JACOBS ENGINEERING GROUP INC.

	PROJECT NOTE NO.	PROJECT NO.
M60050.001024 MCAS EL TORO SSIC # 5090.3	PN-0145-73 CLE-C01-01F145-I2-0057	01-F145-H6 M60050.001024

CONFIRMATION OF:	CONFERENCE	X	DATE HELD	17-18 February 1993
	TELECOM		DATE ISSUED	12 March 1993
	OTHER		RECORDED BY	Charles Flagg/CH2M HILL
			PLACE	Santa Ana, California

SUBJECT

Contract Task Order (CTO) No. 145
MCAS El Toro Remedial Investigation/Feasibility Study (RI/FS)
Remedial Project Managers (RPM) Meeting

PARTICIPANTS: (* DENOTES PART-TIME ATTENDANCE)

See pages 9 and 10

ACTION REQ'D. BY	ITEM

A two day meeting of the Marine Corps Air Station (MCAS) El Toro Remedial Project Managers (RPMs) was held on 17 and 18 February 1993 with representatives from MCAS El Toro; Naval Facilities Engineering Command, Southwest Division (SOUTHWESTDIV); U.S. Environmental Protection Agency (EPA); California Environmental Protection Agency (Cal-EPA), Department of Toxic Substances Control (DTSC); California Regional Water Quality Control Board (RWQCB), Santa Ana Region; Orange County Water District (OCWD); Jacobs Engineering Group Inc. (JEG); and CH2M HILL. These meeting minutes provide a summary of agenda items discussed; a copy of the agenda is attached.

17 February 1993

The meeting began with presentation by John Scandura, Chief of the Site Mitigation Branch of DTSC, concerning the reorganization of DTSC. As a result of the reorganization, Joe Zarnoch has replaced Manny Alonzo as the DTSC RPM for MCAS El Toro. Joe Zarnoch's telephone number is 310/590-4878. Thank you Manny Alonzo for your long standing dedication to this project and to the team.

Andy Piszkin/Code 1812.AP introduced Janet Corbett, who is an Industrial Hygienist in the Technical Branch of SOUTHWESTDIV. John Broderick/RWQCB then introduced Larry Vitale who is assigned to the RWQCB's Federal Facilities Branch. Both Janet Corbett and Larry Vitale were present as observers.

Partnering Issues

Andy Piszkin stated that revisions to the team phone book were not complete but would be completed and distributed at the next RPM meeting.

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Team Health Check

John Hamill/EPA stated that during a recent RPM meeting for Marine Corps Logistics Base (MCLB) Barstow, the project team instituted a Team Health Check.

John Hamill voiced concern that a misunderstanding may have arisen regarding direct communication between Sebastian Tindall/Bechtel Corp. and Roy Herndon/OCWD concerning selection of groundwater modeling. The consensus of the Project Team is that open technical discussion among Team members is welcomed; however only the Navy and OCWD may make binding agreements. LCDR Serafini stated that MCAS El Toro sent a letter to OCWD stating general acceptance of the project and assigning SOUTHWESTDIV action for negotiating the final agreements in two parts (the monitoring wells and all other work). SOUTHWESTDIV will send a technical letter on 22 February 1993. The current OCWD proposal was distributed to the Team members.

John Hamill indicated that a Record of Decision (ROD) had been recently signed at another EPA Region IX site with groundwater issues. John Hamill will provide information to Andy Piszkin regarding this site and the groundwater model used.

Desire Chandler/Code 1812.DC stated that the Graphic Plan has not be completed and provided copies of the plan as it currently stands (attached). The revised Graphic Plan will be distributed at the next RPM meeting.

CTO Scope Status

Andy Piszkin distributed copies of the February 1993 Technical Proposal for Contract Task Order (CTO) No. 145. The scope of work includes the Feasibility Study (FS) for Operable Unit (OU) -1; assessment of treatability study and testing for OU-1, -2, and -3; groundwater modeling for OU-1; RI/FS Phase II planning documents; and groundwater sampling water level monitoring (attached). Desire Chandler then presented a brief overview of the streamlined approach to cost proposal approval which entails submission of separate Technical Proposals and Cost Proposals.

RCRA Facility Assessment (RFA) Report

Andy Piszkin stated that the RFA Decision Diagram has not been completed. Mike Arends/RFA Project Manager/CH2M HILL introduced Daryl Hernandez/CH2M HILL and Tim Smith/CH2M HILL who were principal players in the RFA field activities. Mike Arends then distributed copies of the proposed outline for the Draft RFA Report and RFA Sampling Strategy (attached).

There was general discussion concerning geophysics used to locate underground utilities. Mike Arends stated that over 700 borings had been completed and only two PVC lines (without tracer wires) were hit. The consensus of the Project Team is that this is a good track record.

Daryl Hernandez and Tim Smith presented the findings of the RFA laboratory data with handouts showing (PCE) and (TCE) hits at Solid Waste Management Units (SWMUs). It was stated that only 37 hits occurred in approximately 1,000 samples with SWMU 194 registering the highest detected level of 130 parts per billion (ppb). All of the

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detected PCE and TCE were primarily found in Area 3, in the northeast area of MCAS El Toro.

Mike Arends distributed a paper that described the leaching model contaminant (Long Beach Values [LBVs]), developed for use at the Long Beach Naval Shipyard as a preferable action level to MCLs for contaminants in soils. LBVs take into account attenuation and the potential of a compound to leach to groundwater. Mike cautioned that the sites were different--the LBVs were meant to show the kind of approach that could be taken to evaluate contaminants.

LCDR Serafini said that it was not acceptable to use LBVs for MCAS El Toro. However, it was acceptable to use the approach as a model. In general, it contaminant levels were below MCLs, though, we can probably assume that there will be no impact to groundwater.

Andy Piszkin suggested that since the RFA data is so close to MCLs that it would be a conservative approach to use the LBVs for a first approximation. Mike Arends agreed, but stated that he will also consider other lines of evidence when making his recommendations. Joe Zarnock suggested that Mike present the report with his recommendations and the regulatory agencies will review it.

John Broderick asked whether any samples had high levels of petroleum hydrocarbons, that may have caused the detection limit to be raised. Mike Arends responded that there were no high concentrations of hydrocarbons.

Andy Piszkin stated that further action sites will go into the RI/FS and must go to a ROD and that it may be more expedient to treat some sites outside of the RI/FS. John Broderick pointed out that the RWQCB accepts attenuation models, and will evaluate whatever the Navy proposes. Also, the Navy needs to explore ways to put petroleum-contaminated sites into another program than the RI/FS.

(BREAK FOR LUNCH)

Andy Piszkin indicated that during a lunch discussion, the agencies suggested that Preliminary Remedial Goals (PRGs) may be better than MCLs to use as the decision criteria for the RFA. He then distributed a copies of Draft PRG guidance from EPA provided by John Hamill. Mike Arends will use his best professional judgement in the Draft RFA Report for agency review.

Sebastian Tindall voiced concern regarding exchange of information among the various Navy sites. He said that the risk based criteria used for MCAS Yuma, created with input from EPA and using the Data Quality Objectives (DQOs) approach, may be useful for MCAS El Toro site screening. Andy Piszkin will obtain a copy of the MCAS Yuma document.

OU Definitions

Davi Richards/CH2M HILL discussed the position paper (attached) on the Definition of OUs-1, -2, -3, and -4. OU-1 is defined as groundwater on and off-Station that is contaminated with constituents that have migrated from sites at MCAS El Toro. OU-2 is

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comprised of all environmental and deposited media at sites at MCAS El Toro, and OU-3 is all environmental and deposited media,other than air, at all other sites that are sources of groundwater contamination that contain contaminants that may have entered the soil and will not impact groundwater. Sebastian Tindall asked if it were appropriate to include all groundwater in OU-1. LCDR Serafini suggested that it may be more appropriate to treat a "hot spot" locally rather than relying on the OCWD Desalter. Roy Herndon/OCWD indicated that the Desalter will unavoidably draw water across OUs and therefore it may be better to include all groundwater in OU-1. Chuck Elliott stated that the DQO process will allow definition of site boundaries and may recommend that all groundwater be included in OU-1.

Andy Piszkin stated that local treatment may be a "Point of Compliance" (POC) issue. LCDR Serafini said that according to the FFA, the site is the Station boundary. John Broderick indicated that the POC can be local or the Station boundary. The Project Team consensus is that the Team will reach a decision during the DQO process.

Davi Richards stated that she will propose Remedial Action Objectives during the March RPM meeting. John Broderick then asked if an FS was needed for OU-1 since OCWD has already completed an FS. John Hamill stated that Superfund Accelerated Cleanup Model (SACM) seeks to streamline the RI/FS process and as a result, the Project Team may rely on OCWD's studies for most if not all of the FS. Copies of the OCWD's updated Irvine Desalter Facility Plan, Project Report, and Cost sharing Analysis will be provided to the agencies for evaluation of the level of effort required for the MCAS El Toro OU-1 FS. Davi Richards will compare the National Contingency Plan (NCP) FS requirements to the OCWD's documents to identify gaps and evaluate their importance, and present her recommendations in a position paper for buy-off by the Project Team at the March 1993 RPM meeting.

MCAS El Toro Master Plan

LCDR Serafini introduced Ann Dotson/MCAS El Toro Planning Department, who provided an overview of the MCAS El Toro Master Plan. Ann Dotson stated that the Station Master Plan is dictated by self-imposed restrictions in addition to geographic restrictions in close association with local government agencies. MCAS EL Toro adheres to a strict noise abatement program that requires that aircraft take off and rapidly climb over the mountains. This would be nearly impossible for commercial aircraft to accomplish and virtually assures that MCAS El Toro will not become a commercial airport.

Ann Dotson stated that no new family housing has been built on MCAS El Toro since the 1970s because of Station utilization and aircraft clearance zones. It is permissible to construct buildings on Installation Restoration Program (IRP) sites. However, to do so requires undergoing an informed decision-making process. The IRP site must be remediated prior to any construction. In the event that MCAS El Toro is sold, institutional control of IRP sites can be accomplished through deed restrictions. Ann Dotson also stated that if the Station were to close, the Navy would be required to follow CERCLA property transfer requirements.

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RI Phase I Technical Memorandum Update

Sylvia Ross/CH2M HILL stated that data are still being evaluated. Based on current data, there appears to be three possible TCE source areas; two possible benzene, toluene, xylene, and ethylbenzene (BTXE) areas; and one possible Dioxin area at the Burn Pits. Sylvia Ross will present an update at the next RPM meeting. The Project Team was provided a copy of the revised Phase I Technical Memorandum outline.

Chuck Elliott requested a copy of the most recent dioxin/dibenzofuran equivalency calculations from the regulatory agencies. Joe Zarnoch will provide this information on behalf of DTSC.

18 February 1993

RI/FS OU-1 Completion

Davi Richards reviewed a Conceptual Flow Diagram for the OU-1 RI/FS Completion (attached). She stated that the timing for the ROD is approximate and may change as a result of on-going evaluation. The following three items were identified for position papers that CH2M HILL will produce and distribute to the Project Team prior to the next RPM meeting: Remedial Action Objectives; a focused approach for the OU-1 ROD; and NCP FS requirements as they relate to the OCWD Irvine Desalter Facility Plan.

LCDR Serafini stated that the group had made a decision to use the OCWD model. CH2M HILL will review the model and evaluate how it may be updated with Phase I RI data. Sebastian Tindall said that this was new information to him. Andy Piszkin confirmed that we agreed to use the model. The task now is to evaluate data gaps and update it as part of the FS. Sebasian Tindall then said that there should be a paper prepared that summarizes the analysis of the model for agency review. It was decided that on 5 May 1993, agency modelers will meet with CH2M HILL staff to review the technical aspects of the CH2M HILL adaptation of the OCWD model. Davi Richards will provide a paper for agency review two weeks prior to the modelers meeting that summarizes the findings to date and identifies measures to take at the meeting. Following the modelers meeting, a summary of conclusions will be provided to the Project Team for review at the May 1993 RPM meeting.

Level III Versus Level IV Laboratory Analysis

Artemis Antipas/CH2M HILL briefed the Project Team on the similarities and differences between Level III and Level IV laboratory analysis. It was explained that in the past there were significant differences between the two levels. However, with Level IV software being standardized and purchased by most certified laboratories, the cost differences between the two levels have nearly vanished. The differences between Levels III and IV can be understood by describing the elements of an analytical program.

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To analyze environmental samples and obtain data of known and appropriate quality, the following elements are defined prior to analysis for each parameter (compound or potential contaminant of concern):

1. The analytical method–sample preparation techniques and instrumental parameters.

2. The specific quality control (QC) procedures to be implemented–e.g., specifications regarding the standard solutions to be used for calibrations and spiking of the samples (introducing known concentrations to establish accuracy) or use of blank standards to establish contamination introduced by the laboratory. With the current state of the art for the analytical methods, the QC procedures are a necessity as opposed to being optional.

3. Level of effort–required frequency of QC runs; e.g., the calibration standard(s) be analyzed daily or after every 10 samples.

4. QC control limits–QC procedures result in an analytical number, which needs to be evaluated for obtaining data of known quality. QC control limits give upper and lower limits of acceptable numbers. QC control limits are based on prior data bases established by a regulatory agency or the laboratory.

5. Laboratory corrective action requirements need to be defined for when the data are outside the defined control limits.

6. Laboratory documentation/deliverables.

Artimas Antipas the above-described elements are not defined by referencing standard EPA method. Referencing an EPA or other standard method defines only element 1. and gives guidance but not the specifics needed for the QC procedures, which are project- and laboratory-specific.

Level IV defines elements 1 through 6 through EPA Laboratory Contract Program statement of work, in great detail.

For Level III, elements 2 through 6 can be defined through one of the following ways:

- By referencing an existing regulatory QA/QC program developed for the specific parameter of concern; e.g., EPA defined QA/QC specifications for EPA 624 volatiles, EPA 625 semivolatiles, EPA 608 pesticides/PCB, EPA 200 metals under the CERCLA program known as Contract Laboratory Program (CLP). This program's specifications are based on data bases built from over 100 laboratories for over a decade; implementation of these procedures ensure data of known (not necessarily superior) quality; this ensures technical soundness, reproducibility, and defensibility. The CLP program is currently implemented by most laboratories even if the laboratory is not in the EPA CLP; more recently, these QA/QC procedures are implemented through commercially available software packages, thus the recent cost-effectiveness of CLP quality data.

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- By implementing laboratory-specific standard operating procedures, if the laboratory has written defined procedures—this approach does not ensure reproducibility, defensibility, or project needs.
- By developing project-specific specifications—technically, this is not always a sound approach nor is there assurance that the laboratory can implement the specifications.

Artemis Antipas stated that currently the difference in market prices for Level III versus Level IV has dissipated in view of the commercially available CLP software packages as noted above; thus, the choice of CLP protocols for these studies. Further cost savings have been obtained by volume bids and reduction of documentation requirements on 90 percent of the packages.

The CLEAN program is receiving Level IV laboratory analysis with some reduction in the documentation requirements. Artemis Antipas stated that the project has experienced good service and turnaround for MCAS El Toro laboratory analysis. All of the laboratories utilized on this project are Naval Energy and Environmental Support Agency (NEESA) certified and are audited on a routine basis by both NEESA and Artimis Antipas.

ITEMS Program

Andy Piszkin stated that the ITEMS System will be on-line between May and June 1993. SOUTHWESTDIV will provide system administration. Training for the new system will be provided as part of Navy Contract Task Order (CTO) No. 259. Andy Piszkin will provide a list of hardware requirements and a training schedule at the next RPM meeting.

DOQ Schedule

Chuck Elliott presented a position paper on the Data Quality Objective (DQO) Process and Schedule for the MCAS El Toro RI/FS (attached). Chuck Elliott indicated that the dates listed in the position paper are a point-of-departure although the DQOs must be completed by 1 July 1993 to meet FFA deadlines. The Project Team decided that three DQO meetings should be scheduled with two meetings for general directions to CH2M HILL, and one meeting to do Site 18, one OU-2 site, and one OU-3 site. See meeting schedule for dates and locations selected.

(BREAK FOR LUNCH)

ARARs

Andy Piszkin stated that SOUTHWESTDIV will be sending letters to all agencies to confirm all ARARs in response to letters previously sent to the Navy by the agencies.

Background Soil Threshold Levels

Yueh Chuang/CH2M HILL presented a position paper concerning the Proposed Background Soil Threshold Levels for Metals and Other Waste Classification Issues

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(attached). Yueh Chuang stated that the background has been determined using the multiple univariate statistical approach with a power of 90 percent and a confidence of 85 percent. This will be applied to the waste to determine the proper method of disposal.

John Hamill on behalf of the regulatory agencies voiced concern that the information was not presented to the agencies ahead of time for evaluation. Also, the multiple univariate approach was a departure from the multiple variate approach that the Project Team previously accepted. Andy Piszkin stated that the team had previously set the 80 percent confidence and 90 percent power criteria. Confidence had now been raised to 85 percent. In addition, the multiple univariate approach was more conservative than the mulitple variate approach and that the change was equivalent to making a field change. Bruce Peterson/CH2M HILL statistician explained the advantages of using the mulitple univariate approach which was accepted by the Project Team.

John Broderick stated that he did not recall agreeing that the criterion for Total Petroleum Hydrocarbons should be set at 300 ppm. This limit was too low for gasoline. He was concerned that analytical Method 418.1 not be used during Phase II since it does not provide a differentiation between gasoline and diesel. LCDR Serafini agreed to provide the specifications analysis for JP-4, JP-5, and JP-8 to the Project Team. Yueh Chuang will revise the position paper to address gas and diesel fuel analysis.

It was agreed that the Project Team will be provided review material a least one week prior to the RPM meeting and that the meeting agenda should be revised to identify items of an informational nature versus those items that require decisions on the part of the Project Team.

Risk Assessment

Liz Miesner/CH2M HILL reviewed her position paper concerning the Preliminary Risk Assessment for OU-1, -2, and -3 and the Proposed Baseline Human Health Risk Assessment for OU-1 (attached). The Preliminary Risk Assessment position was presented as information on format and general content.

Manny Alonzo pointed out that often State levels for risk were lower than federal levels. Andy Piszkin replied that as a matter of policy the Navy will use federal levels. If the State wished to use lower levels, the Navy will request justification why the stricter standards should be met.

Manny Alonzo stated that about 5 chemicals, such as vinyl chloride, have action levels that are below the detection limit. During Phase II, we may want to analyze these chemicals by Special Analytical Services (SAS) analyses. Chuck Elliott pointed out that we will still analyze all VOCs during Phase II groundwater sampling. The team will not drop out individual chemicals, but rather analytical methods. So, VOCs like vinyl chloride will still be analyzed, since it is highly unlikely that the team would drop VOCs from analysis. If SAS analyses are required, it would be better to require them on samples taken of water after treatment by the Desalter. Manny Alonzo said that there were other alternatives to SAS, such as using proxy levels to calculate an action level,

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or model the percentage of trichloroethylene that will revert to vinyl chloride. These issues should be decided by the risk assessors.

Action Items

o Technical letter on desalter to OCWD	Andy Piszkin	22 February 1993
o Update of graphic plan	Andy Piszkin	12 March 1993
o Position paper on Remedial Action Objectives	Davi Richards	12 March 1993
o Position paper on FS for OU-1	Davi Richards	12 March 1993
o Regulatory method for dioxin calculation	John Hamill Joe Zarnoch	12 March 1993
o ITEMS hardware list	Andy Piszkin	24 March 1993
o ITEMS training plan	Andy Piszkin	24 March 1993
o ARARs letter to all agencies	Andy Piszkin	5 March 1993
o JP-4, 5, and 8 specifications and analysis	LCRD Serafini	12 March 1993
o Revise agenda for next meeting to reflect information versus action items	Andy Piszkin	12 March 1993
o Presentation on Navy Funding Processing	Sebstian Tindall	24 March 1993
o Letter on DTSC RPM Change	Manny Alonzo	26 February 1993
o Updated graphic for RI update	Sylvia Ross	24 March 1993

Future Meetings

Risk issues	CH2M HILL/EPA/DTSC	Week of 21 February 1993 Phone conference
RPM meeting at SF	All the Team	24 - 25 March 1993
DQOs general at SA	All the Team	14 - 15 April 1993
Groundwater model at SA	Model exp. all	5 May 1993
DQOs general at SF	All the Team	10 - 11 May 1993
RPM meeting at Riverside	All the Team	26 - 27 May 1993
DQOs site 18, sample OU-2 and OU-3 at El Toro	All the Team	9 - 10 June 1993
RPM meeting at El Toro	All the Team	23 - 24 June 1993

Attendees - 17 February 1993

Andy Piszkin - Code 1812.AP
Janet Corbett - Code 1852.JC
Chrisa Mitchell - MCAS El Toro
Manny Alonzo - DTSC
Desire Chandler - Code 1812.DC
LCDR L. Serafini - MCAS El Toro
John Hamill - US EPA
Joe Zarnoch - DTSC

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John Broderick - RWQCB
Roy Herndon - OCWD
Amir Matin - JEG/PAS
Mike Arends - CH2M HILL/SCO
Charles Flagg - CH2M HILL/SCO
*Daryl Hernandez - CH2M HILL/SCO
*Ann Dotson/MCAS El Toro
Larry Vitale - RWQCB
Sebastian Tindall - Bechtel Corp.
Davi Richards - CH2M HILL/CVO
Chuck Elliott - CH2M HILL/SAC
*Sylvia Ross - CH2M HILL/SCO
*Tim Smith - CH2M HILL/SCO

Attendees - 18 February 1993

Andy Piszkin - Code 1812.AP
Janet Corbett - Code 1852.JC
Chrisa Mitchell - MCAS El Toro
Manny Alonzo - DTSC
John Broderick - RWQCB
Sebastian Tindall - Bechtel Corp.
Chuck Elliott - CH2M HILL/SAC
Bruce Peterson - CH2M HILL/SEA
Liz Miesner - CH2M HILL/SFO
*Yueh Chuang - CH2M HILL/SCO
Desire Chandler - Code 1812.DC
LCDR L. Serafini - MCAS El Toro
John Hamill - US EPA
Joe Zarnoch - DTSC
Larry Vitale - RWQCB
Amir Matin - JEG/PAS
Mike Arends - CH2M HILL/SCO
Davi Richards - CH2M HILL/CVO
Charles Flagg - CH2M HILL/SCO
*Artemis Antipas - CH2M HILL/SEA

*Part-Time Attendee

Nonparticipant Distribution

Robin Green - Code 0232.RG
Mary Nuzum - Code 1812.MN
John Dolegowski - CH2M HILL/SCO
Ken Tomeo - CH2M HILL/SCO
Mike Bittner - CH2M HILL/ABQ
File - PMO
File - CTO Notebook/PMO
File - CH2M HILL

MANAGERS MEETING
MCAS EL TORO RI/FS & RFA
PROGRESS & PLANNING ACTIVITIES

17 & 18 February 1993
8:30 A.M.

Location: State of California EPA
Department of Toxic Substances Control
245 W. Broadway, Suite 350
Long Beach CA 90802-4444
310/590-4904

WEDNESDAY
0830-0900 Partnering Issues.
- Handout of revised Team Phone Book
- Team Health & Communication Check
- Review agenda topics & time limits

0900-1200.
- CTO/Scope Status List (30min-SWDIV)
- Finalized RFA decision diagram (30min-SWDIV)
- RFA presentation of results & OU-4 recommendations (2hr-HILL)

Lunch.

1315-1700.
- Revised Tech Memo outline (10min-HILL)
- Presentation of latest RI/FS progress (35min-HILL)
- DQO Schedules (30min-HILL)
- FS Options for OU-1 (2 1/2hrs-HILL)

THURSDAY
0830-1130.
- continue with OU-1 discussion (1hr)
- ITEMS Hardware Procurement status (5min-SWDIV)
- Level 4 vs. Level 3 cost comparison paper (10min-HILL)
- Brief on Master Plan for El Toro (1hr-EL TORO)
- Background Report status (1hr-HILL)

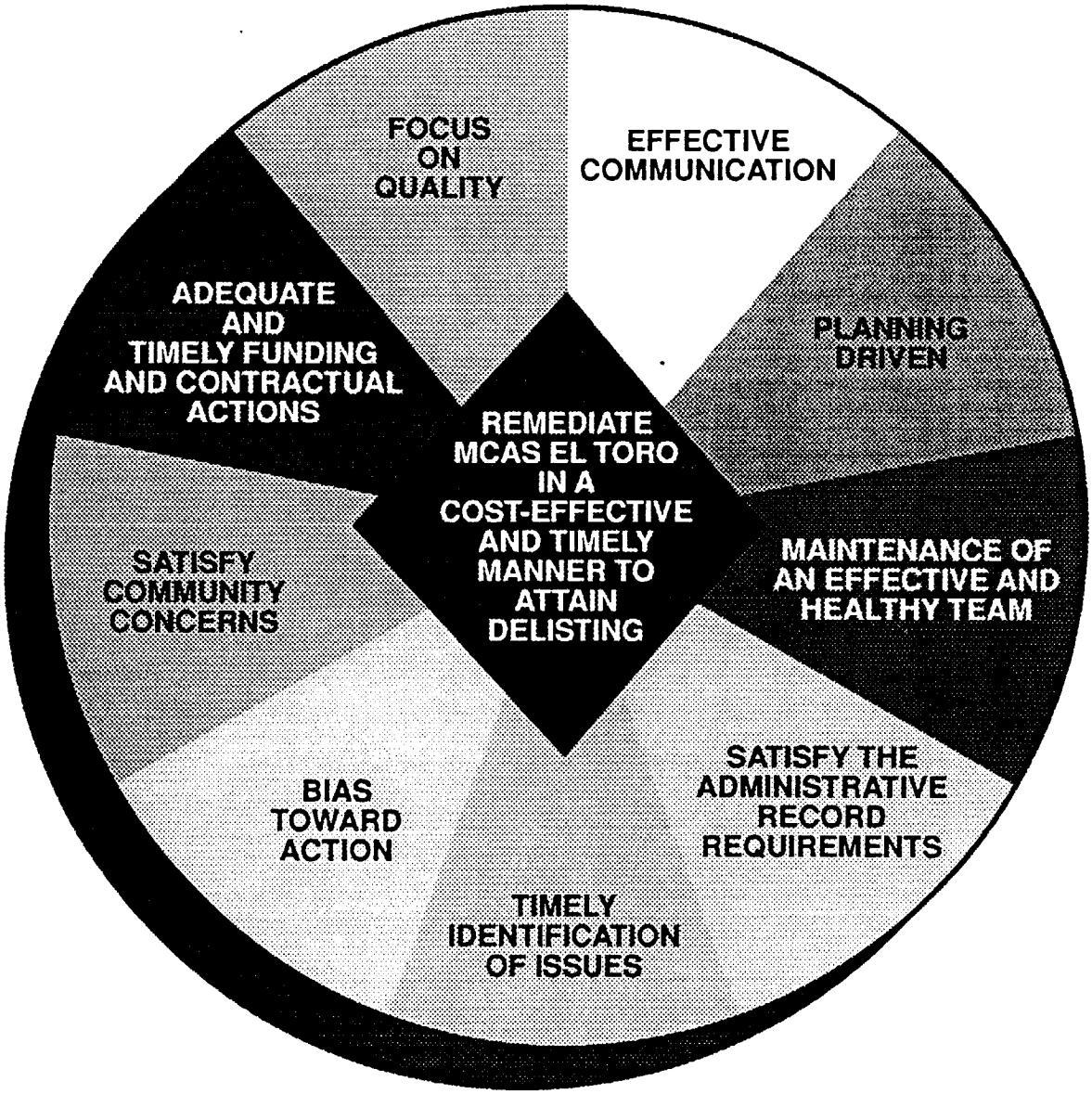
Lunch.

1245-1530.
- Sample Risk presentation table (15min-DTSC)
- Risk Assessment Position Paper (2hrs-SWDIV & HILL)
- ARARs status (30min-SWDIV)

1530-1540 Future Meeting(s).
- Next Managers Meeting: _____
- Who should attend?

1540-1615 Meeting Assessment & Reality Check.
- Summarize key points & goals accomplished
- Action Items (what, who, when)
- Assessment

MCAS EL TORO GRAPHIC PLAN



2/15/93

OUTLINE
DRAFT EL TORO RFA REPORT

EXECUTIVE SUMMARY

1.0 INTRODUCTION

2.0 BACKGROUND

2.1 Historical Description of MCAS El Toro

2.2 Site Location

2.3 Site Operations and Hazardous Waste Generation, Handling, and Disposal

2.4 Previous Site Investigations and Regulatory History

2.4.1 General

2.4.2 NPL Listing

2.4.2 CERCLA Investigations

2.4.3 RCRA Activities

2.5 Environmental Setting

2.5.1 Setting and Topography

2.5.2 Surface Water

2.5.3 Climate

2.5.4 Geology

2.5.5 Hydrogeology

2.5.6 Groundwater Chemistry

2.5.7 Ecology

3.0 PRELIMINARY REVIEW

3.1 Agency Files Reviewed

3.2 Navy/Marine Corps Files Reviewed

3.3 Photographs Reviewed

3.4 Interviews with Station Personnel

3.5 Other Information Reviewed

3.6 Summary of Results

4.0 VISUAL SITE INSPECTION REPORT (VSI)

4.1 Summary of Work

4.2 Summary of Results

5.0 SAMPLING VISIT

5.1 Sampling Objective

5.2 Sampling Plan

5.3 Pre-Sampling Activities

5.3.1 Boring Location Selection

5.3.2 Geophysical Survey

5.4 Field Methods and Procedures

5.4.1 Drilling Methods

5.4.1.1 Hand Auger Borings

5.4.1.2 Twenty-Five-Foot Vertical Borings

5.4.1.3 Sixty-Foot Angle Borings

5.4.2 Soil Boring Logs

5.4.3 Completion of Borings

5.4.4 Soil Vapor Headspace Analysis

5.4.5 Health and Safety Procedures

5.4.6 Surveying

5.5 Analytical Testing

5.5.1 Types of Analyses

5.5.2 Laboratories

5.5.3 Quality Control Samples

5.5.4 Metals Background Samples

5.5.5 Data Validation

5.6 Waste Management

5.7 Sampling Visit Work Plan Amendments

5.7.1 Borehole Locations

5.7.2 New SWMUs and Areas of Concern

5.7.2.1 SWMU/AOC 300 - Solvent Spill Area

5.7.2.2 SWMUs/AOCs 301 and 302 - Mark 21 Arrest System

5.7.2.3 SWMU/AOC 303 - UST at Building 359

5.7.2.4 SWMU/AOC 304 - Conduit Trenches Inside Building 359

5.7.3 Sampling Procedures

5.7.4 Analytical Testing

5.8 Sampling Visit Results

5.8.1 Sample Analytical Results

5.8.2 Quality Control Samples

5.8.3 Metals Background Samples

6.0 DATA EVALUATION, CONCLUSIONS, AND RECOMMENDATIONS

6.1 Evaluation Procedure

7.0 REFERENCES

APPENDICES

Appendix A - Sampling Visit Analytical Results

Appendix B - Boring Location Maps

Appendix C - Boring Logs

FIGURES

2-1 Location (Vicinity) Map

2-2 MCAS El Toro Site Boundary

5-1 Locations of Solid Waste Management Units and Areas of Concern

TABLES

3-1 Photograph Review Summary

3-2 List of Station Personnel Interviewed

3-3 SWMUs/AOCs Identified During Preliminary Review

5-1 Hand Auger Borings

5-2 Twenty-Five-Foot Vertical Borings

5-3 Sixty-Foot Angle Borings

5-4 Chemical Analyses at SWMUs/AOCs

5-5 MCAS El Toro RFA Laboratories

5-6 Amended Sample Locations

5-7 SWMUs/AOCs with Cyanide Analysis

JACOBS ENGINEERING GROUP INC.

MEMORANDUM

TO: Andy Piszkin - Code 1812.AP
Desire Chandler - Code 1812.DC

DATE: 15 February 1993

FROM: John Dolegowski - CH2M HILL
Davi Richards - CH2M HILL/CVO

SUBJECT: **Definition of Operable Units (OUs) 1, 2, 3, and 4 for Marine Corps Air Station (MCAS) El Toro**

Proposed Definitions

The following proposed definitions are more explicit and extensive than those in previous documents, but are not substantially changed:

- **OU-1**: OU-1 includes groundwater on- and off-Station that is contaminated with constituents that have migrated from sites at MCAS El Toro. No other environmental media are included in OU-1.

- **OU-2**: The following five sites constitute OU-2: the Magazine Road Landfill (Site 2), the Original Landfill (Site 3), the Perimeter Road Landfill (Site 5), the Petroleum Disposal Area (Site 10), and the Communication Station Landfill (Site 17). This OU includes all environmental and deposited media at these sites other than air: surface soil, subsurface soil, landfill solids and liquids, sediment, surface water, groundwater, and any liquid or solid contaminants that may have entered the soil or groundwater.

  Note: The delineation of which groundwater is in OU-1 and which is in OU-2 will be made on the basis of actual data from Phase 1, during step 4 of the DQO process, which requires that the boundaries of each site be defined. Possible criteria for this definition might be 1) by concentration gradient, or 2) by capture zone for a well (or wells) proposed for source control downgradient from an OU-2 site.

- **OU-3**: The remaining 16 sites identified under the Navy Assessment and Control of Installation Pollutants (NACIP) program constitute OU-3: Sites 1, 4, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 19, 20, 21, and 22. This OU includes all environmental and deposited media at these sites other than air and groundwater: surface soil, subsurface soil, sediment, surface water, and any liquid or solid contaminants which may have entered the soil.

- **OU-4**: Sites at MCAS El Toro that are identified during the current Resource Conservation and Recovery Act (RCRA) Facility Assessment as requiring further investigation will constitute OU-4. OU-4 will include all environmental media (other than air) present at the identified sites.

Figure 1 is a graphic summary of the OUs.

Continuing Reevaluation

As new data becomes available, the proposed definitions of the OUs will be reevaluated and refined, as appropriate, to respond to actual site conditions in a coherent, logical approach both technically and administratively. The definitions of the OUs can be modified at any time by agreement among the parties to the Federal Facilities Agreement (FFA). For instance:

- **New Source Areas.** If localized areas of groundwater were found to be contaminated at high concentrations ("hot spots"), which could serve as continuing sources to the wider plume area, they would probably be addressed by OU-2. For instance, if Site 7, presently in OU-3, were found to have a concentrated source of trichloroethane (TCE), it would more logical to move it to OU-2 so that it could be addressed in the same Feasibility Study (FS) with the other areas that are potential sources of contamination to groundwater.

- **New Plume.** If a new plume of low level groundwater contamination was found that was not clearly associated with a source area, it would probably be most logical to evaluate it as part of OU-1.

- **Contamination Intermediate Between OUs.** If contamination were discovered at some intermediate distance from a present OU-2 site and were not clearly associated with one of the OU-2 sites, a case by case decision would be made on the basis of the actual data and local hydrogeology.

Rationale for Definitions

The following criteria are relevant to defining the OUs.

- **Control of Migration vs. Source Control**

  OU-1 will deal with contamination which has already migrated into the regional groundwater system from its original source(s). OUs-2 and 3 (and presumably 4) will deal primarily with contamination that is still at or near the source of the release. These differences will require that different issues (i.e., control of migration vs. source control) be considered during investigation, evaluation, and remediation, making it logical to consider them in separate OUs.

- **Schedule**

  If the DQO for OU-1, which is to be performed on the basis of Phase I data, indicates that a Phase II Remedial Investigation (RI) is not required for OU-1, the proposed definitions of OUs-1 and 2 will allow OU-1 to proceed to a Record of Decision (ROD) more quickly than OU-2, which is more likely to need additional data collection during Phase II.

- **Environmental Media Intereffects**

  Including groundwater, contamination in the immediate vicinity of the individual OU-2 sites with the other environmental media found there will allow for a more realistic evaluation of potential remedial alternatives. For instance, coordination of the evaluations might be difficult if highly concentrated groundwater at an OU-2 site were being evaluated in OU-1, while the contaminated surface soils and vadose zone soils immediately above them were being evaluated in OU-2.

- **Similarity of Media**

  Although the environmental media contaminated at OU-2 sites vary, the sites are similar in size; four of them are landfills, and they may be able to be grouped for some purposes during FS activities. Similarly, OU-3 sites are smaller and are primarily sites of surface soil contamination. By contrast, OU-1 deals only with large-scale groundwater issues.

- **Manageability**

  The primary purpose for separating a site into OUs is to divide an unmanageably large task into more manageable pieces. Regional groundwater contamination (OU-1) and localized source control measures (OU-2 and OU-3) both represent potentially large problems which warrant separate though coordinated evaluations.

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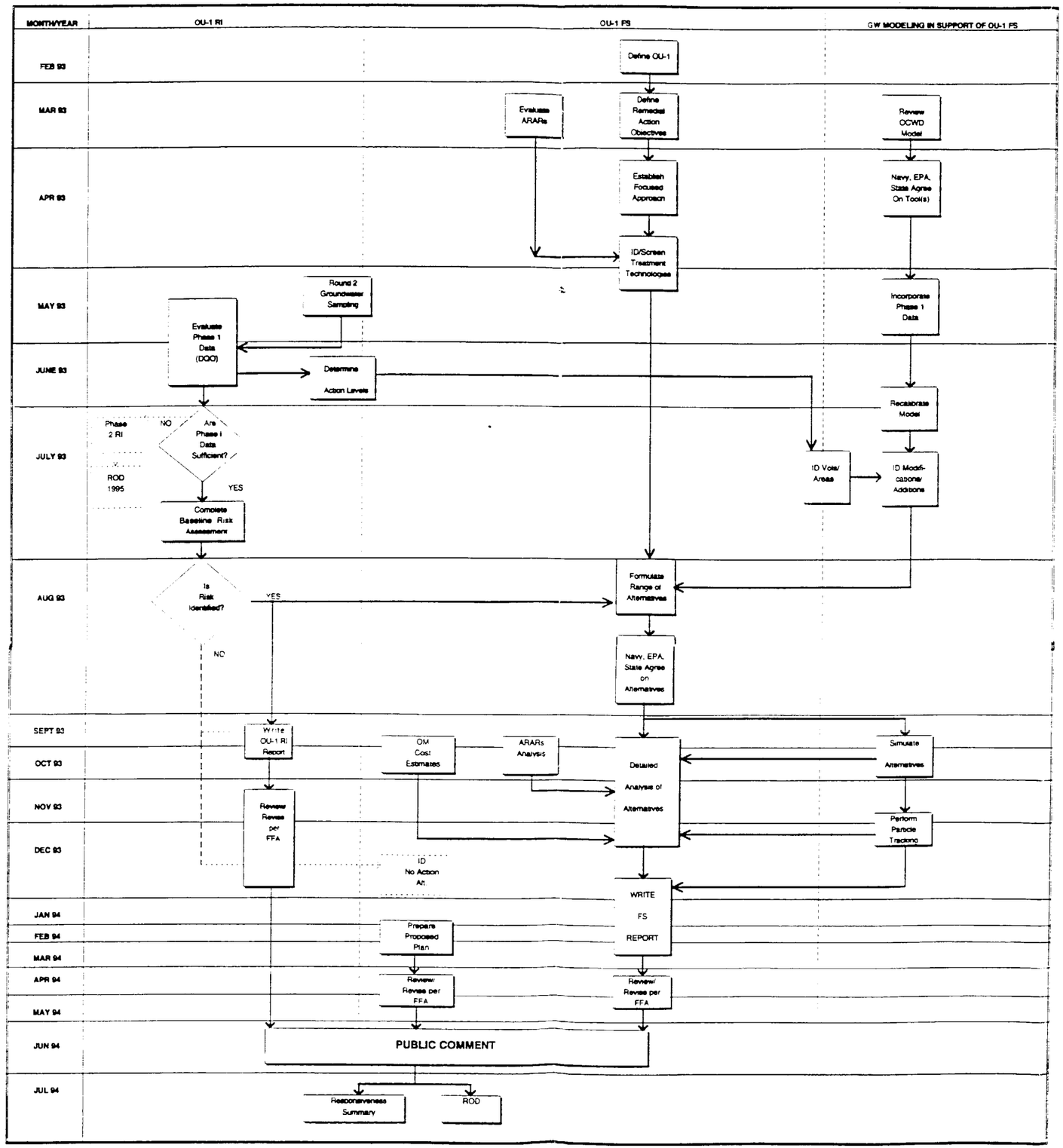
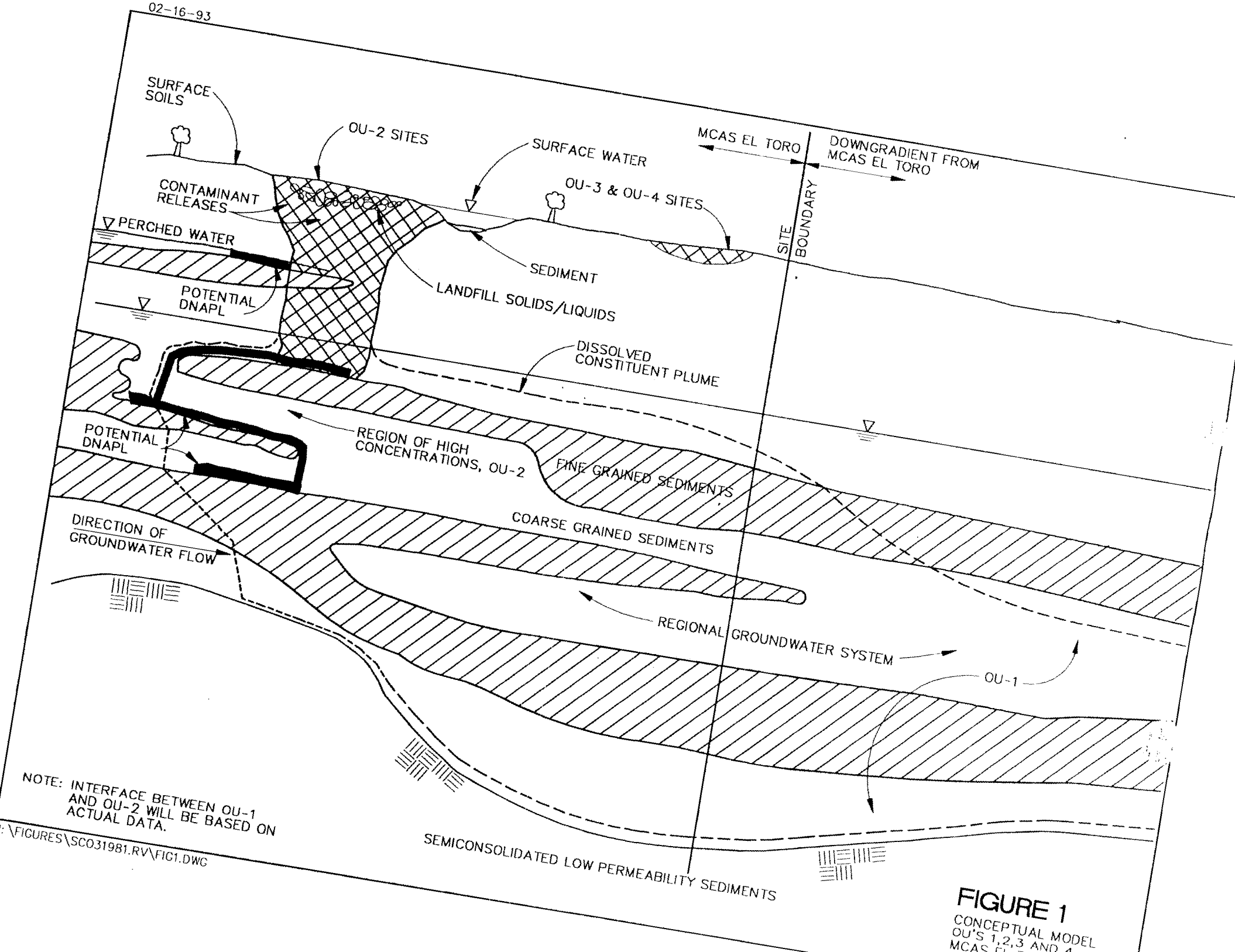


FIGURE 1
CONCEPTUAL FLOW DIAGRAM
OU-1 RI/FS COMPLETION
MCAS EL TORO

02-16-93



:\FIGURES\SC031981.RV\FIG1.DWG

FIGURE 1

CONCEPTUAL MODEL
OU'S 1,2,3 AND 4
MCAS

REPORT OUTLINE
PHASE I REMEDIAL INVESTIGATION TECHNICAL MEMORANDUM
16 February 1993

(VOLUME 1 - RI REPORT)

EXECUTIVE SUMMARY

ACRONYMS AND ABBREVIATIONS

1.0 INTRODUCTION

1.1 Statement of Purpose

1.2 Report Organization

1.3 Regional Background Information

- 1.3.1 Regional Site Description
  - 1.3.1.1 Boundaries
  - 1.3.1.2 Topography and Geography
  - 1.3.1.3 Weather and Climate
  - 1.3.1.4 Soils
  - 1.3.1.5 Geology
  - 1.3.1.6 Groundwater
  - 1.3.1.7 Demographics
  - 1.3.1.8 Land Use
  - 1.3.1.9 Ecology
    - Habitats
    - Natural Communities
    - Special-Status Wildlife Species
    - Methodology
- 1.3.2 Regional Site History Affecting the Remedial Investigation
- 1.3.3 Regional Background Chemical Data

1.4 Institutional and Regulatory Considerations
- 1.4.1 Entities Involved
- 1.4.2 Schedule
- 1.4.3 Applicable or Relevant and Appropriate Requirements
  - 1.4.3.1 Types of Regulations
  - 1.4.3.2 Specific Standards

1.5 Other Investigations
- 1.5.1 Previous Investigations
- 1.5.2 Ongoing Related Investigations

1.6 Individual Site Descriptions
- 1.6.1 Site 1 - EOD Range
- 1.6.2 Site 2 - Magazine Road Landfill
- 1.6.3 Site 3 - Original Landfill
- 1.6.4 Site 4 - Ferrocene Spill Area

1.6.5 Site 5 - Perimeter Road Landfill
1.6.6 Site 6 - Drop Tank Drainage Area No. 1
1.6.7 Site 7 - Drop Tank Drainage Area No. 2
1.6.8 Site 8 - DRMO Storage Area
1.6.9 Site 9 - Crash Crew Pit No.1
1.6.10 Site 10 - Petroleum Disposal Area
1.6.11 Site 11 - Transformer Storage Area
1.6.12 Site 12 - Sludge Drying Beds
1.6.13 Site 13 - Oil Change Area
1.6.14 Site 14 - Battery Acid Disposal Area
1.6.15 Site 15 - Suspended Fuel Tanks
1.6.16 Site 16 - Crash Crew Pit No. 2
1.6.17 Site 17 - Communication Station Landfill
1.6.18 Site 18 - Regional VOC Investigation
1.6.19 Site 19 - ACER Site
1.6.20 Site 20 - Hobby Shop
1.6.21 Site 21 - Waste Management Group, Building 320
1.6.22 Site 22 - Tactical Air Fuel Dispensing System

2.0 INVESTIGATION METHODS

2.1 Preliminary Activities
- 2.1.1 Regulatory Permits, Licenses, and Notification
- 2.1.2 Drilling Subcontract
- 2.1.3 Health and Safety Requirements

2.2 Field Methods for Site Characterization
- 2.2.1 General Description of Field Activities?
- 2.2.2 Surface Water Investigations
- 2.2.3 Sediment Investigations
- 2.2.4 Surface Soil and Shallow Soil Investigations
- 2.2.5 Vadose Zone Investigations
  - 2.2.5.1 Site Preparation
  - 2.2.5.2 Drilling Procedures
  - 2.2.5.3 Formation Sampling
- 2.2.6 Groundwater Investigations
  - 2.2.6.1 Monitoring Well Construction and Pump Installation
  - 2.2.6.2 Water-Level Measurements
  - 2.2.6.3 Measurement of Aquifer Parameters
  - 2.2.6.4 Groundwater Quality
- 2.2.7 Survey of Sample Locations

2.3 Field Quality Assurance/Quality Control
- 2.3.1 Sample Identification
- 2.3.2 Handling and Shipping
- 2.3.3 Trip Blanks
- 2.3.4 Duplicate Samples
- 2.3.5 Rinsates and Equipment Blanks
- 2.3.6 Decontamination of Drilling and Sampling Equipment
- 2.3.7 Matrix Spike/Matrix Spike Duplicate Samples

2.4 Data Collection Field Changes
- 2.4.1 Boring and Well Locations
- 2.4.2 Sample Locations
- 2.4.3 Sample Analytes and Protocol

2.5 Waste Management
- 2.5.1 Waste Sources
  - 2.5.1.1 Solids
  - 2.5.1.2 Liquids
- 2.5.2 Waste Management Techniques
  - 2.5.2.1 Solids
  - 2.5.2.2 Liquids
- 2.5.3 Waste Disposal
  - 2.5.3.1 Solids
  - 2.5.3.2 Liquids

2.6 Laboratory Quality Assurance/Quality Control

2.7 Data Evaluation Methods for Site Characterization
- 2.7.1 Database Development
- 2.7.2 Data Validation
- 2.7.3 Geographic Information System
- 2.7.4 Risk Assessment Methods

3.0 SUMMARY OF NATURE AND EXTENT OF CONTAMINATION: SITE 18 - REGIONAL GROUNDWATER (OU-1)

3.1 Regional Groundwater

3.2 Surface Water and Sediments

4.0 SUMMARY OF NATURE AND EXTENT OF CONTAMINATION: SITES 1 THROUGH 17 AND SITES 19 THROUGH 22 (OU-2 and OU-3)

4.1 Types of Contaminants Being Contributed to OU-1
4.2 Sources of Contaminants Being Contributed to OU-1
4.3 Site 1 - EOD Range
4.4 Site 2 - Magazine Road Landfill
4.5 Site 3 - Original Landfill
4.6 Site 4 - Ferrocene Spill Area
4.7 Site 5 - Perimeter Road Landfill
4.8 Site 6 - Drop Tank Drainage Area No. 1
4.9 Site 7 - Drop Tank Drainage Area No. 2
4.10 Site 8 - DRMO Storage Area
4.11 Site 9 - Crash Crew Pit No.1
4.12 Site 10 - Petroleum Disposal Area
4.13 Site 11 - Transformer Storage Area

4.14 Site 12 - Sludge Drying Beds
4.15 Site 13 - Oil Change Area
4.16 Site 14 - Battery Acid Disposal Area
4.17 Site 15 - Suspended Fuel Tanks
4.18 Site 16 - Crash Crew Pit No. 2
4.19 Site 17 - Communication Station Landfill
4.20 Site 19 - ACER Site
4.21 Site 20 - Hobby Shop
4.22 Site 21 - Waste Management Group, Building 320
4.23 Site 22 - Tactical Air Fuel Dispensing System

5.0 SUMMARY OF INFORMATION FROM THE CONCURRENT RFA INVESTIGATION (OU-4)

5.1 Additional Potential Sources of Contaminants (OU-4)
5.X (for each site, from RFA report summary and recommendations)
- 5.X.1 Locations of Contaminants
- 5.X.2 Types of Contaminants
- 5.X.3 Source(s) of Contaminants
- 5.X.4 Soils
- 5.X.5 Vadose Zone

6.0 CONTAMINANT FATE AND TRANSPORT

6.1 Interrelationship Between Operable Units
6.2 Factors Influencing Potential Routes of Migration
- 6.2.1 Surface Movement of Contaminants
- 6.2.2 Contaminant Movement in Soils and the Vadose Zone
- 6.2.3 Contaminant Movement in Groundwater

6.2 Contaminant Persistence
6.3 Contaminant Migration by Site
- 6.3.1?
- .
- .
- .
- 6.3.22?

7.0 PRELIMINARY BASELINE RISK ASSESSMENT

7.1 Human Health Evaluation
- 7.1.1 Identification of Chemicals of Potential Concern
- 7.1.2 Exposure Assessment
- 7.1.3 Toxicity Assessment
- 7.1.3 Preliminary Risk-Based Remediation Goals

7.2 Environmental Evaluation
- 7.2.1 Contaminants of Ecological Concern

7.2.2 Exposure Assessment
7.2.3 Ecological Effects Assessment
7.2.4 Risk Characterization
7.2.5 Conclusions and Limitations

8.0 SUMMARY AND CONCLUSIONS

8.1 Summary
8.1.1 Nature and Extent of Contamination
8.1.1.1 OU-1
8.1.1.2 OU-2 AND OU-3
8.1.1.3 OU-4
8.1.2 Fate and Transport Between Operable Units
8.1.3 Risk Assessment

8.2 Conclusions
8.2.1 Recommendations for Future Work
8.2.2 Recommended Remedial Action Objectives
8.2.3 ARARs and Data Quality Objectives (DQOs) for Phase II

9.0 REFERENCES

(VOLUME 2 - APPENDICES)

A. NATURE AND EXTENT OF CONTAMINATION, OU-1

B. NATURE AND EXTENT OF CONTAMINATION, OU-2 AND OU-3 SITES

B1 Nature and Extent of Contamination: Site 1 - EOD Range (OU-3)
B1.1 Source(s) of Contaminants
B1.2 Types of Contaminants
B1.3 Field Investigation
B1.4 Surface Soils
B1.5 Vadose Zone
B1.6 Groundwater
B1.7 Interaction with OU-1
B1.8 Conclusions and Recommendations

B2. Nature and Extent of Contamination: Site 2 - Magazine Road Landfill (OU-2)
B2.1 Source(s) of Contaminants
B2.2 Types of Contaminants
B2.3 Field Investigation
B2.4 Surface Runoff
B2.5 Sediment
B2.6 Surface Soils
B2.7 Vadose Zone

B2.8 Groundwater
B2.9 Interaction with OU-1
B2.10 Conclusions and Recommendations

B3. Nature and Extent of Contamination: Site 3 - Original Landfill (OU-2)
B3.1 Source(s) of Contaminants
B3.2 Types of Contaminants
B3.3 Field Investigation
B3.4 Surface Runoff
B3.5 Sediment
B3.6 Surface Soils
B3.7 Vadose Zone
B3.8 Groundwater
B3.9 Interaction with OU-1
B3.10 Conclusions and Recommendations

B4. Nature and Extent of Contamination: Site 4 - Ferrocene Spill Area (OU-3)
B4.1 Source(s) of Contaminants
B4.2 Types of Contaminants
B4.3 Field Investigation
B4.4 Sediment
B4.5 Surface Soils
B4.6 Vadose Zone
B4.7 Groundwater
B4.8 Interaction with OU-1
B4.9 Conclusions and Recommendations

B5. Nature and Extent of Contamination: Site 5 - Perimeter Road Landfill (OU-2)
B5.1 Source(s) of Contaminants
B5.2 Types of Contaminants
B5.3 Field Investigation
B5.4 Surface Soils
B5.5 Vadose Zone
B5.6 Groundwater
B5.7 Interaction with OU-1
B5.8 Conclusions and Recommendations

B6. Nature and Extent of Contamination: Site 6 - Drop Tank Drainage Area No. 1 (OU-3)
B6.1 Source(s) of Contaminants
B6.2 Types of Contaminants
B6.3 Field Investigation
B6.4 Sediment
B6.5 Surface Soils
B6.6 Vadose Zone
B6.7 Groundwater
B6.8 Interaction with OU-1
B6.9 Conclusions and Recommendations

B7. Nature and Extent of Contamination: Site 7 - Drop Tank Drainage Area No. 2 (OU-3)
- B7.1 Source(s) of Contaminants
- B7.2 Types of Contaminants
- B7.3 Field Investigation
- B7.4 Sediment
- B7.5 Surface Soils
- B7.6 Vadose Zone
- B7.7 Groundwater
- B7.8 Interaction with OU-1
- B7.9 Conclusions and Recommendations

B8. Nature and Extent of Contamination: Site 8 - DRMO Storage Yard (OU-3)
- B8.1 Source(s) of Contaminants
- B8.2 Types of Contaminants
- B8.3 Field Investigation
- B8.4 Surface Soils
- B8.5 Vadose Zone
- B8.6 Groundwater
- B8.7 Interaction with OU-1
- B8.8 Conclusions and Recommendations

B9. Nature and Extent of Contamination: Site 9 - Crash Crew Pit No. 1 (OU-3)
- B9.1 Source(s) of Contaminants
- B9.2 Types of Contaminants
- B9.3 Field Investigation
- B9.4 Surface Soils
- B9.5 Vadose Zone
- B9.6 Groundwater
- B9.7 Interaction with OU-1
- B9.8 Conclusions and Recommendations

B10. Nature and Extent of Contamination: Site 10 - Petroleum Disposal Area (OU-2)
- B10.1 Source(s) of Contaminants
- B10.2 Types of Contaminants
- B10.3 Field Investigation
- B10.4 Surface Soils
- B10.5 Vadose Zone
- B10.6 Groundwater
- B10.7 Interaction with OU-1
- B10.8 Conclusions and Recommendations

B11. Nature and Extent of Contamination: Site 11 - Transformer Storage Area (OU-3)
- B11.1 Source(s) of Contaminants
- B11.2 Types of Contaminants
- B11.3 Field Investigation
- B11.4 Surface Soils
- B11.5 Interaction with OU-1

B11.6 Conclusions and Recommendations

B12. Nature and Extent of Contamination: Site 12 - Sludge Drying Beds (OU-3)
- B12.1 Source(s) of Contaminants
- B12.2 Types of Contaminants
- B12.3 Field Investigation
- B12.4 Sediment
- B12.5 Surface Soils
- B12.6 Vadose Zone
- B12.7 Groundwater
- B12.8 Interaction with OU-1
- B12.9 Conclusions and Recommendations

B13. Nature and Extent of Contamination: Site 13 - Oil Change Area (OU-3)
- B13.1 Source(s) of Contaminants
- B13.2 Types of Contaminants
- B13.3 Field Investigation
- B13.4 Surface Soils
- B13.5 Vadose Zone
- B13.6 Groundwater
- B13.7 Interaction with OU-1
- B13.8 Conclusions and Recommendations

B14. Nature and Extent of Contamination: Site 14 - Battery Acid Disposal Area (OU-3)
- B14.1 Source(s) of Contaminants
- B14.2 Types of Contaminants
- B14.3 Field Investigation
- B14.4 Sediment
- B14.5 Surface Soils
- B14.6 Vadose Zone
- B14.7 Groundwater
- B14.8 Interaction with OU-1
- B14.9 Conclusions and Recommendations

B15. Nature and Extent of Contamination: Site 15 - Suspended Fuel Tanks (OU-3)
- B15.1 Source(s) of Contaminants
- B15.2 Types of Contaminants
- B15.3 Field Investigation
- B15.4 Surface Soils
- B15.5 Vadose Zone
- B15.6 Groundwater
- B15.7 Interaction with OU-1
- B15.8 Conclusions and Recommendations

B16. Nature and Extent of Contamination: Site 16 - Crash Crew Pit No. 2 (OU-3)
- B16.1 Source(s) of Contaminants
- B16.2 Types of Contaminants

B16.3 Field Investigation
B16.4 Surface Soils
B16.5 Vadose Zone
B16.6 Groundwater
B16.7 Interaction with OU-1
B16.8 Conclusions and Recommendations

B17. Nature and Extent of Contamination: Site 17 - Communication Station Landfill (OU-2)
B17.1 Source(s) of Contaminants
B17.2 Types of Contaminants
B17.3 Field Investigation
B17.4 Surface Soils
B17.5 Vadose Zone
B17.6 Groundwater
B17.7 Interaction with OU-1
B17.8 Conclusions and Recommendations

B18. Nature and Extent of Contamination: Site 19 - ACER Site (OU-3)
B18.1 Source(s) of Contaminants
B18.2 Types of Contaminants
B18.3 Field Investigation
B18.4 Surface Soils
B18.5 Vadose Zone
B18.6 Groundwater
B18.7 Interaction with OU-1
B18.8 Conclusions and Recommendations

B19. Nature and Extent of Contamination: Site 20 - Hobby Shop (OU-3)
B19.1 Source(s) of Contaminants
B19.2 Types of Contaminants
B19.3 Field Investigation
B19.4 Sediment
B19.5 Surface Soils
B19.6 Vadose Zone
B19.7 Groundwater
B19.8 Interaction with OU-1
B19.9 Conclusions and Recommendations

B20. Nature and Extent of Contamination: Site 21 - Materials Management Group, Building 320 (OU-3)
B20.1 Source(s) of Contaminants
B20.2 Types of Contaminants
B20.3 Field Investigation
B20.4 Sediment
B20.5 Vadose Zone
B20.6 Groundwater
B20.7 Interaction with OU-1
B20.8 Conclusions and Recommendations

B21. Nature and Extent of Contamination: Site 22 - Tactical Air Fuel Dispensing System (OU-3)
- B21.1 Source(s) of Contaminants
- B21.2 Types of Contaminants
- B21.3 Field Investigation
- B21.4 Surface Soils
- B21.5 Vadose Zone
- B21.6 Groundwater
- B21.7 Interaction with OU-1
- B21.8 Conclusions and Recommendations

C. SUMMARY OF CHEMICAL ANALYSES

D. GEOLOGIC LOGS OF BORINGS

E. MONITORING WELL COMPLETION INFORMATION

F. AQUIFER ANALYSIS

G. WESTBAY WELL REPORTS

H. RISK ASSESSMENT DOCUMENTATION
- H1 Human Health: Risk Assessment Methodology
- H2 Human Health: Toxicity Profiles
- H3 Human Health: Risk-Based Calculation Spreadsheets
- H4 Ecological Effects Tables

LIST OF FIGURES

R = Regional scale (small)
S = Station scale (intermediate)
L = Site scale (large)

(VOLUME I - RI REPORT)

Section:

1 (INTRODUCTION)

Location Map (8-1/2 x 11)
Regional Study Area Boundaries (R)
Regional Topography (R)
Regional Soils?
Regional Geology (R)
Land Use (R)
General Site Locations-(S) (8-1/2 x 11)

2 (INVESTIGATION METHODS) - (Unknown; maybe none)

3 (CONTAMINATION - SITE 18 - OU-1)

Sample Locations (R)
Lithologic Cross Sections (3 to 6)
Field VOCs (Fence Diagram)
TCE Values (Fence Diagram)
Other Organic Contaminants (Fence Diagrams) (0 to ?)
General Water Chemistry (Stiff-type Diagrams) (Plan or Fence?)
Water-level Contour Maps (2 or more)

4 (CONTAMINATION - SITES IN OU-2 AND OU-3)

Location Map(s) (May be similar to one in Section 1)
Individual (or group) Site Maps, all to same scale (Some 8-1/2 x 11, some fold-out)
1 - Plan - sample locations
2 - Cross sections showing findings

5 (CONTAMINATION - FROM RFA)

(Similar to the maps in Section 4)

6 (CONTAMINANT FATE AND TRANSPORT) - (Figures unknown)

7 (BASELINE RISK ASSESSMENT) - (Figures unknown)

8 (SUMMARY AND CONCLUSIONS)

Regional Groundwater and Wells

9 (REFERENCES) - (No figures)

(VOLUME II -- APPENDIXES)

Appendixes:

A (CONTAMINATION - OU-1)

Regional Location Map
Regional Geologic Fence Diagram showing lithology
---- Showing VOCs
---- Showing ?
Regional Water Quality - Stiff-type diagrams
Regional Water-Level Contours
Depth-to Water Contours (all wells)

B (CONTAMINATION, OU-2 AND OU-3)

B1 through B21 (L-Scale) - Similar series for each site:
- Station Location Map
- Surface Contamination
- Geologic Cross Section, showing detected VOCs
- Geologic Cross Section, showing ?
- Water Chemistry - Stiff-type diagrams
- Water-Level Contours
- Depth-to-Water Contours

C (SUMMARY OF CHEMICAL ANALYSES) - (No figures; tables only)

D (GEOLOGIC LOGS OF BORINGS)

GSTS Well Logs

E (MONITORING WELL COMPLETION INFORMATION

Summary of Lithologic and Well Completion Logs

E (WESTBAY WELL REPORTS)

Westbay Reports - (No outside figures)

F (AQUIFER ANALYSIS)

Aquifer Analysis - (No outside figures)

- Round 2 Groundwater Sampling

  A second round of groundwater sampling for OU-1 will be performed in spring 1993 before a decision is made with regard to a Phase II RI. These data will be required whether or not a Phase II RI is needed.

- OU-1 RI Report

  If a Phase II RI is not required for OU-1, an RI Report will be prepared in late 1993 for submittal with the OU-1 FS to the agencies and subsequently to public comment. The OU-1 RI Report will use information from the Phase I RI Technical Memorandum, updated with the results of the second round of groundwater monitoring. The OU-1 Baseline Risk Assessment, described below, will be included as a chapter in this report.

Risk Assessment

- Preliminary Remedial Goals

  Preliminary remedial goals (PRGs) will be developed for the Phase I RI Technical Memorandum for OUs-1, 2, and 3. PRGs are concentrations of contaminants that correspond to an acceptable incremental cancer risk or to a hazard quotient of 1 under a given exposure scenario.

- Baseline Risk Assessment

  A full baseline human health risk assessment for OU-1 will be performed on the basis of:

  - The round of groundwater samples taken as part of the Phase I field work
  - The second round of groundwater samples to be taken in spring 1993
  - The Orange County Water District (OCWD) groundwater samples taken from the study area (1985 through 1992)
  - The James M. Montgomery Engineers, Inc., groundwater samples taken from the study area (1988 through 1989)

- Groundwater Modeling

  Groundwater modeling will be performed to provide information to the FS in the form of alternatives for groundwater extraction.

- Evaluate OCWD Model

The model used for the OCWD Desalter Project will be reviewed in light of information collected during the Phase I RI and evaluated for its usefulness in support of the OU-1 FS.

- Navy, EPA, and State Agreement on Tools

  Following the evaluation of the OCWD model, the Navy and the Comprehensive Long-Term Environmental Action Navy (CLEAN) Project Team will meet with the Environmental Protection Agency (EPA) and the State to agree on suitable modeling tools for the FS.

- Incorporate Phase I Data, Recalibrate, Identify Additions/Modifications to Desalter

  Using the agreed-upon model, the hydrogeologic property distributions will be updated based on the Phase I data and the model will be recalibrated. Conceptual remedial alternatives for groundwater extraction will be formulated and submitted to the Navy, EPA, and the State for concurrence. These alternatives are expected to include no action, the OCWD Desalter, and approximately three additional alternatives consisting of the Desalter and various configurations of additional extraction wells.

- Simulate Alternatives and Perform Particle Tracking

  The agreed-upon alternatives will be simulated to provide information in support of the detailed analysis of alternatives in the FS. A particle-tracking module will be used to assess the collective capture zone of the wells associated with each remedial alternative.

Feasibility Study

- Define OU-1

  The Navy, EPA, and the State will discuss and agree upon definitions for OUs -1, 2, and 3. These definitions will be periodically reevaluated as new data becomes available.

- Define Remedial Action Objectives

  The CLEAN Project Team will prepare a list of potential remedial action objectives for OU-1 for discussion at the March 1993 managers' meeting.

- Establish Focused Approach

  The CLEAN Project Team will prepare a position paper for discussion at the March 1993 managers' meeting, outlining a focused approach to the OU-1 FS.

- Identify/Screen Technologies

Because the only contaminated medium expected to be addressed in OU-1 is groundwater, this step will focus on groundwater extraction and treatment technologies for removal of contaminants generated from MCAS El Toro.

- Assemble Alternatives

  Using the groundwater extraction alternatives formulated from the groundwater modeling tasks and representative treatment technologies identified and screened earlier, the CLEAN Project Team will assemble alternatives to be presented to the Navy, EPA, and the State for concurrence.

- Detailed Analysis of Alternatives

  The agreed-upon alternatives will be analyzed in detail following EPA RI/FS guidance and specified criteria. They will be developed to the extent required to generate order-of-magnitude cost estimates.

- FS Report

  An OU-1 FS Report will be prepared, reviewed, and revised according to the FFA.

- Proposed Plan/Public Comment Period

  The OU-1 RI and FS Reports will be submitted to public review with a proposed plan presenting the preferred remedy.

- Responsiveness Summary

  A formal document will be prepared in response to public comment and published with the ROD.

- ROD

  The ROD will be prepared, signed, and published.

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JACOBS ENGINEERING GROUP INC.

MEMORANDUM

TO: Andy Piszkin - Code 1812.AP **DATE:** 16 February 1993

FROM: John Dolegowski - CH2M HILL/SCO
Chuck Elliott - CH2M HILL/SAC

SUBJECT: **Data Quality Objectives (DQOs) Process and Schedule**
Marine Corps Air Station (MCAS) El Toro
CTO #145, Remedial Investigation/Feasibility Study (RI/FS)

DQO PROCESS

Data Quality Objectives (DQOs) comprise seven distinct but interrelated steps that are normally taken in sequence. The following discussion summarizes the DQO process and lists some of the inputs that will be required to be provided to El Toro team members, as well as decisions that will have to be made, at DQO meetings.

1. State the Problem

The first step of the DQO process for each site provides a foundation for the other steps by summing up what is known about the site and clearly articulating the problems and issues that need to be addressed. Before a DQO meeting that will focus on a site at MCAS El Toro, the Navy and the CLEAN Project Team will provide information to the El Toro decision-making team (the El Toro team), which includes the Naval Facilities Engineering Command, Southwest Division, the U.S. Environmental Protection Agency (EPA), the California Environmental Protection Agency--Department of Toxic Substances Control, and the California Regional Water Quality Control Board, Santa Ana Region. The required information is:

- Historic data (if any) for the site
- A summary of Phase I data
- A summary of findings (if any) from the survey of aerial photographs that will be completed in 1993
- A proposed definition of the problems and issues that need to be addressed, including a risk statement (hypothesis) to be proven for each medium. The CLEAN team will provide the position statement in outline form for discussion and approval by the El Toro team at the meeting.

2. Identify the Decision

The second step of the DQO process involves listing actions that might address the problem. In addition, this step includes stating clearly the decision(s) that will be made (i.e, the action[s] that will be taken) using the environmental data that will be collected

during the Phase II Remedial Investigation (RI). This step requires a preliminary statement of potential remedial alternatives, and an evaluation of information that will be needed to complete the site characterization and risk assessment. The CLEAN Project Team will provide a position statement in outline form for discussion and approval by the El Toro team at the meeting.

3. Identify the Inputs Affecting the Decision

Step 3 has two main elements: naming the Chemicals of Concern (COCs) at each site; and developing statistical measures of the variables.

In the first element, COCs will be listed for each site and for each medium. A list of COCs will be developed concurrently as part of the Preliminary Risk Assessment for the Phase I Technical Memorandum. Report writing requirements dictate that COCs be formulated immediately. The Preliminary Risk Assessment will rely on detected chemicals in Phase I RI data. The DQO process will choose COCs in order to select laboratory analyses during Phase II. The El Toro team may choose to use COCs developed as part of the risk assessment process, or may use other criteria to develop COCs; e.g., the list of chemicals used at Norton AFB, Applicable or Relevant and Appropriate Requirements (ARARs) for compounds detected in Phase I data, or Preliminary Remediation Goals (PRGs). Selecting a COC based on a sample collected at depth in the soil may involve the use of a model to evaluate attenuation and the potential of the compound to leach to the groundwater from subsurface soils. One possible approach for developing a list of COCs in surface soils at a site may use the following criteria:

- Organic chemicals (except pesticides and herbicides) detected in Phase I samples
- Inorganic compounds with health-based criteria and pesticides or herbicides detected above background levels in Phase I samples
- Other chemicals that may be included are:
  - Those on the list of chemicals used at Norton AFB for sites with a similar history
  - Chemicals detected at significant levels at other related sites at El Toro
  - Chemicals for which historical evidence suggests their use at a site
  - Chemicals for which other compelling evidence indicates that a chemical may be present even though it was not detected in Phase I samples

The second element of this DQO step involves the development of statistical measures of the variables. Phase I surface and shallow soil samples were allocated using the stratified random approach, and will be evaluated in the context of the statistical conclusions that follow from this approach. During the DQO process, the El Toro team will develop an approach to statistically analyze background soil concentrations of inorganics or pesticides/herbicides to help identify COCs at a site. This approach may

involve the use of multivariate or multiple univariate statistical models. The analysis of background will also take place during the analysis of Phase I data for the Phase I Technical Memorandum, and as part of risk assessment. Finally, during the DQO process the El Toro team will establish statistical measures to evaluate Phase II data, such as the mean and coefficient of variance. The CLEAN team will provide a position statement on statistical measures for discussion and approval by the El Toro team at one of the DQO meetings.

4. Define the Boundaries of the Study

Step 4 has two main tasks: defining the spatial boundaries for each site, and identifying populations potentially at risk.

At each site, the CLEAN Project Team will propose surface boundaries based on the Sampling and Analysis Plan (SAP) Amendment, with changes based on Phase I data or aerial photographs if necessary. The El Toro team will approve these boundaries at the DQO meeting. In addition, the El Toro team needs to agree on a "rule" or a depth to separate surface soils from subsurface soils for cutpoint development.

The identification of populations potentially at risk (human and ecological) and evaluation of exposure pathways will be accomplished concurrently as part of the Preliminary Risk Assessment process.

For these Step 4 tasks, the CLEAN Project Team will provide a position statement on boundaries for discussion and approval by the El Toro team at one of the DQO meetings.

5. Develop Decision Rules

This step of the DQO process involves defining quantitative criteria (cutpoints) that will trigger actions based on the data. Cutpoints may require the following inputs: PRGs; method detection limits; BAT (best available technology) limits; BPT (best practicable technology) limits; and chemical-specific ARARs. PRGs are being developed as part of the Preliminary Risk Assessment. The CLEAN Project Team will propose PRGs, BATs, and BPTs for consideration by the El Toro team at one of the DQO meetings. ARARs are being developed according to a process outlined in the Federal Facility Agreement; they must be finalized early to provide input both to the DQO process and the Phase I Technical Memorandum.

6. Specify Limits on Uncertainty

Specifying limits on uncertainty mainly involves agreeing on statistical criteria that will allow actions to proceed based on the Phase II data. Once these criteria have been defined, statistical calculations may be performed to specify acceptable uncertainly limits that will bracket the cutpoint for each COC. Specifying uncertainty includes stating the acceptable probability of arriving at an incorrect decision and defining the consequences of an incorrect decision. At the CTO 145 DQO meeting in December 1992, for example, the El Toro team set confidence at 0.80 and power at 0.90 to support waste management decisions. It also includes defining the minimum detectable relative difference (MDRD), which refers to variability in data from the laboratory and is usually

picked for an analytical method. The CLEAN Project Team will propose confidence, power, and MDRDs for discussion by the El Toro team.

7. Optimize the Design

The El Toro team must finally agree on the design of the Phase II RI at each site. If each of the previous steps has been completed, then Step 7 should follow easily. The El Toro team must agree early in the DQO process on a statistical approach for allocating the Phase II samples. At each site, the sample design may also involve the use of calculation formulas to evaluate the number of samples required given a coefficient of variation, confidence, power, and MDRD; and the analysis of alternative designs to determine the most cost-effective design within acceptable limits of error. The CLEAN team will propose a sample design for discussion and approval by the El Toro team.

At the December 1992 DQO Workshop, the El Toro team agreed to establish Technical Support Groups that would perform various activities in support of the DQO process:

- Chemical/Analytical Group
  - Development of list of detected chemicals from Phase I RI data development of MDRDs
  - Determination of detection limits
- Cutpoint Group
  - Compilation of criteria and ARARs, BATs, BPTs, and PRGs
  - Proposal of cutpoints for compounds
- Geophysics Group
  - Research and selection of models to evaluate attenuation and the potential of compounds to leach to groundwater from subsurface soils
  - FS issues
- Statistics Group
  - Research and selection of software models using multivariate techniques to evaluate background
  - Use of statistics to evaluate Phase I RI/FS data

The El Toro team agreed at the January 1993 Managers' Meeting that the Clean Project Team will bear primary responsibility for accomplishing these activities. Members of Technical Support Groups that are not part of the Clean Project Team will serve as facilitators to help the groups accomplish their mission.

DQO SCHEDULE

The product of the DQO process will be the Phase II Work Plan with separate DQO documents written for each site in the four Operable Units (OUs) at MCAS El Toro. These documents will be included in the Work Plan as appendixes.

DQO development will be a long and complex activity, for which few existing models are readily available. MCAS El Toro's four OUs comprise 22 sites plus some sites added to OU-4 as a consequence of the RFA. Each of these four OUs will require special treatment. The schedule for completing the DQO process will be affected by the following considerations:

- OU-1 is being "fast-tracked" and will require immediate evaluation and DQO development as soon as the Phase I Technical Memorandum is released to support a decision whether an additional RI is necessary at OU-1.

- OU-2 and OU-3 will be evaluated for the Phase II RI.

- Based on discussion at the 13 January 1993 Managers' Meeting, it is assumed that comprehensive DQOs for OU-1 and OU-2 will be prepared to meet the August 1993 deadline for the Phase II Work Plan. Simplified DQOs will be prepared for OU-3 and OU-4 to meet the August 1993 deadline, and more comprehensive DQOs for these OUs will be prepared later. Thus, additional effort beyond 9 August 1993 will be required to complete the DQO process for OU-3 and OU-4.

- Finally, OU-4 may require a different approach than that followed for OU-1, OU-2, and OU-3, because OU-4 sites will proceed to a Phase I RI, not a Phase II RI.

The DQOs will be developed in about 10 meetings from March to September 1993. Attendees will include regulatory agencies (including EPA's consultant, Bechtel), and the CLEAN Project Team (the Navy, MCAS El Toro, CH2M HILL, and Jacobs). The Draft Phase II Work Plan and DQOs are due 9 August 1993. In order to complete the internal CLEAN Project Team review, DQOs must be complete for OU-1 and OU-2 no later than 1 July 1993. The following tentative schedule meets these constraints and provides time at the beginning of the process to make "global" decisions:

Date (1993)	Topics of Meeting
3/24-3/25	Introduction General issues Review and agree on the DQO process ARARs Define media boundaries Statistical approach to background concentrations, Phase II data design and how to evaluate data (mean, coefficient of variance, confidence, power, MDRD) Agree on how to measure attenuation Agree on how to select COCs

4/7-4/8	PRGs (tentative) BATs BPTs Detection limits Establish cutpoints by contaminant and medium (using PRGs, BATs, BPTs, ARARs, detection limits, and attenuation potential)
4/21-4/22	Site 18 (OU-1)
5/12-5/13	Sites 2 and 3 (OU-2)
5/26-5/27	Sites 5 and 17 (OU-2)
6/9-6/10	Site 10 (OU-2) and Site 22 (OU-3)
6/23-6/24	Site 6, 7, and 12 (OU-3)
7/21-7/22	Sites 1, 4, 9, and 16 (OU-3)
8/25-8/26	Sites 8, 11, 20, 21 (OU-3)
9/22-9/23	Sites 13, 14, 15, 19 (OU-3)

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JACOBS ENGINEERING GROUP INC.

MEMORANDUM

TO: Andy Piszkin - Code 1812.AP **DATE:** 23 February 1993

FROM: John Dolegowski - CH2M HILL
Yueh Chuang - CH2M HILL

SUBJECT: **Marine Corps Air Station (MCAS) El Toro Remedial Investigation (RI) - Derived Soil Cuttings Proposed Background Soil Threshold Levels for Metals and Other Waste Classification Issues**

This memorandum presents the proposed background metals concentrations for the purpose of documenting field changes in waste classification of waste soil cuttings generated during the MCAS RI. It also formally documents several decisions already reached at previously held Remedial Project Managers Meetings, and the Data Quality Objectives (DQO) Workshops.

Metals

Threshold levels are required for Designated Wastes, wastes with concentrations that are below hazardous levels but which may still degrade the quality of water below MCAS El Toro. Such threshold levels for metals are needed because the RI-derived soil cuttings generated are expected to fall below hazardous levels, yet naturally occurring metals exist in all soils. It was agreed that the soil cuttings will be compared against "background" levels at the 10 August 1992 Project Managers Meeting. Background soil samples were defined as soil samples collected from on-Station sites that were not impacted by MCAS El Toro activities. It was further agreed that an appropriate statistical methodology will be used to generate the threshold levels for metals at the 18-20 November 1992 DQO Workshop. As a result of the workshop, it was decided the statistical approach of choice was to use a multivariate comparison of waste samples against background samples at 80 percent confidence, and 90 percent power. A confidence level of 80 percent implies that 20 in 100 soil bins may be classified as designated waste when they are actually clean.

Strategy for Selection of Background Samples

All soil samples collected on Station for the RI were screened for use as background samples against aerial photography findings, site use information, field data gathered during sample collection, and organics results. The availability of the pool of background samples is limited by whether metals were analyzed for a particular sample. For example, soil samples from Operable Unit (OU)-1 wells were not included because, consistent with the Sampling and Analysis Plan (SAP) (21 February 1991), and the Sampling and Analysis Plan Amendment (26 August 1992), metals were not analyzed for those samples. The screening strategy is as follows:

- Subsurface soil samples collected from upgradient OU-2 and OU-3 wells were selected. Since these wells were located in order to assess groundwater quality upgradient of potentially contaminated sites, they generally should not be impacted by Station activities. The soil samples were collected generally at a depth within 30 feet above the water table.

- Surface soil samples and shallow soil boring samples (e.g., 0-6 inch and 18-24 inch soil samples) associated with the same upgradient well locations were also selected using similar reasoning. Note that the soil samples collected between ground surface and 2 feet below ground surface are referred to as shallow soil samples in the discussion below. Shallow soil samples associated with deep borings, angle borings, and 25-foot borings were eliminated because those soil borings were specifically located in suspected areas of contamination. Shallow soil samples associated with downgradient wells and other shallow soil samples are likely to be affected by past Station activities.

- The list of soil samples generated using the two screening steps described above was refined using aerial photography findings and past site use information.

- Remaining soil samples were eliminated if high headspace measurements were recorded during sample collection.

- Finally, those samples which exhibited organics contamination (e.g., total recoverable petroleum hydrocarbon [TRPH] levels much greater than 100 mg/kg) were also eliminated. It is not uncommon to find soils contaminated with waste oils also to be contaminated with metals. Some Station activities include machining process and vehicle maintenance oil changeouts.

After screening the soil samples through the procedure outlined above, 35 soil samples (six are duplicate samples) were selected for statistical analysis. Except for one sample, they essentially consist of shallow and subsurface soil samples associated with upgradient OU-2 and OU-3 wells. The samples were not segregated by depth since a comparison of the metal concentrations did not show significant differences between shallow and subsurface soil samples. Table 1 lists the soil samples, by location and depth, which were screened as appropriate for use as background samples.

Data with Qualifiers

Data used for this analysis includes detected values (e.g., values above the contract required detection limit [CRDL] with no qualifiers), nondetected values (e.g., values below the instrument detection limit [IDL] with "U" qualifiers), and values between the CRDL and IDL (e.g., data with "B" qualifiers). Data with other qualifiers were not used in the analysis.

All nondetected values were assigned values of the CRDL for the statistical analysis (e.g., silver concentration for the 0-6 inch sample at Well 25 [Site 2] is below the detection limit of 0.3 mg/kg; however, a data value of 0.3 mg/kg was assigned).

Table 1 List of Soil Samples Used in Background Threshold Level Analysis			
Well No.	**Site No.**	**Depth (bgs)**	**Remarks**
25	2	0-6 inch 18-24 inch 50 feet	 Above Screen
26	3	0-6 inch 0-6 inch	 Duplicate
27	5	0-6 inch 0-6 inch 175 feet	 Duplicate Above Screen
28	6	18-24 inch 148 feet	 Above Screen
100	7	5 feet 10 feet 15 feet 20 feet 25 feet 30 feet 30 feet 40 feet 40 feet 111 feet	 Duplicate Duplicate Above Screen
31	12	18-24 inch 98 ft	 Above Screen
32	13	18-24 inch 130 feet	 Above Screen
NA	15	18-24 inch	
33	16	0-6 inch 0-6 inch 18-24 inch 18-24 inch 158 feet	 Duplicate Duplicate Above Screen
36	20	0-6 inch 18-24 inch 100 feet	 Above Screen
37	21	18-24 inch 70 feet	 Above Screen

Statistical Methodology

The multivariate approach, although conceptually desirable, is complex to implement and can produce results that appear unreasonable. The proposed statistical approach uses univariate comparisons at 99 percent confidence, and 90 percent power. By specifying an individual comparison confidence level of 99 percent, an overall confidence of 85 percent is achieved. The calculations are based on 16 metals for comparison, therefore, 16 individual comparisons ($0.99^{16} = 0.85$). Results from these univariate comparisons achieve approximately the same desired confidence of 80 percent for a multivariate approach.

Proposed Threshold Levels

Threshold levels are proposed for 16 metals. All of the metals have regulatory standards, namely hazardous waste standards, drinking water standards, and/or health advisories. Standards for each metal are listed in Table 2. The background soil samples were analyzed for all 23 metals listed in the Target Analyte List (TAL). However, threshold levels are proposed for only 16 of the 23 metals for the following reasons:

- Four metals are common cations (e.g., calcium, magnesium, potassium, and sodium). The concentrations of these metals naturally range over several orders of magnitude; therefore, they are not included in the statistical analysis.

- Three metals (e.g., aluminum, iron, and manganese) were not analyzed in the waste samples since they did not have hazardous waste criteria and were not specified for waste sample analysis in the Waste Management Plan. Therefore, a comparison against background levels is not possible.

- Additionally, molybdenum, a metal regulated under California hazardous waste rules, was not analyzed as part of the TAL. Although waste samples were analyzed for molybdenum, the background samples were not; a comparison against background levels is not possible.

The metals data for the background samples are assumed and demonstrated to be lognormally distributed (see Figures 1 through 16 of Attachment A). The threshold levels are calculated as the upper bound of the mean of the natural logarithm of the concentrations, plus 2.88 times the standard deviation of the natural logarithm of the concentrations. The value 2.88 is the "K" factor for 99 percent confidence and 90 percent power for a population of 30 samples. The background threshold levels for the 16 metals are also listed in Table 2. Attachment A presents a more detailed discussion of the statistical approach used, including the pros and cons of the multivariate and univariate approaches. It also presents calculations for the relative standard deviations due to the variability in duplicate sample results, laboratory analysis, and spatial location.

Table 2
Regulatory Standards, Health Advisories, and Proposed Background Threshold Levels for Metals
MCAS El Toro

Metal	USEPA TCLP[1] (mg/l)	California TTLC[2] (mg/kg)	California STLC[3] (mg/l)	USEPA MCL[4] (mg/l)	California MCL[5] (mg/l)	Health Advisories			IRIS		Threshold Level (mg/kg)
						10-day (ug/l)	Chronic (Lifetime) Noncancer (ug/l)	Chronic (Lifetime) Cancer (ug/l)	RfD (ug/Kg-day)	10-6 Risk (ug/l)	
Antimony		500	15.0			15	3		0.4		3.1
Arsenic	5.0	500	5.0	0.050(P)	0.050			0.03	1		8.5
Barium	100.0	10,000	100	2,000(P)	1.000		>2,000		70		309
Beryllium		75	0.75			30,000		0.008	5	0.008	1.32
Cadmium	1.0	100	1.0	0.005(P)	0.010	>40	>5		0.5		4.2
Chromium (Total)	5.0	2,500	580	0.100(P)	0.050	>1,000	>100		5		32.2
Cobalt		8,000	80								13.4
Copper		2,500	25.0	1.000(S)							18.0
Lead	5.0	1000	5.0	0.050(P)	0.050						33.2
Mercury	0.2	20	0.2	0.002(P)	0.002		>2		0.3		0.16
Nickel		2,000	20.0			>1,000	>100		20		28.6
Selenium	1.0	100	1.0	0.010(P)	0.010				5		0.33
Silver	5.0	500	5.0	0.050(P)	0.050	200	100		5		0.69
Thallium		700	7.0			7	0.4		0.07		0.45
Vanadium		2,400	24.0			80	20		3		89.8
Zinc		5,000	250	5.000(S)		4,000	2,000		200		124

1 - USEPA Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedure (TCLP).
2 - California Total Threshold Limit Concentration (TTLC).
3 - California Soluble Threshold Limit Concentration (STLC).
4 - USEPA Maximum Contaminant Level (MCL); "P" denotes primary standard, and "S" denotes secondary standard.
5 - California MCL.
6 - Developed by either USEPA's Health Advisory Program, or the National Academy of Sciences recommendations based on Suggested No-Adverse Response Levels.
7 - USEPA's Integrated Risk Information System (IRIS).
8 - Oral Reference Doses (RfD).

Hexavalent Chromium

Consistent with the Final MCAS El Toro Waste Management Plan (14 December 1991), all waste soil will be first classified based on total chromium levels. If the total chromium levels exceed the newly proposed background threshold level of 32.2 mg/kg, the soil will be classified as designated waste (provided the levels are less than corresponding hazardous threshold levels for total chromium).

However, if the total chromium levels also exceed 50 mg/kg, which is 10 times the Soluble Threshold Limit Concentration (STLC) for hexavalent chromium (ignore the difference in units between soil and extract fluid), the soil may be hazardous according to California hazardous waste rules. Note that for this to occur, it would require applying the most conservative assumption that the total chromium concentration represents hexavalent chromium only and that complete leaching occurs during extraction testing.

It is proposed that all such soils will be automatically resampled for additional analysis for both total chromium and hexavalent chromium levels. If the hexavalent chromium levels are less than 50 mg/kg, the soil will remain classified as designated waste. This formally amends the procedures stated in the Waste Management Plan, which stipulates the regulatory agencies will be consulted for further direction.

Total Recoverable Petroleum Hydrocarbon

As stated in the 10 August 1992 Project Managers Meeting, a threshold level of 300 mg/kg generally will be used for TRPH. However, as was agreed in the 17-18 February 1993 Project Managers Meeting, waste soil with TRPH levels between 100 and 300 mg/kg also will be classified as designated if gasoline fraction compounds, specifically benzene, toluene, ethylbenzene, or xylene (BTEX), are showing above detection limits. Any waste soil with less than 300 mg/kg of TRPH and showing no BTEX compounds will be classified as clean, and can be managed on Station as nonhazardous soil. Waste soil with greater than 300 mg/kg of TRPH and showing no BTEX compounds, or waste soil with TRPH between 100 and 300 mg/kg and showing BTEX compounds, will be classified as designated waste, stored in polyethylene "burritos" in the soil disposal areas, and treated and/or disposed at a subsequent date.

Organic Compounds

Waste soil will be classified as designated waste (provided the levels are less than corresponding hazardous threshold levels) if any organic level exceeds either the Federal or California drinking water standard (DWS) or the practical quantitation limit (PQL), whichever is greater. For example, 1,1,1-trichloroethane has a DWS of 0.2 mg/l, and a PQL generally between 11 and 13 ug/l depending on dilution factors or moisture percentage. The threshold level for 1,1,1-trichloroethane would be 0.2 mg/l, the greater of the 2 values. Conversely, the DWS for trichloroethylene (TCE) is 5 ug/l but the PQL is again between 11 and 13 ug/l. The threshold limit for TCE would be the PQL, the greater of the 2 values.

The above discussion pertains to all data values without a qualifier. However, data values with "J" qualifiers will be treated as above the detection limits even though they

are estimated values. Data values with "J" qualifier are defined as estimated values when the mass spectral data indicates the presence of those compounds below their stated PQLs, or when concentrations are estimated due to analytical interferences. For example, if a TCE value of 7 ug/l with "J" qualifier is returned, the soil would be classified as designated waste. This is because the TCE value is greater than the DWS of 5 ug/l even though it is less than the stated PQL.

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ATTACHMENT A
Proposed Statistical Methodology

At the 18-20 November 1992 Data Quality Objectives (DQOs) Workshop, it was agreed that the proposed statistical methodology for comparison of waste soil samples contained in bins with background soil samples was to use a multivariate comparison at 90 percent power and 80 percent confidence. Instead, a univariate approach is proposed because the first approach will be difficult to implement and may not be desirable in practice.

There are four statistical parameters used to design a statistical comparison: 1) alpha (1 - confidence); 2) beta (1 - power); 3) delta (the difference to be detected with probability beta); and 4) sample size. If three of these parameters are specified, the fourth can be calculated. For the comparison of bin samples with background samples, the sample size is already determined by what is available. The confidence level of 80 percent implies that 1 in 5 bins may be misclassified as above background for each parameter when, in fact, they are similar to background.

The multivariate approach is conceptually desirable because it eliminates what is known as the multiple comparison problem. If 16 parameters are tested, each with an 80 percent confidence of correctly specifying that each is not significantly different from background, then there is a 2.8 (i.e., 0.80^{16}) percent probability that all 16 would be correct. This virtually assures that all bins will be classified as above background (97 out of 100 bins) even though they are similar to background. However, if a multivariate test was used with the same confidence level of 80 percent, then only 20 percent of the bins will be misclassified as above background.

There are practical problems in implementing a multivariate test. The standard statistical software packages do not have a multivariate test option; the test would have to be programmed and tested. While this can be done, the more important issue is how the test would be used and explained. The description of a multivariate test is usually done in terms of matrix algebra, which is likely beyond the comprehension of the general public. The comparison is complex enough that a computer routine will be needed to use the procedure. The net result is the use of a "black box" to determine whether or not a bin is classified as above background. Further, the results may not always seem reasonable because it is possible for a bin to be classified as above background even though no single parameter is significantly above background levels.

The alternate approach is to use univariate comparisons with a higher confidence level for each comparison. This is the traditional approach, not only because of the complexities discussed but also because of the consequences of each type of error. The confidence can be chosen so that the overall probability of rejecting a bin is the specified 80 percent. The individual comparison confidence level used to determine this is approximately 99 percent ($0.99^{16} = 0.85$).

Table A-1 shows the results of the analysis of the background soil data. The data used for this analysis only includes detected and non-detected values (i.e., data values with no qualifiers, and "B" and "U" qualifiers). Data with other qualifiers were not used in the analysis.

Table A-1
Summary of Statistical Analysis Results of Background Soil Concentrations

Parameter	Estimated Duplicate RSD	Upper and Lower 2 SD bounds for one Sample Measurement		Total Spatial + Analytical RSD	Analytical Fraction of Total Variability	Estimated Mean Background Concentration	Tolerance Limit 99% Confidence value is greater than 90% of data	Ratio of Mean Concentration to Background for 90% Power and 99% Confidence
		Upper Value times	Lower Value times					
Aluminum	0.39	2.09	0.48	0.52	0.590	8050.65	29336.469	9.25
Antimony				0.05		2.69	3.141	1.28
Arsenic	0.32	1.83	0.55	0.56	0.348	2.16	8.538	10.77
Barium	0.37	2.02	0.50	0.49	0.600	90.44	308.652	8.18
Berylium	0.30	1.77	0.56	0.49	0.397	0.39	1.319	8.17
Cadmium	0.28	1.72	0.58	0.56	0.283	1.06	4.166	10.61
Calcium	0.37	2.03	0.49	0.50	0.576	4411.86	15553.917	8.69
Chromium	0.14	1.32	0.76	0.53	0.079	8.64	32.231	9.68
Cobolt	0.36	1.98	0.51	0.51	0.521	3.75	13.407	8.92
Copper	0.22	1.52	0.66	0.42	0.283	6.08	17.978	6.27
Iron	0.28	1.70	0.59	0.48	0.356	9927.15	33066.949	7.81
Lead	1.13	5.95	0.17	0.89	1.426	4.93	33.212	31.81
Magnesium	0.27	1.69	0.59	0.54	0.278	3642.67	13818.049	9.99
Manganese	0.25	1.63	0.61	0.43	0.364	207.74	626.284	6.50
Mercury				0.57		0.04	0.164	10.93
Nickel	0.36	1.97	0.51	0.57	0.431	7.18	28.647	11.00

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Table A-1
Summary of Statistical Analysis Results of Background Soil Concentrations

Parameter	Estimated Duplicate RSD	Upper and Lower 2 SD bounds for one Sample Measurement		Total Spatial + Analytical RSD	Analytical Fraction of Total Variability	Estimated Mean Background Concentration	Tolerance Limit 99% Confidence value is greater than 90% of data	Ratio of Mean Concentration to Background for 90% Power and 99% Confidence
		Upper Value times	Lower Value times					
Potassium	0.26	1.65	0.61	0.53	0.261	2646.08	9863.099	9.66
Selenium	0.44	2.29	0.44	0.33	1.692	0.14	0.328	4.37
Silver				0.16		0.45	0.694	2.01
Sodium	0.13	1.28	0.78	0.34	0.146	276.22	676.186	4.46
Thallium	0.14	1.31	0.76	0.29	0.228	0.20	0.447	3.71
Vanadium	0.27	1.70	0.59	0.52	0.306	24.79	89.768	9.15
Zinc	0.19	1.44	0.69	0.52	0.148	34.46	124.106	9.05

A comparison was made among data from subsurface soils (greater than 2 feet) and from shallow soils (less than or equal to 2 feet) to test for significant differences in metals concentrations. Since significant differences were not found between the two groups of samples, all values were used for analysis of the background data.

The first data column of the table shows the relative standard deviation (RSD), also referred to as coefficient of variation (CV), of the duplicate analysis. The second and third columns show the two standard deviation (SD) factors for a single measurement. For example, barium has a RSD of 0.37; this means that the true concentration of barium in a sample is between 0.5 and 2.02 times greater than the reported value. Another way of stating this is that the reported barium concentration is between plus 100 percent and minus 50 percent of the true value.

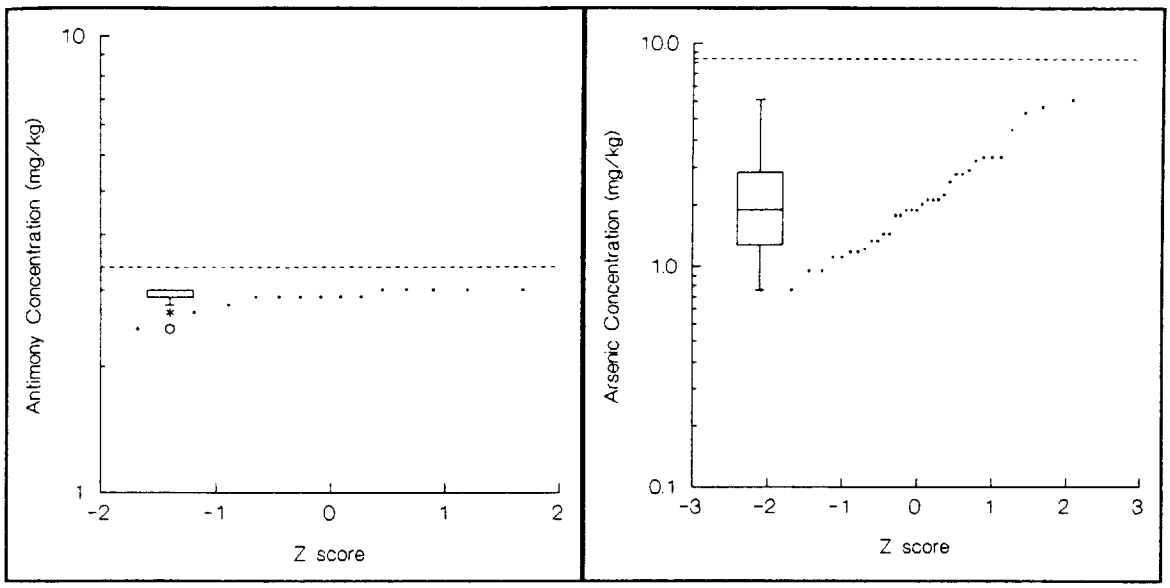
The fourth column shows the RSD for the background data. This RSD is a combination of the laboratory variability and the spatial variability. The fifth column shows the fraction of the total variability due to the laboratory. This ranges from about 8 percent for chromium to 60 percent for barium. Two parameters (lead and selenium) had more variability in the duplicates than was observed in the background data, indicating a possible quality control (QC) problem with these parameters.

The sixth column shows the estimated mean background concentration for each parameter. This mean is estimated using the assumption that the background concentrations of each parameter are lognormally distributed.

The seventh column of the table shows the upper tolerance limits for 99 percent confidence that 90 percent of the background concentrations are less than this limit. This column represents the threshold levels for the metals. The tolerance limit is calculated as the mean of the natural logarithm of the concentrations plus 2.88 times greater than the standard deviation of the natural logarithm of the concentrations. The value 2.88 is the "K" factor for 99 percent confidence of the 90th percentile assuming 30 samples.

Figures 1 through 16 show the distribution of background data values for each metal in the form of a box plot and a normal probability plot. The 99 percent confidence limit that the threshold levels exceed 90 percent of the values are also plotted in these figures (represented with dashed lines).

The last column shows the ratio of the potential mean bin concentration to the background mean for 90 percent power and 99 percent confidence. For example, this ratio is 8.2 for barium. Since the mean background concentration is 90 mg/kg, the probability of misclassifying a bin as clean when it has a barium concentration of 738 mg/kg (i.e., 8.2 x 90 mg/kg) is less than 10 percent when the 99 percent confidence tolerance limit is used.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Antimony Concentration (mg/kg)
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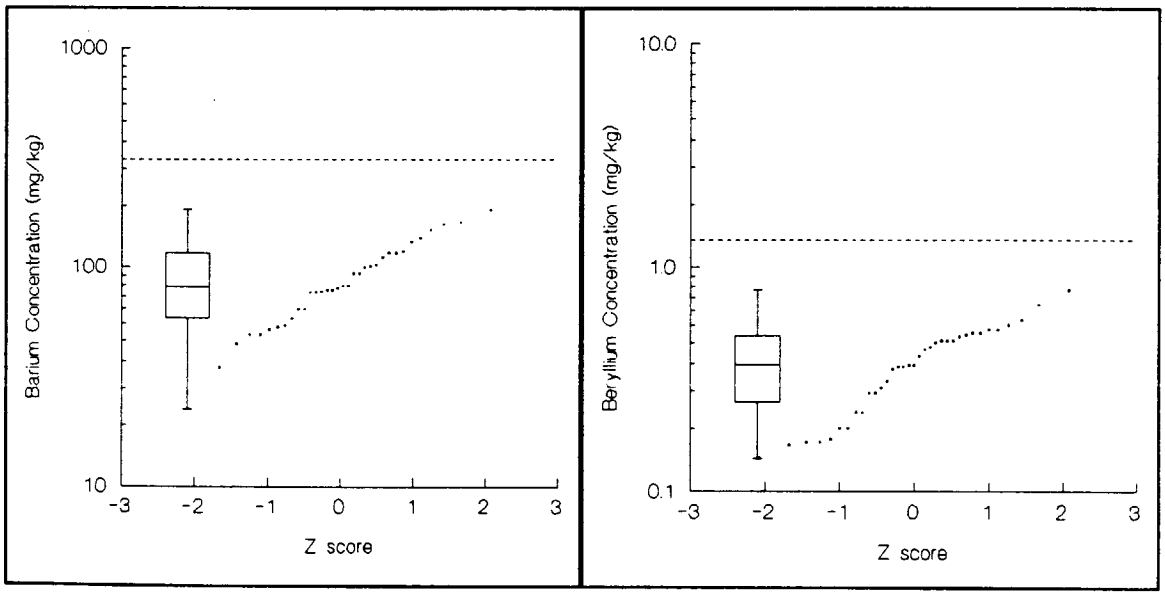
-2
-1
0
1
2
3
Z score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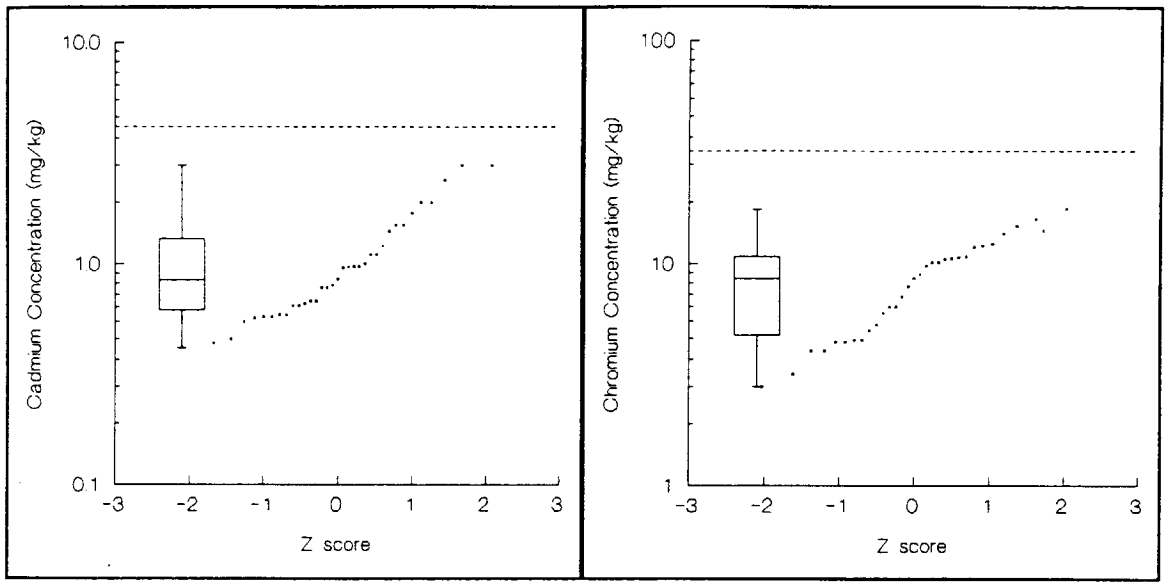
3
Z score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Chromium Concentration (mg/kg)
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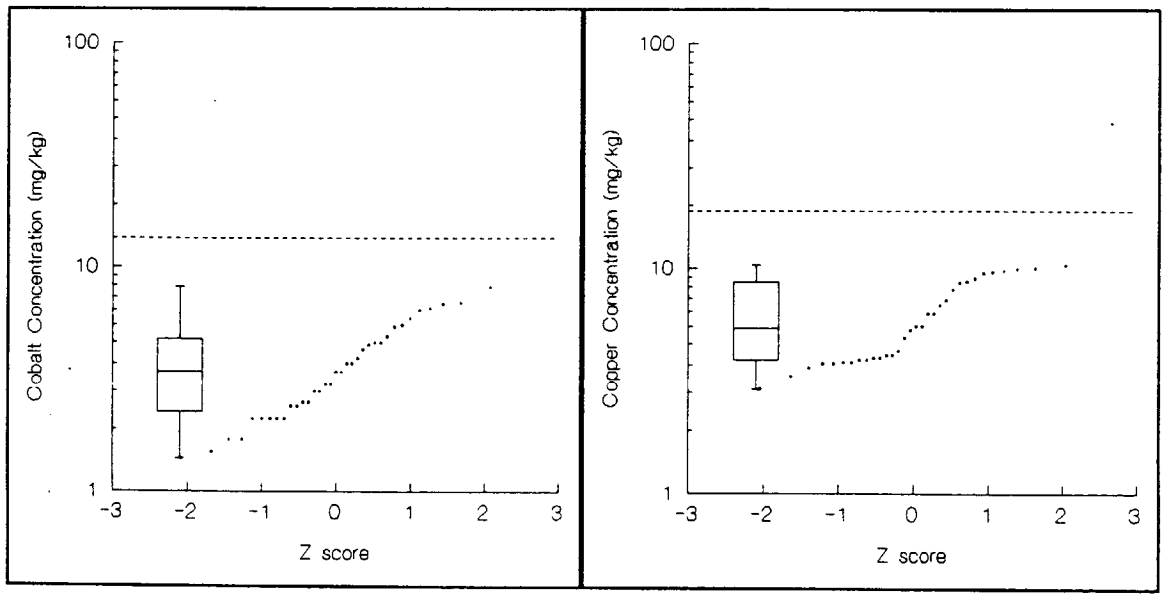
Z score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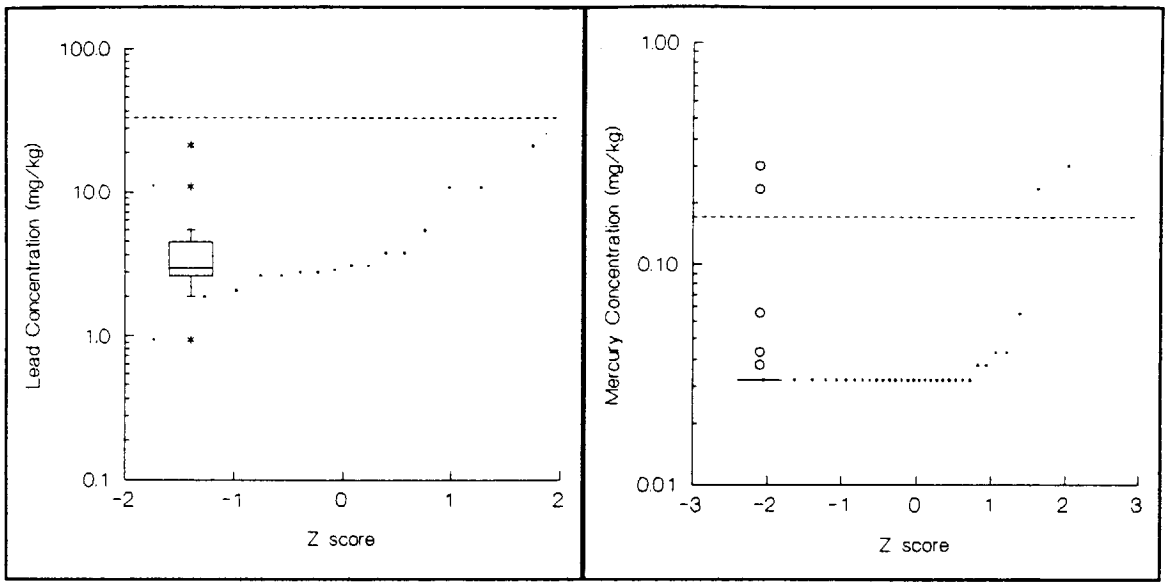
Z score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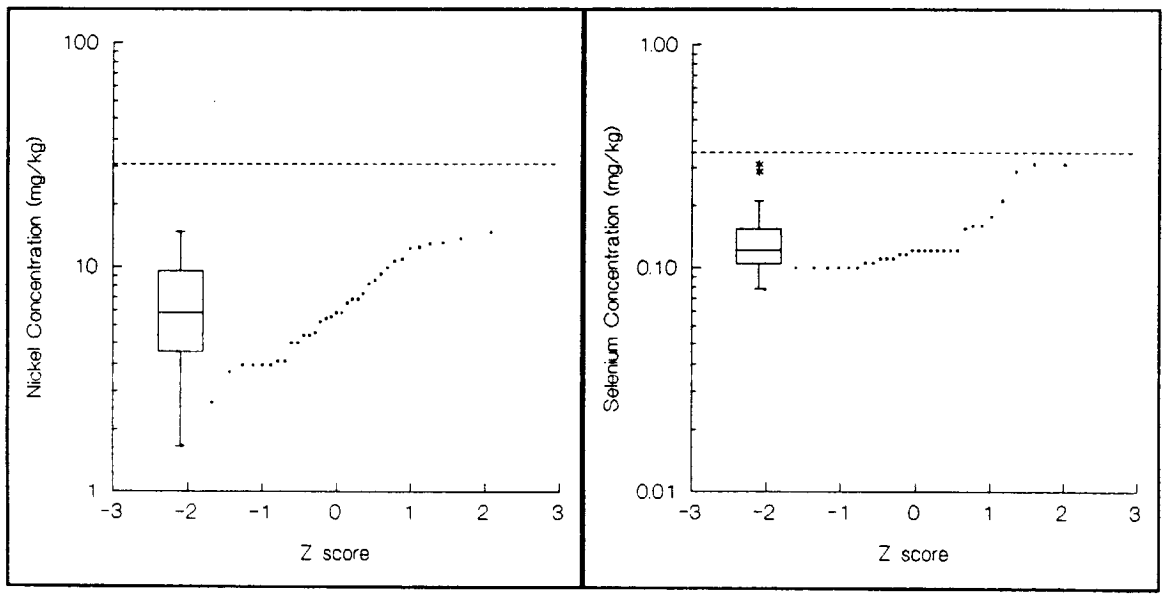
1
2
3
Z score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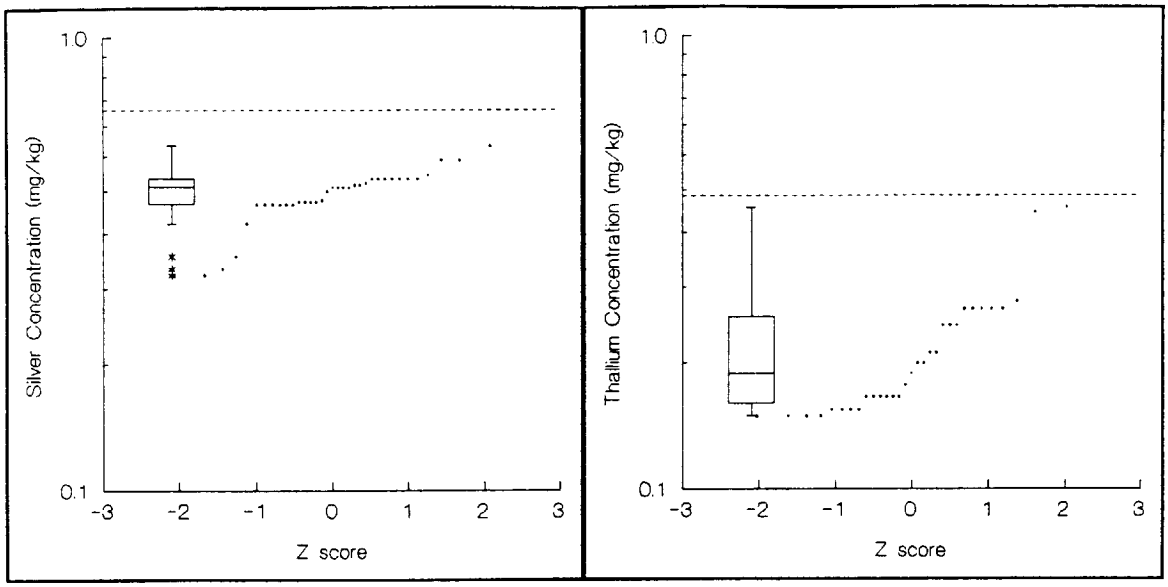
1
2
3
Z score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0.1
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0.1
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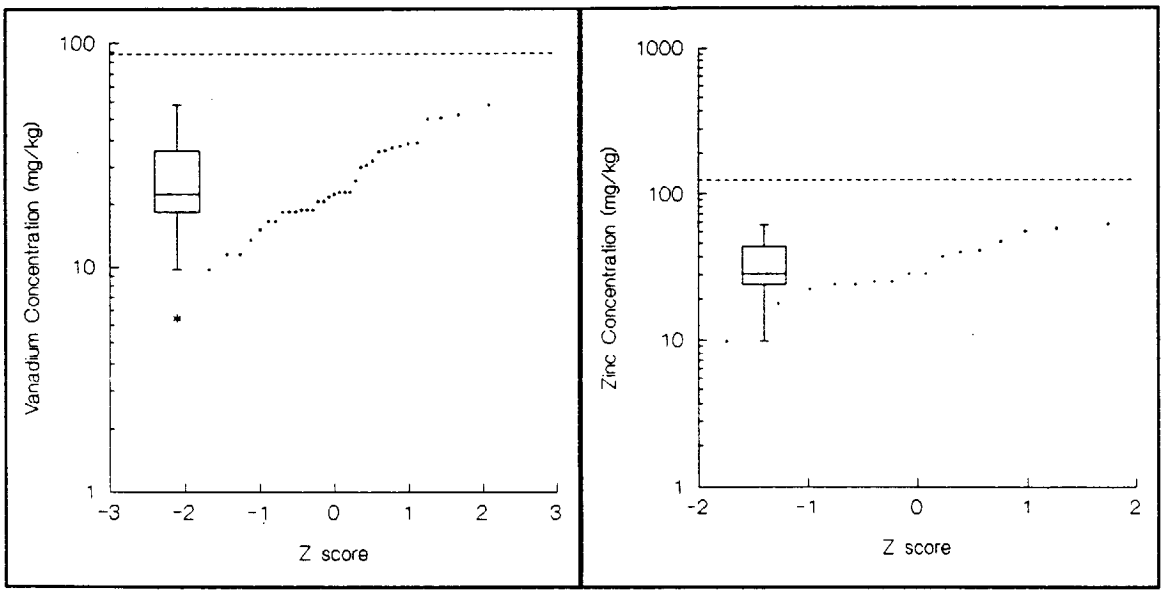
Z score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Vanadium Concentration (mg/kg)
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Z score
1000
100
10
1
Zinc Concentration (mg/kg)
-2 -1 0 1 2
Z score

JACOBS ENGINEERING GROUP INC.

MEMORANDUM

TO: Andy Piszkin - Code 1812.AP
Desire Chandler - Code 1812.DC

DATE: 15 February 1993

FROM: John Dolegowski - CH2M HILL
Liz Miesner - CH2M HILL

SUBJECT: **Marine Corps Air Station (MCAS) El Toro Remedial Investigation/ Feasibility Study (RI/FS) Phase I Draft Position Paper on the MCAS El Toro Preliminary Risk Assessment for Operable Units (OUs)-1, 2 and 3 and the Proposed El Toro Baseline Human Health Risk Assessment for OU-1**

The following memorandum and attachments are the Draft Position Paper on Risk Assessment for the MCAS El Toro Site. If you have any questions or comments regarding the memorandum or attachments, please contact Liz Miesner/CH2M HILL/SFO at 510/251-2888, extension 2109.

DRAFT POSITION ON RISK ASSESSMENT

The MCAS El Toro (Station) is currently in the process of completing a Phase I RI/FS of regional volatile organic compound (VOC) groundwater contamination and 21 additional on-Station sites. These sites have been grouped into three OUs for the RI/FS:

- OU-1 (Site 18 - regional VOC groundwater contamination)
- OU-2 (On-Station Sites 2, 3, 5, 10, and 17 considered potential source areas for the regional groundwater VOC contamination)
- OU-3 (Sixteen additional on-Station sites which may be potential source areas for other contamination).

During fieldwork conducted for the Phase I RI, on-Station and off-Station groundwater (1 round); surface water runoff (3 rounds); sediment; and soil (surface and subsurface) samples were collected from OUs-1, 2, and 3.

In addition to OUs-1, 2, and 3, sites from the MCAS El Toro Resource Conservation and Recovery Act (RCRA) Facilities Assessment that require further investigation will be addressed in OU-4. Sites to be addressed in OU-4 have not yet been identified.

As part of the Phase I evaluation, the Comprehensive Long-Term Environmental Action Navy (CLEAN) Project Team is conducting a preliminary risk assessment for OUs-1, 2, and 3. The risk assessment includes both a human health evaluation and an ecological evaluation. The objective of the preliminary risk assessment is to evaluate potential human health and ecological risks due to exposure to contaminated media assuming no

action has been taken to control or mitigate sources of contamination. The results of the preliminary risk assessment will be used to refine the site list of chemicals of potential concern, identify populations and exposure pathways of potential concern, and to help determine the need for further data collection during the Phase II RI field activities.

Attachment I summarizes the work to be included in the preliminary risk assessment. The results of preliminary risk assessment will be included in the Phase I RI Technical Memorandum due to the regulatory agencies 07 May 1993.

OUs-2 and 3 will be completed in the Phase II RI; however, MCAS El Toro will "fast-track" the schedule for completion of a Record of Decision (ROD) for OU-1. This assumes that additional RI (Phase II) field work will not be necessary for OU-1, although an additional round of groundwater sampling will be completed in April/May 1993 and will be included in the full baseline risk assessment conducted for OU-1. Attachment II provides a draft approach for the full baseline risk assessment to be included in the RI report for OU-1.

CLE-C01-01F145-G2-0130

ATTACHMENT I
PRELIMINARY RISK ASSESSMENT FOR OPERABLE UNITS (OUs)-1, 2, AND 3
PHASE I

The preliminary risk assessment will be conducted in accordance with the following guidance:

- *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A.* Interim Final. U.S. Environmental Protection Agency (EPA) (1989)
- *Human Health Evaluation Manual, Part B: "Development of Risk-based Preliminary Remediation Goals,"* EPA (1991)
- *Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors,"* EPA (1991)
- EPA Region IX Risk Assessment Guidance (1989)

Data to be evaluated for the preliminary risk assessment for OUs-1, 2, and 3 will include environmental sampling data collected during the following investigations:

- Phase I fieldwork, including groundwater (1 round); surface water runoff (3 rounds); sediment; surface soil; subsurface soil; and landfill gas sampling data.
- Orange County Water District (OCWD) groundwater samples taken from the study area (1985 through 1992)
- James M. Montgomery Engineers, Inc. (JMM) groundwater samples taken from the study area (1988 through 1989)
- Landfill air solid waste assessment tests (SWATs) conducted on-Station during previous site investigations (Strata, 1990)

Selection of Chemicals of Potential Concern

All chemicals detected during the on-Station and off-Station investigations described in the previous section will be evaluated for inclusion in the preliminary risk assessment as chemicals of potential concern (COPC). COPC will be identified by site and medium.

Concentrations of inorganic chemicals detected in soils on-Station will be statistically compared with concentrations detected in background/offsite soil samples (not including major ions such as potassium, calcium, and sodium). Statistical comparisons will be made for each site for each inorganic detected. Inorganic chemicals determined to be at natural background concentrations will not be included in the preliminary risk assessment as COPC for that site (i.e., the remainder of the risk assessment will address only those inorganic chemical concentrations which may be site related.)

Since the Station was built on land and was formerly used for agricultural purposes, concentrations of pesticides detected in site soils on-Station will be statistically

compared with concentrations detected in off-Station agricultural, commercial, and residential soil samples randomly selected to represent regional pesticide contamination. On-Station sites with similar histories of pesticide application may be aggregated for statistical comparisons. Pesticides determined to be at regional pesticide concentrations will not be included in the preliminary risk assessment as COPC for the Station.

Due to the limited number of soil, sediment, surface water runoff, and landfill gas samples taken at each site, frequency of detection will not be used as selection criteria to eliminate chemicals from these media during the Phase I risk assessment. Frequency of detection, along with other chemical selection criteria (e.g., concentration, toxicity, mobility), may be used to evaluate chemicals detected in groundwater.

Exposure Assessment

Conceptual models will be developed for OU-1 and each site within OUs-2 and 3 to describe the potential sources of contamination (i.e., groundwater, surface water runoff, sediment, soil, and landfill gas), potential pathways of exposure, and potentially exposed current and future populations.

Current and future human populations potentially exposed to groundwater include residents and agricultural workers. Residents may also be exposed to off-Station surface water runoff and sediments.

Potential on-Station human populations will be identified based on current site activities (on and surrounding each site) and future site use plans. Information will be presented to support the assumption that future land use at the 21 on-Station sites will remain industrial. Current on-Station human populations will include workers and, at limited sites, potential passersby/trespassers (identified based on site-specific activity data). Future on-Station human populations will include workers.

Based on the potentially exposed human populations identified above, typical and reasonable maximum exposure parameters will be identified for each potential exposure pathway and route.

Potentially exposed ecological receptors have been identified based on database searches and a reconnaissance level survey of the OU-2 and 3 sites. Small mammal trapping has been conducted at selected sites to verify some of the species identified during this search.

Chemical Concentration Summaries

Chemical concentrations will be summarized by medium and site for all COPC. Summaries to be included in the report include the frequency of detection, minimum detected, and maximum detected concentrations.

Data collected during the Phase I fieldwork are currently being validated and entered into a computer database. Data validation is expected to be completed for over 95 percent of the Remedial Investigation (RI) samples before the Technical Memorandum is submitted 07 May 1993. The remaining RI samples will be validated before the Phase II

Work Plan is submitted in August 1993. If the results of the data validation process show that data flags or detection limits need to be entered into the database, these will be made prior to completion of the Phase II Work Plan.

Groundwater data collected by the OCWD and JMM and landfill gas data collected during previous site investigations will not be independently validated by CH2M HILL.

Toxicity Assessment

Toxicity values for the human health evaluation (i.e., cancer slope factors and reference doses) will be collected and summarized for all COPC identified at the Station. Sources of toxicity data to be reviewed include:

- U.S. EPA Integrated Risk Information System (IRIS)
- U.S. EPA Health Effects Assessment Summary Tables (HEAST)

A literature and database review will be conducted for relevant toxicity ("dose response") information for contaminants of ecological concern identified in the study area. This review will include results of field studies and toxicity testing studies giving toxicity endpoint or bioaccumulation data.

Human Health Evaluation - Development of Risk-based Remediation Goals

Due to the limited number of samples taken at each site, a full baseline risk assessment will not be conducted as part of the Phase I evaluation. Instead, chemical-specific risk-based goals will be developed based on guidance provided in the Human Health Evaluation Manual, Part B: "Development of Risk-based Preliminary Remediation Goals" (EPA, 1991). These Preliminary Risk-based Goals (PRGs) will be used along with other criteria to determine the need for further data collection during the Phase II RI.

PRGs will be developed for the potentially exposed current and future populations and pathways identified in the exposure assessment section. For carcinogenic effects, a concentration will be calculated that corresponds to an excess lifetime cancer risk of 10^{-4}, 10^{-5}, and 10^{-6}. For noncarcinogenic effects, a concentration will be calculated that corresponds to a hazard quotient of one.

Ecological Evaluation - Risk Characterization

The results of the ecological exposure assessment will be compared to the results of the ecological toxicity effects assessment to determine whether current or potential future receptors will be exposed to contaminant concentrations expected to cause adverse effects. If adverse ecological effects are observed or predicted, the type, extent, and severity will be described along with the uncertainties in the risk characterization.

REPORT

The preliminary risk assessment for OUs-1, 2, and 3 will be included in the Phase I RI Technical Memorandum to be delivered to the regulatory agencies 07 May 1993.

References

Strata Technologies, Inc. *Draft Solid Waste Air Quality Assessment Test Reports* for MCAS El Toro. October 1990.

ATTACHMENT II
BASELINE RISK ASSESSMENT FOR OU-1

Marine Corps Air Station (MCAS) El Toro is currently working with the regulatory agencies to better define Operable Unit (OU)-1. The proposed definition of OU-1 is the regional, contiguous groundwater plume potentially due to El Toro contamination. If localized sources of groundwater contamination ("hot spots") are found then they will be addressed in OU-2.

Based on this definition, MCAS El Toro would like to proceed with the FS for OU-1, including a baseline human health risk assessment. Since groundwater does not discharge to the surface in the vicinity of the site and is at depths not expected to affect plant root zones, an ecological risk assessment will not be conducted for the OU-1 baseline risk assessment.

Data to be evaluated for the full baseline human health risk assessment for OU-1 (as defined above) include the round of groundwater samples taken as part of the Phase I fieldwork, a second round of groundwater samples from these same wells to be collected in April/May 1993, the Orange County Water District (OCWD) groundwater samples taken from the study area (1985 through 1992) and the James M. Montgomery Engineers, Inc. (JMM) groundwater samples taken from the study area (1988 through 1989).

The preliminary risk assessment will be conducted in accordance with the following guidance:

- *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A. Interim Final.* U.S. Environmental Protection Agency (EPA) (1989)
- *Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors,"* EPA (1991)
- EPA Region IX risk assessment guidance (1989)

Selection of Chemicals of Potential Concern

Chemicals detected during the investigations described in the previous section will be evaluated for inclusion as chemicals of potential concern (COPC) in the full baseline risk assessment. Frequency of detection, along with other chemical selection criteria (e.g., concentration, toxicity, and mobility), may be used to evaluate chemicals detected in groundwater.

Exposure Assessment

The conceptual model and exposure parameters identified for the groundwater pathway in the preliminary human health evaluation included as part of the Phase I Technical Memorandum (see Attachment I) will be updated if needed and used in this assessment. Current and future populations potentially exposed to groundwater are expected to include residents and agricultural workers.

Exposure Point Concentrations

Exposure point concentrations will be summarized for all COPC. Summary statistics to be included in the report are the frequency of detection, mean concentration, standard deviation, and 95 percent upper confidence limit on the mean concentration.

Data validation of sample analyses is expected to be completed on both the Phase I groundwater sampling data and the second round of sampling conducted in April/May 1993. Groundwater data collected by the OCWD and JMM will not be independently validated by CH2M HILL.

Toxicity Assessment

Toxicity values (cancer slope factors and reference doses) collected and summarized during the Phase I preliminary risk assessment (See Attachment I) will be updated and used for the baseline risk assessment. Toxicity profiles will be included for major chemical contributors to OU-1 estimated health risks.

Risk Characterization

Rather than generating a single point estimate of risk sitewide, the site risks will be characterized by evaluating sample-specific risks. This approach retains information on the spatial distribution of risk throughout the site. Sample specific risk or hazard index calculations use the same equations to estimate typical and reasonable maximum exposure risks as defined in the *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual* (EPA, 1989).

Exposure parameter values and toxicity values are the same as those used in a conventional, sitewide calculation. The only mechanical difference in calculating sample-specific versus sitewide risks lies in the concentration values used. Where the conventional, sitewide approach uses the 95 percent upper confidence limit concentration for all contaminants of concern, sample-specific risk calculations use concentrations reported from each individual site sample. However, the sample-specific risks are still considered to be reasonable maximum, due to the use of assumed upper bound medium intake rates, exposure frequencies, exposure durations, and averaging time in the calculation of intake. The advantages of the sample-specific risk characterization approach over the conventional approach are summarized in the following bullets:

- **Retains spatial information**. Sample-specific risk calculations retain the spatial information inherent to the site characterization data. Information on the spatial discreetness of risk (and contamination) is provided. Sample-specific risks can be used to discriminate areas of the site exceeding target risk levels (thereby requiring action) from areas to which exposure results in calculated risk levels which are acceptable.

- **Avoids spatial assumptions**. Calculation of sample-specific risk estimates avoids the assumption inherent to the sitewide risk calculations, that contaminant levels coincide spatially across the site. That assumption implies concomitant exposure to all contaminants at comparable conservative (high) levels and results

in unpredictably conservative estimates of sitewide risk. To the extent that maximum contaminant concentrations are in different locations for different chemicals (as is often the case), simultaneous exposure to these "hot spots" becomes less likely.

- **Estimates central tendency in risk**. If necessary, point-interval estimates of risk or hazard levels (such as the mean, the median, the upper 95th quantile) can be estimated from the sample-specific risks rather than derived from aggregated estimates of contaminant concentrations.

- **Allows easy visualization of site risks**. The sitewide profile of risk, generated on a sample-specific basis, can be graphically displayed using contours (or equivalent). These can be overlaid with chemical-specific risk contours to visualize the major risk contributors.

- **Increased usefulness to feasibility analyses**. Sample-specific risk is a logical tool which can be used in streamlining the RI/FS process. It directly translates cumulative contaminant concentrations within specific samples to point estimates of risk of exposure in specific areas of a site, focusing remediation efforts. The spatial delineation of contaminants which dominate risk levels allows feasibility teams to generate volume estimates and concentration distributions of the contaminants requiring remediation.

- **Location-specific risk reduction analyses**. By evaluating different treatment technologies and their relative efficiencies, risk reductions can be estimated on a location- and contaminant-specific basis.

- **Cost savings**. By identifying discrete areas of unacceptable risk during the baseline risk assessment, there are potential savings in the feasibility analyses and cleanup costs.

Report

The baseline human health risk assessment for OU-1 will be included in the OU-1 RI report.