understanding of the underlying treatment processes and promoting the responsible use of this remediation method should serve to enhance the role that natural attenuation plays in restoring the nation's ground water. Greater regulatory and public acceptance of natural attenuation will require demonstrating that such remedies will be effective in meeting remediation goals and in protecting human health and the environment over the long period required for cleanup. Demonstrating the effectiveness of remedies using natural attenuation will involve thorough site characterization, careful monitoring of remedy progress, and contingency measures to ensure long-term reliability and protectiveness.

References

1. U.S. EPA. 1990. National Oil and Hazardous Substances Pollution Contingency Plan: Final rule (NCP). Fed. Reg. 55, (46) 8733-8734. March 8.
2. U.S. EPA. 1988. Guidance on remedial actions for contaminated ground water at Superfund sites. Office of Solid Waste and Emergency Response Directive 9283.1-2 EPA/540/G-88/003 (December).
3. U.S. EPA. 1996. Use of natural attenuation at Superfund, RCRA Corrective Action, and UST remediation sites. **Draft directive available in Fall 1996 or Winter 1997.** Office of Solid Waste and Emergency Response.

COMMONLY ASKED QUESTIONS REGARDING THE USE OF NATURAL ATTENUATION FOR CHLORINATED SOLVENT SPILLS AT FEDERAL FACILITIES

This brochure was developed through a partnership among the U.S. EPA, Air Force, Army, Navy, and Coast Guard.

Do federal, state, and local regulations allow natural attenuation as an option for remediation of chlorinated solvents?

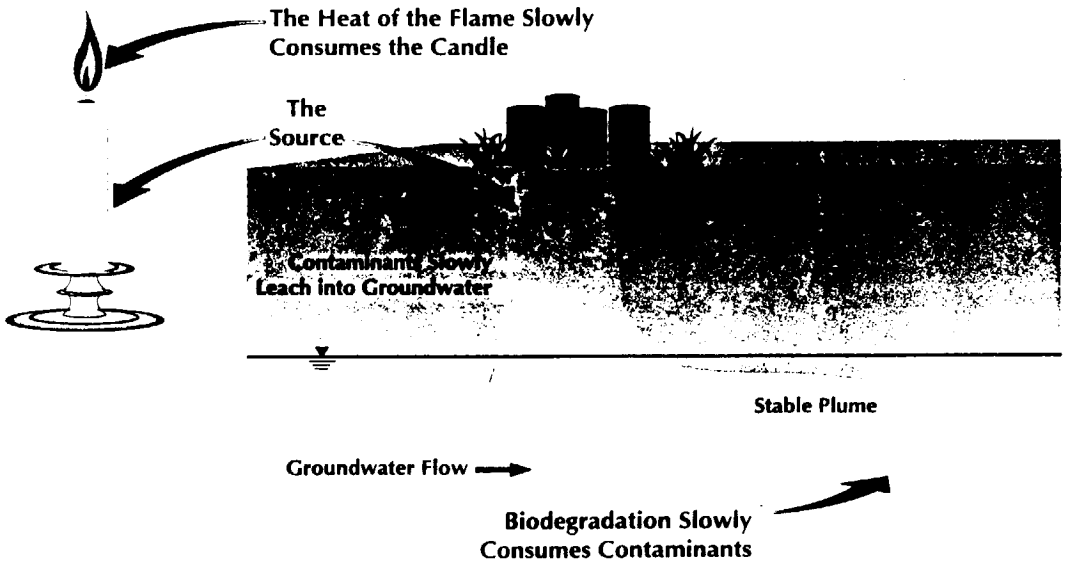
Natural attenuation is recognized by the EPA as a viable method of remediation for soil and groundwater that can be evaluated and compared to other methods of achieving site remediation as a part of the remedy selection process. The selection of natural attenuation as a component of any site remedy should be based on its ability to achieve remediation goals in a reasonable timeframe and protect human health and the environment. EPA recognition of natural attenuation extends to sites regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Resource Conservation and Recovery Act (RCRA); and underground storage tank (UST) regulations. Natural attenuation is not a default option or a "presumptive remedy." As with any remedy, it must comply with state groundwater use classifications and standards.

"Under certain site conditions, and if properly documented, natural attenuation can be a viable option for remediating sites as a stand-alone option or in conjunction with other engineered remediation." Jim Woolford, Director, EPA's Federal Facilities Restoration and Reuse Office

What is natural attenuation?

When chlorinated solvents such as trichloroethene (TCE) or perchloroethene (PCE) are spilled or leak into the soil or groundwater, several natural processes can occur to destroy or alter these chemicals. These processes, known collectively as natural attenuation, include adsorption to soil particles, biodegradation of contaminants, and dilution and dispersion in groundwater. Many contaminants are prevented from migrating off the site because they are adsorbed to soil particles. Although biodegradation does not occur at all chlorinated solvent sites, it can be an important process in destroying these contaminants. Dilution and dispersion do not destroy contaminants, but can significantly reduce their potential risk at many sites.

"Intrinsic" and "passive" remediation are other terms which have been used to describe the combined effect of these processes. Dr. John Wilson of the EPA compares natural attenuation in groundwater to the flame of a candle. The source of the flame is the wax of the candle just as the source of the groundwater contamination is the concentrated solvents trapped in the soil. The flame appears steady because the wax is destroyed in the flame as fast as it is removed from the candle. In the same way, many groundwater plumes will reach "steady state" at some distance from the source, when biological reactions are able to destroy contaminants as they enter the groundwater from the soil. Eventually, the candle is consumed by the flame just as the contaminants in the soil and groundwater can be attenuated through biodegradation and other natural processes.



How is natural attenuation different from the "do nothing" approach?

Natural attenuation is sometimes mislabeled as the "do nothing" or "walk away" approach to site cleanup. The truth is that natural attenuation is a proactive approach that focuses on the verification and monitoring of natural remediation processes rather than relying totally on "engineered" processes.

Before natural attenuation can be proposed for any site, significant soil and groundwater data must be collected and evaluated to document that natural attenuation is occurring and to estimate the effectiveness of natural processes in reducing contaminant concentrations over time. If natural attenuation is selected as the preferred site remedy, the party responsible for site cleanup must commit to long-term monitoring to verify that the contaminants pose no risk to human health or the environment and that natural processes are reducing contaminant levels and risk as predicted. Land use and groundwater use are generally controlled on these sites to prevent human exposure to contaminants.

How does natural attenuation of chlorinated solvents differ from natural attenuation of petroleum products such as fuels?

Because chlorinated solvents are synthetic chemicals, they tend to be more resistant to natural biodegradation processes. However, significant evidence now exists that biochemical reactions can also break down chlorinated compounds in the soil and groundwater. These processes are harder to predict and are effective at a smaller percentage of sites compared to petroleum-contaminated sites. Despite these limitations, significant progress has been made in understanding the fate and transport of chlorinated solvents and the role of natural attenuation.

Chlorinated solvents also migrate differently than petroleum hydrocarbons. Because chlorinated compounds have a greater density than water, they tend to sink rapidly into the aquifer. When large quantities of solvent are released, they will sink until they encounter an impermeable layer where they form small pools which serve as a long-term source of groundwater contamination. These untreated sources dissolve slowly over time, contaminating large volumes of water.

How can you tell if natural attenuation may work at a site?

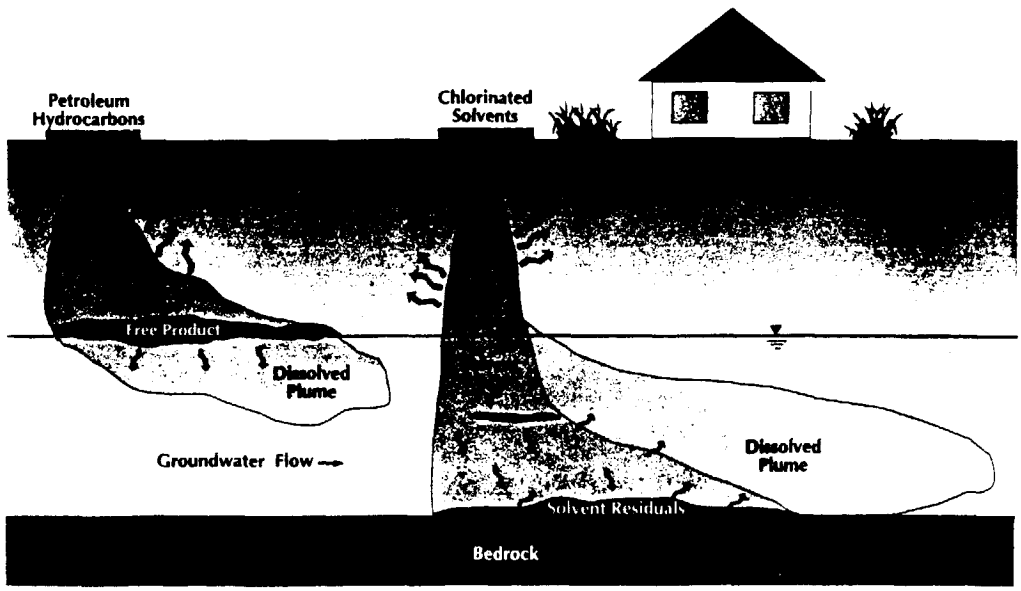
Experts in the science of natural attenuation have identified several good indicators or lines of evidence that can be used to prove that natural processes are reducing contaminant concentrations. The following lines of evidence are useful in documenting the natural attenuation of chlorinated solvents:

- Historical trends indicating a decrease in contaminant concentrations, as well as a stable or retreating plume. A stable or retreating plume generally indicates that contaminants are being destroyed as fast as they are dissolved into the groundwater.

- Favorable geochemical conditions. Biological reactions will change the chemical composition of the groundwater. One condition which is particularly favorable for chlorinated solvent destruction occurs in groundwater that has been completely depleted of oxygen and nitrate. Depleted levels of sulfate and elevated levels of dissolved methane are also favorable conditions.

- Breakdown or "daughter" products. Chlorinated solvents are often destroyed by biochemical reactions which remove one chlorine atom at a time from the "parent" or original solvent. When these breakdown products are detected in the groundwater, it provides evidence that contaminant destruction is underway. It is important for biodegradation to be complete, because some breakdown products may be more toxic than parent compounds.

- Laboratory "microcosm" studies. These studies can be used to simulate aquifer conditions and to demonstrate that native bacteria can create the necessary biochemical reactions to destroy contaminants of concern. This technique is sometimes required for chlorinated solvent sites because the biochemical reactions are more complex and more difficult to predict than reactions on petroleum-contaminated sites.



The Air Force Center for Environmental Excellence is developing a comprehensive natural attenuation protocol (Draft Technical Protocol for Natural Attenuation of Chlorinated Solvents in Groundwater) for chlorinated solvent sites. This document describes how this evidence can be collected during site investigation activities and how it can be interpreted to estimate the contribution of natural attenuation in the remediation process.

Will natural attenuation be effective on all chlorinated sites?

Definitely not. Some chlorinated solvent contamination has impacted large quantities of groundwater which will be required for some beneficial use. There are risks associated with the continued migration of these plumes into public drinking water supplies and some form of engineered remediation is needed at these sites. On sites where no current risk to public health or the environment exists, natural attenuation can play an important role in reducing future risk if institutional controls (e.g., deed restrictions and zoning ordinances) can be implemented. Scientists are beginning to observe certain site profiles where natural attenuation has a higher probability of being integrated into the remediation process. These include:

- Sites where chlorinated solvents are spilled with other petroleum compounds (the best biochemical reactions for degradation are produced).
- Sites where the soil contains high levels of natural organic matter, such as swampy areas or former marshlands.
- Sites where shallow (unused) groundwater is separated from deeper groundwater by a thick, low-permeability clay layer.
- Sites where there is little or no source remaining due to active remediation.

Why are chlorinated solvent spills so common at federal facilities?

Chlorinated solvents were developed as superior cleaning solutions for removing grease and carbon buildup from metal parts. For over 40 years they were widely used by U.S. industry and the federal government for a variety of equipment cleaning tasks.

Prior to environmental laws restricting their use, these compounds were often stored in drums or underground storage tanks and disposed of in the sanitary sewer, in evaporation ponds, or mixed with fuels and burned. These solvents have created significant groundwater contamination at many federal facilities. Since 1976, when RCRA was established, the use and disposal of these solvents have been carefully regulated and many chlorinated solvents have been replaced with less harmful substitutes.

Can natural attenuation achieve site cleanup goals?

Natural attenuation may be effective in achieving cleanup goals at some sites, particularly when these goals are based on site-specific risk reduction. For example, if contaminant migration is limited to shallow groundwater, and groundwater use can be controlled, natural attenuation may eventually achieve cleanup goals on some sites. However, natural attenuation is more likely to play a role in cleaning up a portion of a chlorinated site. Natural attenuation is more likely to clean up areas that have lower levels of contamination. Such areas are normally found outside of highly contaminated source areas, or at sites with relatively small source areas.

What are some of the potential advantages and limitations of natural attenuation?

Potential Advantages

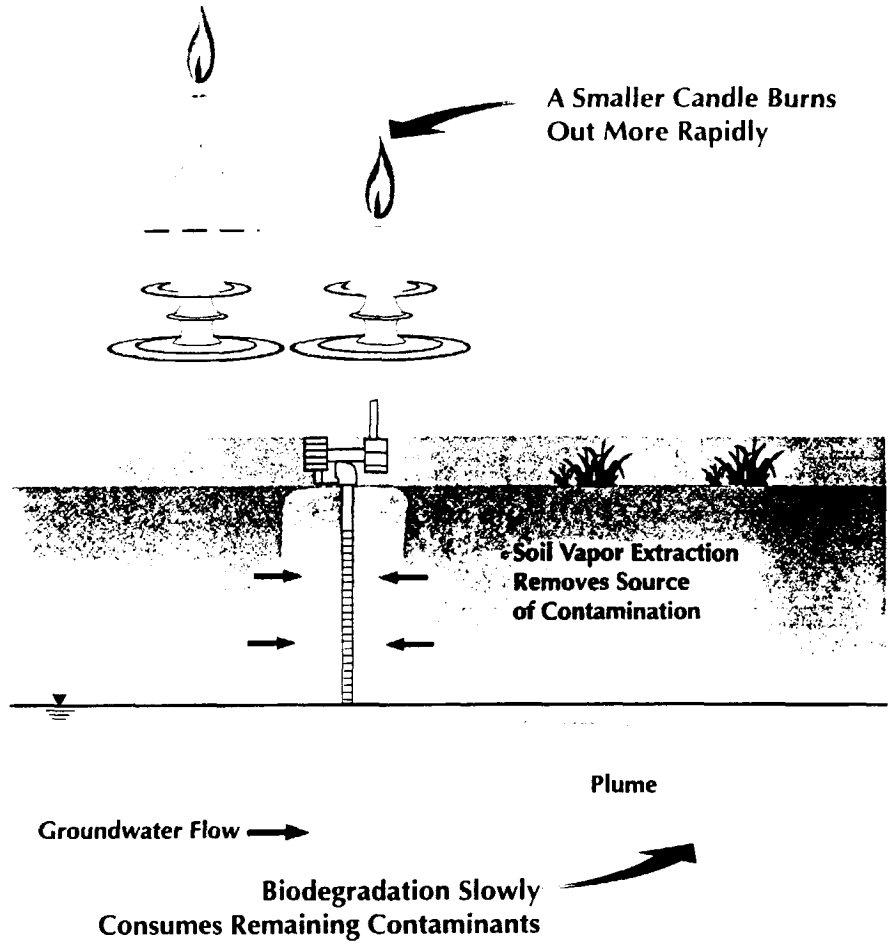
- Less generation or transfer of wastes.
- Less intrusive and disruptive than engineered methods.
- Can be combined with active remedial measures or used to remediate a portion of the site.
- Remediation costs may be lower than with active remediation.

Potential Limitations

- May require more time to achieve cleanup goals and requires a commitment to long-term monitoring. On some sites, long-term monitoring costs can be excessive.
- If natural attenuation rates are too slow, the plume could continue to migrate.
- Incomplete biodegradation can create new, more toxic contaminants.
- Land and groundwater use controls are often required.

Can natural attenuation processes be enhanced to speed up the cleanup process?

Natural attenuation may be successfully combined with other remediation techniques to achieve cleanup goals within a reasonble time frame. Engineered approaches that may be used in conjunction with natural attenuation include hydraulic containment, soil vapor extraction, source removal, and pump-and-treat methods. In addition, non-toxic organic compounds may be added to enhance the breakdown of contaminants.



Again, the candle provides a useful illustration of how active and natural remediation can be combined. If the top of the candle (the source) is cut off and removed, the flame (plume) will exist for only a fraction of the original time. Soil vapor extraction, free product recovery, soil excavation, and groundwater extraction in the source area are all methods of reducing or containing the source of solvent contamination. The rate at which the candle burns can also be increased by improving the conditions for combustion. As mentioned previously, many chlorinated solvents actually degrade faster in the absence of oxygen under anaerobic conditions. Researchers are now developing methods of adding highly biodegradable organic compounds to increase the natural bacteria population in the groundwater which will consume available oxygen and create these favorable conditions. Regardless of whether an engineered remediation or natural attenuation is used, controls on groundwater use will be required on most chlorinated solvent sites.

What if natural attenuation does not work at a site?

As with any remedy, if monitoring results indicate inadequate progress, it will be necessary to reevaluate the remedial action plan. If this occurs, the remediation project manager would consider implementing an engineered approach for all or part of the plume.

This brochure was developed through a partnership among the U.S. EPA, Air Force, Army, Navy, and Coast Guard. If you would like additional information about natural attenuation and its application at federal facilities, you may fax your request to the National Center for Environmental Publications and Information at (513) 489-8695 or contact the following agency home pages on the Internet:

EPA - http://www.epa.gov
Air Force - http://www.afcee.brooks.af.mil
Army - http://aec-www.apgea.army.mil:8080
Navy - http://www.nfesc.navy.mil
Coast Guard - http://www.dot.gov/dotinfo/uscg